



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.

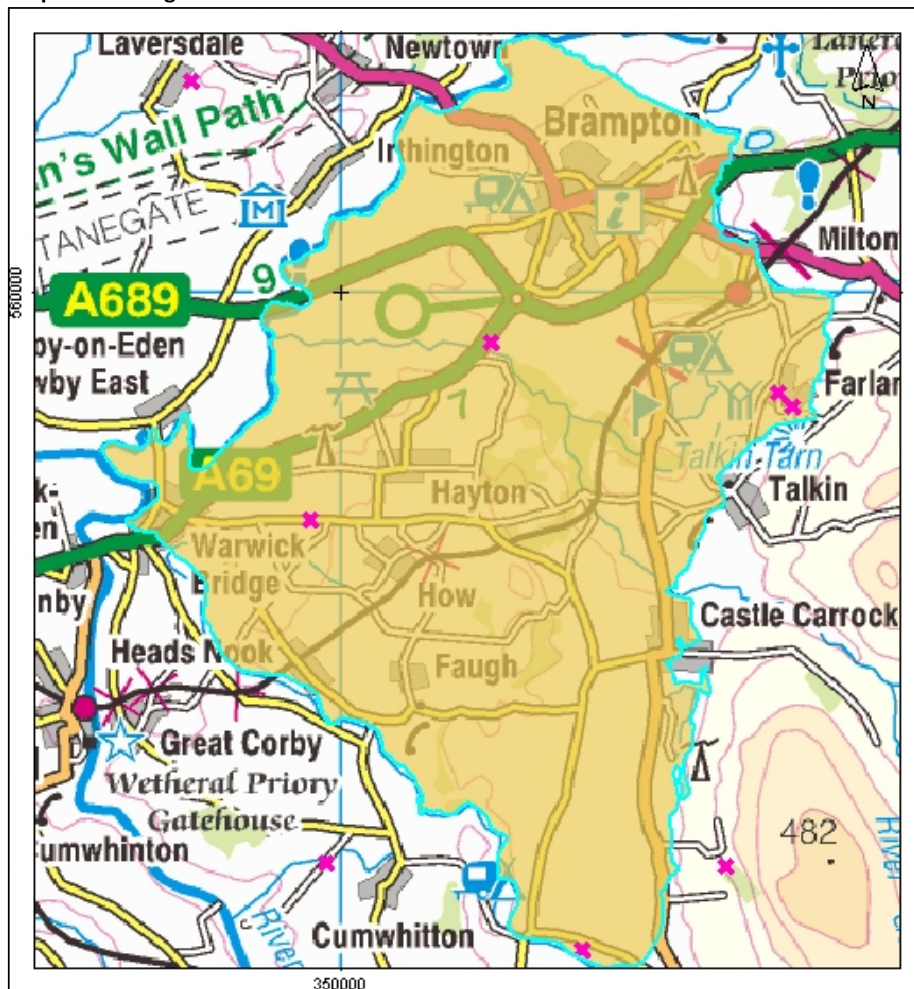
NVZ areas are designated based on a combination of both monitored water quality data and modelled nitrogen loadings that are based on the agricultural census and other data.

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 52 the boundary is based on;

Brampton Sand Sheet NVZ (ID 52) The western and northern boundaries are delineated using local rivers (Cairn Beck) as surface water and possibly groundwater divides in the Brampton sandsheet. The southern and eastern boundaries are defined by the extent of the local drift sandsheet and the thinner windows of drift within the sandsheet that leave the Sherwood Sandstone and Carboniferous limestone aquifers beneath vulnerable to nitrate pollution.

ID of monitoring site(s):

88010238, 88010240, 88020691, 88021771, 88021775

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

Total new area designated (Km2): 57.25

Monitored Nitrate data for sites in zone ID: 52

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 2008.

Results for 2008 monitoring data.

Monitoring Site ID	88010238
Easting	353090
Northing	551490
Total Inorganic Nitrogen concentration 95%ile (mg/l)	10.19
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	40.97
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88010239
Easting	354940
Northing	552580
Total Inorganic Nitrogen concentration 95%ile (mg/l)	2.73
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	10.28
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88010240
Easting	351940
Northing	559330
Total Inorganic Nitrogen concentration 95%ile (mg/l)	13.18
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	24.45
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88020691
Easting	349610
Northing	557050
Total Inorganic Nitrogen concentration 95%ile (mg/l)	7.71
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	9.02
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88021775
Easting	355610
Northing	558680
Total Inorganic Nitrogen concentration 95%ile (mg/l)	19.64
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	NA
Trend (upward, downward, stagnation):	NA

Results for 2012 monitoring data.

