



## Nitrate vulnerable zone designation 2012 (Groundwater)

Mae fersiwn Cymraeg o'r ddogfen hon ar gael

A Welsh version of this document is also available

Version 1.1, revised 27 June 2012

# Evidence of Groundwater Water Nitrate Pollution 2012

## **INTRODUCTION**

This document is intended to provide a summary of the evidence used in assessing the need for nitrate vulnerable zone (NVZ) designation under the Nitrates Directive reference(91/676/EEC of 12th Decmeber 1991). A full description of the methods used is given in the detailed methodologies for Surface Water, Groundwater and Eutrophic Water reports which are available from the Defra and Welsh Government websites. These methods were developed under the guidance of a Review Group convened by the Defra and the Welsh Government which included representatives from the farming and water industries as well as independent academic experts.

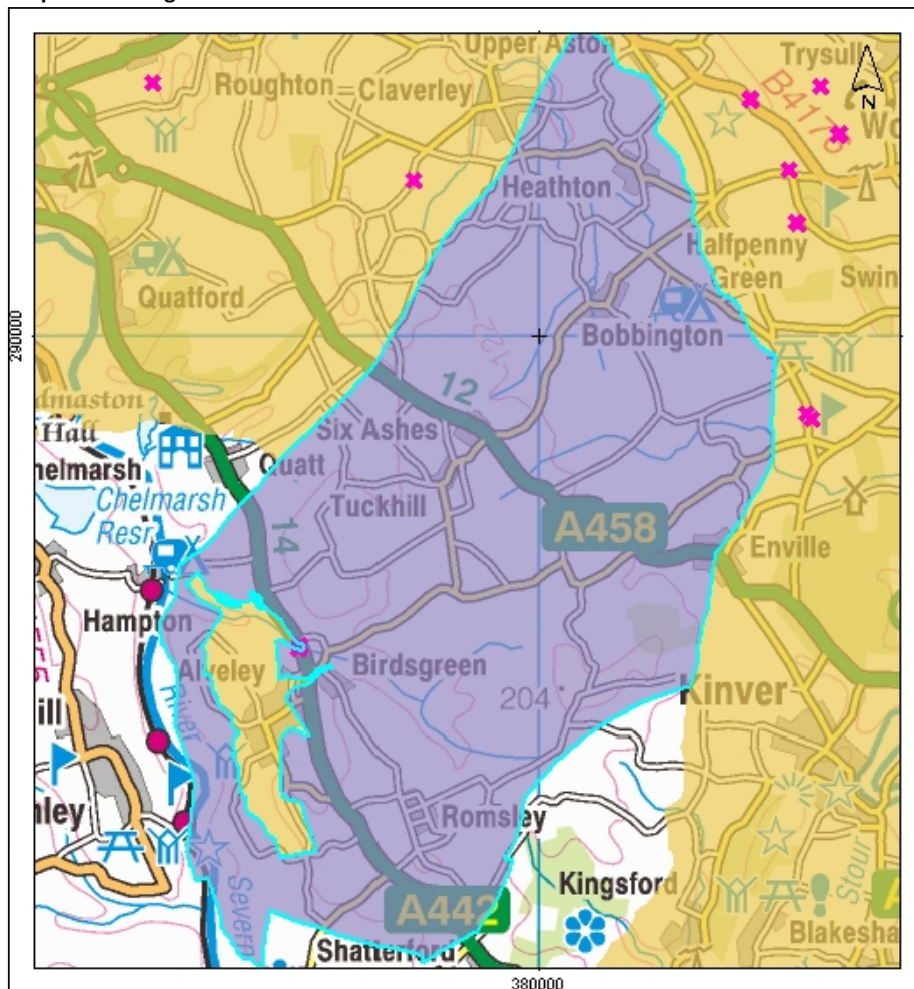
NVZ areas are designated based on a combination of both monitored water quality data and modelled nitrogen loadings that are based on the agricultural census and other data.

The concentration data is presented as milligrams of Nitrogen per litre. Please note 50 mg per litre of Nitrate is equivalent to 11.3 mg per litre as Nitrogen (N). Monitoring sites which exceed the concentration of 11.3 mg N/l set by the Nitrates Directive may lead to designation of all land draining to this point.

Note that for land already designated as a groundwater NVZ prior to this assessment, the land will remain designated even if the 95%ile concentration is now below 11.3 mg N/l. At least two cycles of low Nitrate concentrations are needed to show a sustained decrease that would then be considered for removal from NVZ designation.

For each NVZ area, monitoring data in combination with information on land-use indicate that concentrations of nitrates in one or more groundwaters are likely to exceed the level set out in the EU Nitrates Directive. Agricultural sources are likely to make a significant contribution to the observed or expected concentration of nitrate. Hence the land area draining to these groundwaters has been identified for designation as a Nitrate Vulnerable Zone.

Map of the designated area.



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**Legend**

-  Groundwater NVZ newly designated in 2012
-  Groundwater NVZ designated before 2012 and continuing as designated in 2012
-  Groundwater Monitoring sites

## Description of the boundary

Surface Water Zone designations are applied at a waterbody scale, for groundwater zones, other factors such as geology need to be taken into account. Physical boundaries influencing groundwater NVZs delineation have been defined based on expert discussion at local level. The following represents a selection of the types of boundaries that have been used to delineate the NVZs and determine the land draining to a polluted groundwater.

- Geological boundaries such as faults and geological contacts.
- Surface water catchment boundaries.
- Groundwater level contours.
- High permeability drift outcrops.
- Low permeability drift outcrops.
- Rivers, acting as groundwater catchment divides.
- Coastlines.
- Solution features.

For NVZ area 169 the boundary is based on;

*Bobbington (NVZ 169) NVZ protecting the Salop Formation (includes Clent Formation in the North and fractured area South of Alveley).*

ID of monitoring site(s):

*23526510, 23526900, 23527850, 23527900, 23546360, 24492580, 25099420*

Previously designated area, new area or new area adjacent to previously designated area: *Extension*

Total new area designated (Km2): *62.08*

## Monitored Nitrate data for sites in zone ID: 169

For the 2012 designations monitoring data was analysed where available for the years 1980 - 2009. Where sufficient data was available results were projected to give a predicted concentration in 2027. For the earlier 2008 designation, monitoring data was analysed to 2006 and trend predicted to 2021. The results of the analysis were then compared to the standard of a 95%ile value of 11.3 mg N /l. See section 3 of the Groundwater Methodology report for more details.

The following tables summarise the nitrate concentrations for monitoring sites that either exceed the threshold or show increasing trend for nitrate. Data for these and other nearby sites are presented in Appendix A

**This area was designated in 2012.**

**Results for 2012 monitoring data.**

Monitoring Site ID	23526510
Easting	383690
Northing	291600
Total Inorganic Nitrogen concentration 95%ile (mg/l)	33
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	26.89
Trend (upward, downward, stagnation):	Downward

Monitoring Site ID	23526900
Easting	384300
Northing	292900
Total Inorganic Nitrogen concentration 95%ile (mg/l)	14.44
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	15.22
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	23527850
Easting	384020
Northing	293570
Total Inorganic Nitrogen concentration 95%ile (mg/l)	19.78
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	23.11
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	23527900
Easting	383020
Northing	293360
Total Inorganic Nitrogen concentration 95%ile (mg/l)	18.51
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	18.51
Trend (upward, downward, stagnation):	Stagnation

Monitoring Site ID	23546360
Easting	383900
Northing	288800
Total Inorganic Nitrogen concentration 95%ile (mg/l)	19.89
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	16.78
Trend (upward, downward, stagnation):	Downward

<i>Monitoring Site ID</i>	24492580
<i>Easting</i>	376600
<i>Northing</i>	285500
<i>Total Inorganic Nitrogen concentration 95%ile (mg/l)</i>	14.89
<i>Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)</i>	12.22
<i>Trend (upward, downward, stagnation):</i>	Downward