Monitoring Site ID	88010238
Easting	353090
Northing	551490
Total Inorganic Nitrogen concentration 95%ile (mg/l)	20.11
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	26.44
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88010239
Easting	354940
Northing	552580
Total Inorganic Nitrogen concentration 95%ile (mg/l)	3.22
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	2.56
Trend (upward, downward, stagnation):	Downward

Monitoring Site ID	88010240
Easting	351940
Northing	559330
Total Inorganic Nitrogen concentration 95%ile (mg/l)	19.11
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	28.22
Trend (upward, downward, stagnation):	Upward

Monitoring Site ID	88020691
Easting	349610
Northing	557050
Total Inorganic Nitrogen concentration 95%ile (mg/l)	8.67
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	9.33
Trend (upward, downward, stagnation):	Upward

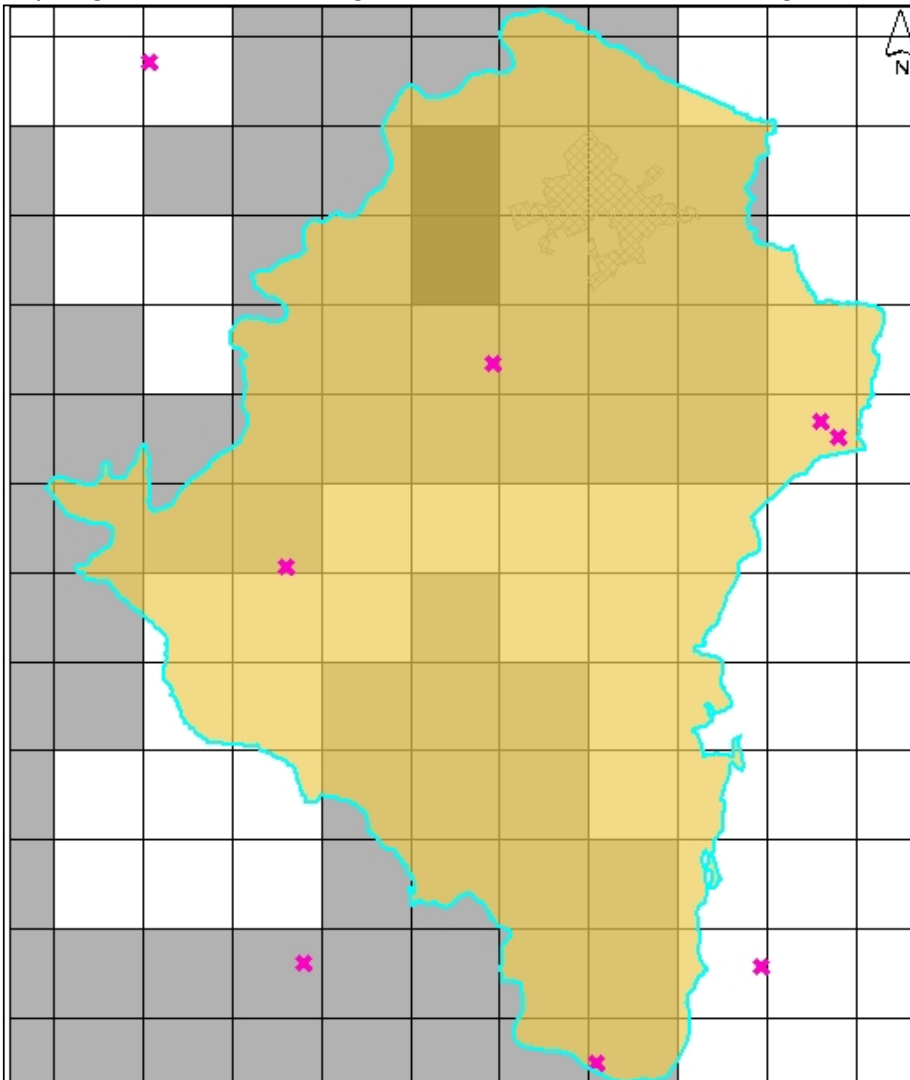
Monitoring Site ID	88021775
Easting	355610
Northing	558680
Total Inorganic Nitrogen concentration 95%ile (mg/l)	15.78
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	6.43
Trend (upward, downward, stagnation):	Downward

Land Use Model results

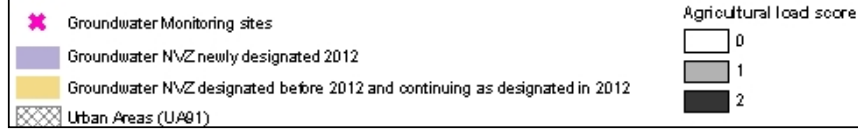
Urban and agricultural load were included in the assessment to identify if agriculture provides a main contribution of nitrate to the groundwater.