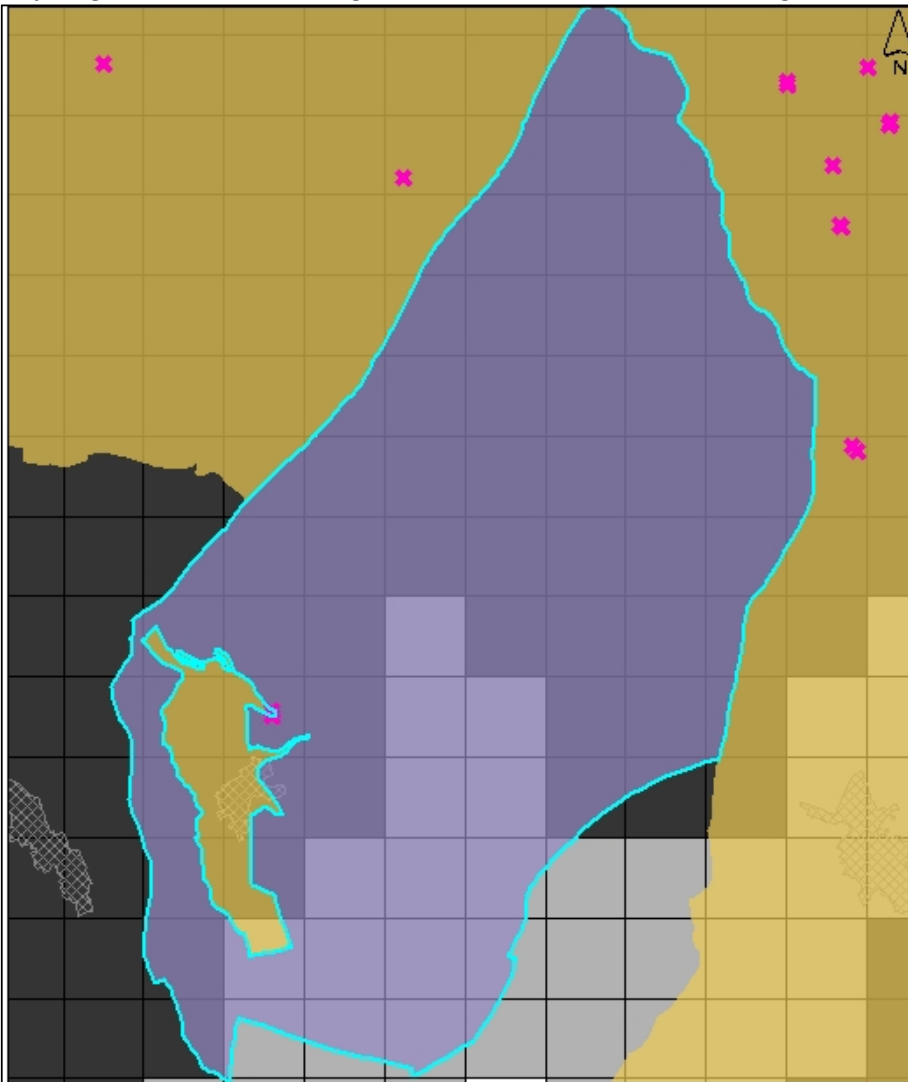
<i>Monitoring Site ID</i>	25099420
<i>Easting</i>	378240
<i>Northing</i>	292210
<i>Total Inorganic Nitrogen concentration 95%ile (mg/l)</i>	25.16
<i>Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)</i>	25.16
<i>Trend (upward, downward, stagnation):</i>	Stagnation

## Land Use Model results

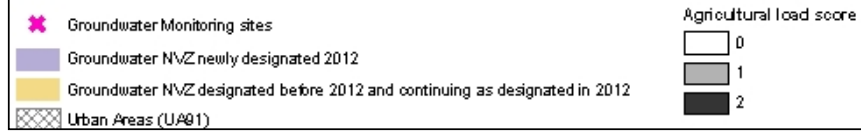
Urban and agricultural load were included in the assessment to identify if agriculture provides a main contribution of nitrate to the groundwater.

The following maps and associated figures indicate the annual average concentration of nitrate from agriculture contained in soil water. The figures are derived from farm scale research undertaken for Defra and are extrapolated based on farming land-use data for the land area covered by this report obtained in 2010 and long-term average rainfall based, using a model called NEAP-N developed by ADAS. The maps indicate those areas within the catchment with higher or lower levels of potential agricultural nitrate leaching to the groundwater.

Map of agricultural load in the designated area. Load score is shown on 1km<sup>2</sup> grid.