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.

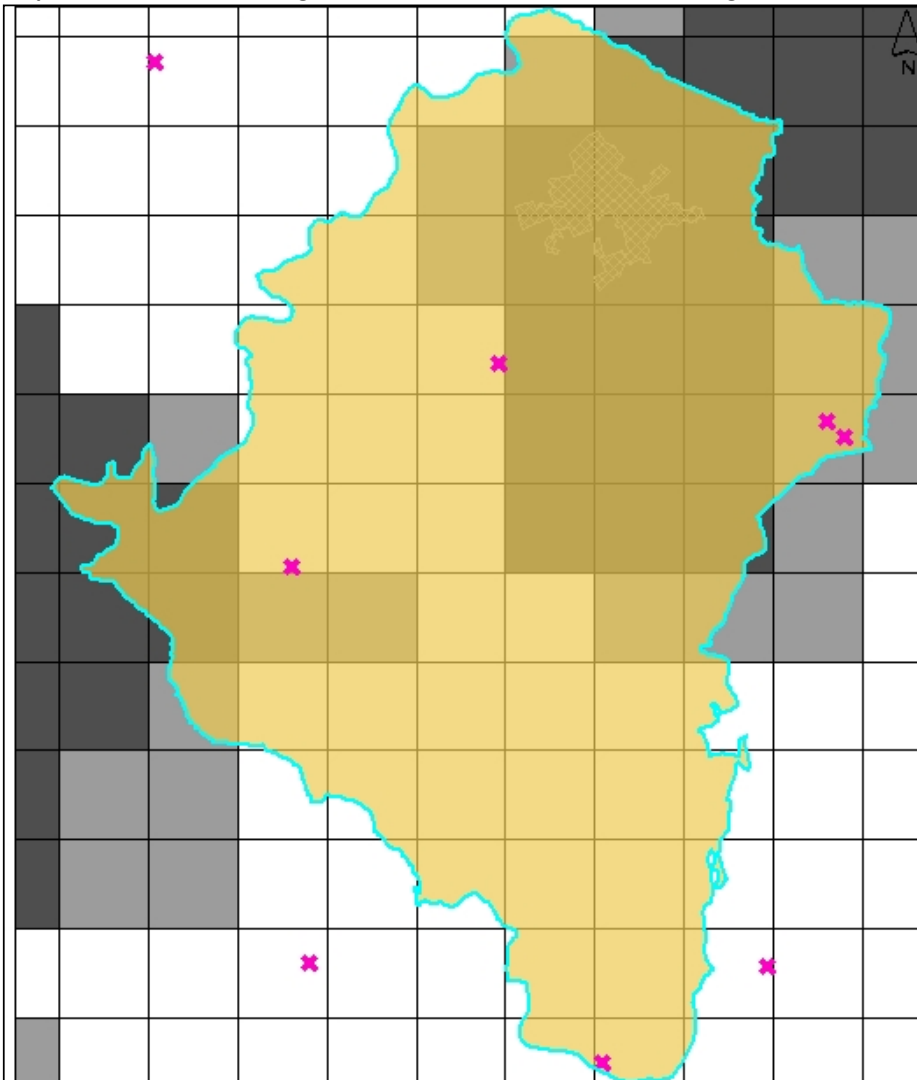
Map of agricultural load in the designated area. Load score is shown on 1km2 grid.