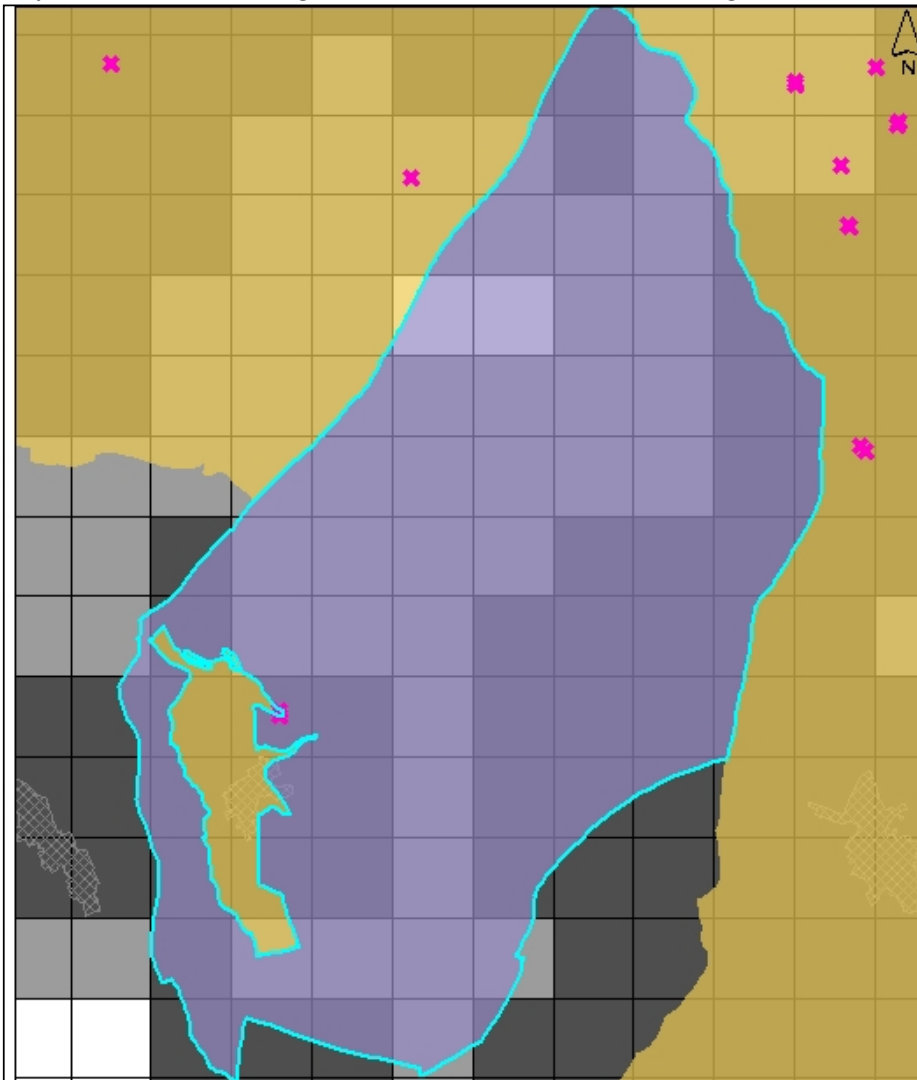


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Map of urban load in the designated area. Load score is shown on 1km2 grid.



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## **Additional Lines of evidence**

Advice was sought from local Environment Agency staff to identify any additional data that could be used in the risk model to improve the robustness of the decision making process. Examples include the location of point sources (e.g. industrial or septic discharges), monitoring data from different groundwater bodies and monitoring data from related surface waters. See section 6 of the Groundwater Methodology report for more details.

For this area, no lines of evidence have been modified from local Environment Agency staff.

## Appendix A: Environment Agency monitoring data

This appendix presents historical concentration data at every monitoring site. For the 2012 designation, samples collected before 1980 were excluded because they may not be indicative of present day groundwater quality.

Monitoring point ID	Easting	Northing	Date	Nitrate (mg N / l)
23526510	383690	291600	14/07/1999	23.7
23526510	383690	291600	03/11/1999	24.1
23526510	383690	291600	04/05/2000	25.1
23526510	383690	291600	27/07/2000	23.6
23526510	383690	291600	16/08/2000	10.1
23526510	383690	291600	17/08/2000	22.8
23526510	383690	291600	12/12/2000	23.6
23526510	383690	291600	29/05/2002	22.1
23526510	383690	291600	26/06/2002	23.3
23526510	383690	291600	15/07/2002	21.9
23526510	383690	291600	02/12/2002	25.3
23526510	383690	291600	06/06/2003	23.4
23526510	383690	291600	26/06/2003	22.6
23526510	383690	291600	08/08/2003	22.9
23526510	383690	291600	10/12/2003	23.6
23526510	383690	291600	17/06/2004	20.7
23526510	383690	291600	18/08/2004	20.5
23526510	383690	291600	27/06/2005	21.7
23526510	383690	291600	01/09/2005	22.5
23526510	383690	291600	29/06/2006	34.8
23526510	383690	291600	07/09/2006	22.5
23526510	383690	291600	22/10/2007	11.3
23526510	383690	291600	02/05/2008	22.4
23526510	383690	291600	31/07/2008	23.2
23526510	383690	291600	21/07/2009	21.7
23526510	383690	291600	22/09/2009	21.2
23526900	384300	292900	27/07/2000	11.3
23526900	384300	292900	16/08/2000	11.1
23526900	384300	292900	29/05/2002	10.4
23526900	384300	292900	26/06/2002	11.3
23526900	384300	292900	15/07/2002	11.2
23526900	384300	292900	06/06/2003	11.4
23526900	384300	292900	11/07/2003	11.6
23526900	384300	292900	08/08/2003	12.9
23526900	384300	292900	17/06/2004	13.6
23526900	384300	292900	18/08/2004	10.4
23526900	384300	292900	23/06/2005	13.8
23526900	384300	292900	29/06/2006	12
23526900	384300	292900	07/09/2006	11.6
23526900	384300	292900	22/10/2007	11.2
23526900	384300	292900	14/05/2008	11
23526900	384300	292900	31/07/2008	11.4
23526900	384300	292900	21/07/2009	12
23526900	384300	292900	22/09/2009	11.8
23527850	384020	293570	03/11/1999	14.3
23527850	384020	293570	27/07/2000	14.2
23527850	384020	293570	16/08/2000	13.6
23527850	384020	293570	17/08/2000	13.3
23527850	384020	293570	26/06/2002	14.1
23527850	384020	293570	15/07/2002	13.3
23527850	384020	293570	06/06/2003	15.4