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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)
88010238	353090	551490	06/02/1997	11.9
88010238	353090	551490	01/09/1997	8.8
88010238	353090	551490	20/04/1998	9.2
88010238	353090	551490	02/10/1998	8.7
88010238	353090	551490	19/05/1999	7.1
88010238	353090	551490	04/11/1999	0
88010238	353090	551490	17/05/2000	8.9
88010238	353090	551490	08/11/2000	7
88010238	353090	551490	22/10/2001	7.3
88010238	353090	551490	14/12/2001	7.6
88010238	353090	551490	28/01/2002	9.4
88010238	353090	551490	04/09/2002	9
88010238	353090	551490	04/09/2002	8.8
88010238	353090	551490	04/12/2002	8.7
88010238	353090	551490	04/12/2002	8.4
88010238	353090	551490	03/06/2003	9.3
88010238	353090	551490	03/06/2003	9
88010238	353090	551490	03/12/2003	8.3
88010238	353090	551490	03/12/2003	8
88010238	353090	551490	10/08/2004	9.7
88010238	353090	551490	03/03/2005	13.7
88010238	353090	551490	03/03/2005	13.6
88010238	353090	551490	07/07/2005	11.4
88010238	353090	551490	09/12/2005	13.8
88010238	353090	551490	15/08/2006	10.5
88010238	353090	551490	23/11/2006	15.4
88010238	353090	551490	23/11/2006	15.6
88010238	353090	551490	08/06/2007	10.7
88010238	353090	551490	22/11/2007	27.3
88010238	353090	551490	29/05/2008	11.2
88010238	353090	551490	20/11/2008	10.9
88010238	353090	551490	29/07/2009	9.5
88010240	351940	559330	04/02/1997	7.1
88010240	351940	559330	01/09/1997	6.9
88010240	351940	559330	01/04/1998	7.7
88010240	351940	559330	02/10/1998	7.2
88010240	351940	559330	18/05/1999	6.8
88010240	351940	559330	02/11/1999	0
88010240	351940	559330	15/05/2000	9.7
88010240	351940	559330	08/11/2000	9.3
88010240	351940	559330	05/02/2002	10.3
88010240	351940	559330	05/02/2002	10
88010240	351940	559330	02/09/2002	10.4
88010240	351940	559330	02/09/2002	10.7
88010240	351940	559330	04/12/2002	10.6
88010240	351940	559330	04/12/2002	10.3
88010240	351940	559330	28/05/2003	11.4
88010240	351940	559330	28/05/2003	11.2
88010240	351940	559330	02/12/2003	11.4
88010240	351940	559330	02/12/2003	11.2
88010240	351940	559330	10/06/2004	9.8

88010240	351940	559330	01/03/2005	12.8
88010240	351940	559330	01/03/2005	12.9
88010240	351940	559330	06/07/2005	11.5
88010240	351940	559330	07/12/2005	12.7
88010240	351940	559330	01/06/2006	11.8
88010240	351940	559330	22/11/2006	14
88010240	351940	559330	06/06/2007	12.8
88010240	351940	559330	11/06/2007	8.2
88010240	351940	559330	21/11/2007	14.6
88010240	351940	559330	26/11/2007	15.2
88010240	351940	559330	03/06/2008	12.5
88010240	351940	559330	21/11/2008	14
88010240	351940	559330	02/06/2009	13.2
88020691	349610	557050	15/01/2001	6.3
88020691	349610	557050	12/12/2001	7
88020691	349610	557050	24/01/2002	6.7
88020691	349610	557050	02/09/2002	7.3
88020691	349610	557050	02/09/2002	7
88020691	349610	557050	04/12/2002	7.4
88020691	349610	557050	04/12/2002	7.1
88020691	349610	557050	28/05/2003	7.4
88020691	349610	557050	28/05/2003	7.2
88020691	349610	557050	03/12/2003	6.7
88020691	349610	557050	03/12/2003	7
88020691	349610	557050	10/06/2004	7.2
88020691	349610	557050	10/06/2004	7.1
88020691	349610	557050	31/03/2005	7.1
88020691	349610	557050	06/07/2005	6.7
88020691	349610	557050	07/12/2005	6.9
88020691	349610	557050	01/06/2006	7.4
88020691	349610	557050	01/06/2006	7.3
88020691	349610	557050	22/11/2006	7.4
88020691	349610	557050	06/06/2007	6.9
88020691	349610	557050	21/11/2007	7.5
88020691	349610	557050	03/06/2008	7.4
88020691	349610	557050	20/11/2008	7.4
88020691	349610	557050	29/07/2009	7.1
88021771	355800	558510	23/03/2004	2.2
88021771	355800	558510	10/06/2004	1.5
88021771	355800	558510	03/03/2005	1.3
88021771	355800	558510	06/07/2005	1.5
88021771	355800	558510	07/12/2005	1.7
88021771	355800	558510	01/06/2006	2.1
88021771	355800	558510	23/11/2006	2.8
88021775	355610	558680	23/03/2004	11.8
88021775	355610	558680	23/03/2004	11.9
88021775	355610	558680	10/06/2004	16.6
88021775	355610	558680	03/03/2005	21.7
88021775	355610	558680	06/07/2005	19.5
88021775	355610	558680	07/12/2005	19.3
88021775	355610	558680	01/06/2006	19.3
88021775	355610	558680	22/11/2006	12.2
88021775	355610	558680	06/06/2007	15.5
88021775	355610	558680	21/11/2007	12.9
88021775	355610	558680	03/06/2008	16.9
88021775	355610	558680	21/11/2008	14.4
88021775	355610	558680	02/06/2009	12.4

References

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

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