23527850	384020	293570	11/07/2003	14.3
23527850	384020	293570	08/08/2003	13.9
23527850	384020	293570	17/06/2004	14.1
23527850	384020	293570	18/08/2004	14.6
23527850	384020	293570	27/06/2005	13.6
23527850	384020	293570	01/09/2005	14.8
23527850	384020	293570	29/06/2006	14.3
23527850	384020	293570	07/09/2006	13.1
23527850	384020	293570	22/10/2007	16.3
23527850	384020	293570	14/05/2008	16.8
23527850	384020	293570	17/10/2008	16
23527850	384020	293570	21/07/2009	15.4
23527850	384020	293570	22/09/2009	15.8
23527900	383020	293360	14/07/1999	15.8
23527900	383020	293360	27/07/2000	16.9
23527900	383020	293360	16/08/2000	16.8
23527900	383020	293360	17/08/2000	17.3
23527900	383020	293360	12/12/2000	17.4
23527900	383020	293360	29/05/2002	17.6
23527900	383020	293360	15/07/2002	17.9
23527900	383020	293360	02/12/2002	17.8
23527900	383020	293360	26/06/2003	16.9
23527900	383020	293360	08/08/2003	15.4
23527900	383020	293360	10/12/2003	16.3
23527900	383020	293360	18/06/2004	15.5
23527900	383020	293360	18/08/2004	15.3
23527900	383020	293360	29/06/2005	15.7
23527900	383020	293360	03/09/2005	17.2
23546360	383900	288800	22/10/1999	13.6
23546360	383900	288800	30/05/2001	16.1
23546360	383900	288800	29/05/2002	13.8
23546360	383900	288800	16/10/2002	13.1
23546360	383900	288800	09/07/2003	14.3
23546360	383900	288800	16/09/2003	11.7
23546360	383900	288800	09/06/2004	14.5
23546360	383900	288800	02/11/2004	9.6
23546360	383900	288800	29/09/2005	11.7
23546360	383900	288800	04/11/2005	12.1
23546360	383900	288800	12/06/2006	16.5
23546360	383900	288800	23/10/2006	11.5
23546360	383900	288800	23/04/2007	19.6
23546360	383900	288800	02/05/2008	12.1
23546360	383900	288800	17/10/2008	11.5
23546360	383900	288800	30/01/2009	12.4
23546360	383900	288800	29/09/2009	10.1
24492580	376600	285500	14/06/1999	13.7
24492580	376600	285500	22/10/1999	14.2
24492580	376600	285500	17/12/1999	13.6
24492580	376600	285500	13/12/2000	11.4
24492580	376600	285500	28/05/2002	13.2
24492580	376600	285500	24/10/2002	13.9
24492580	376600	285500	06/01/2003	14.3
24492580	376600	285500	16/09/2003	13.3
24492580	376600	285500	05/06/2004	11.7
24492580	376600	285500	02/11/2004	12.1
24492580	376600	285500	03/10/2005	12.4
24492580	376600	285500	01/11/2005	12.5
24492580	376600	285500	12/06/2006	13.2

24492580	376600	285500	07/02/2007	11.9
24492580	376600	285500	27/11/2007	12.2
24492580	376600	285500	06/05/2008	12.7
24492580	376600	285500	01/08/2008	12.8
24492580	376600	285500	30/01/2009	11.8
24492580	376600	285500	29/09/2009	12.5
25099420	378240	292210	19/12/2007	20.6
25099420	378240	292210	25/01/2008	22.2
25099420	378240	292210	15/05/2008	21.5
25099420	378240	292210	02/12/2008	24.4
25099420	378240	292210	23/04/2009	23
25099420	378240	292210	01/07/2009	24.6
25099420	378240	292210	29/09/2009	22.1

## **References**

<http://www.defra.gov.uk/food-farm/land-manage/nitrates-watercourses/nitrates/>

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