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.

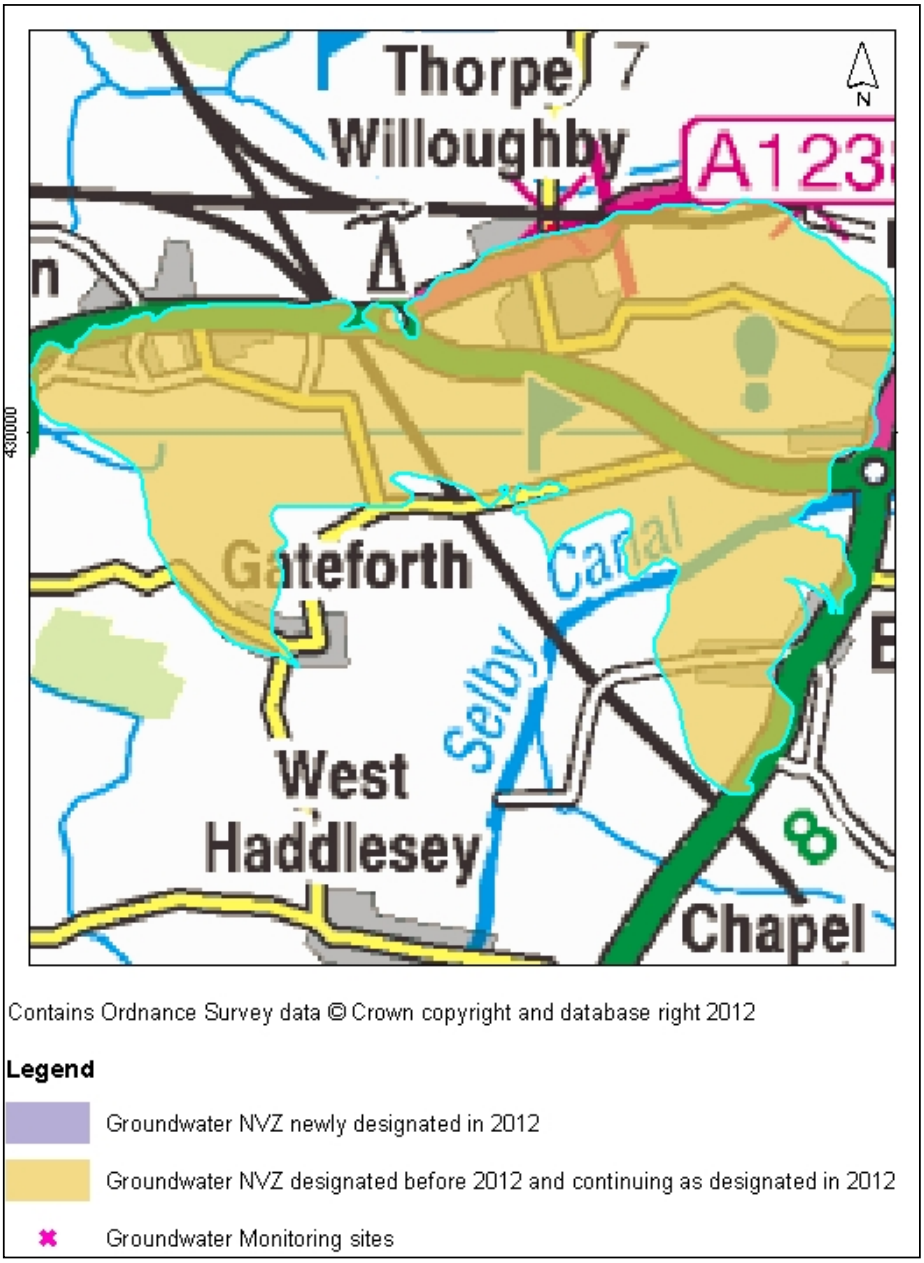
The concentration data is presented as milligrams of Nitrogen per litre. Please note 50 mg per litre of Nitrate is equivalent to 11.3 mg per litre as Nitrogen (N). Monitoring sites which exceed the concentration of 11.3 mg N/l set by the Nitrates Directive may lead to designation of all land draining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

ID of designated NVZ:107

Map of the designated area.



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 107 the boundary is based on;

> *Brayton NVZ (ID 107) The NVZ is delineated by the outcrop of sandstone exposed within a window of thick drift locally.*

ID of monitoring site(s):

> *400D0363, 400D0367, 400D0373, 400D0374, 400D0380, 49100180, 49100191, 49100195, 49100199, 49100200*

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

Total new area designated (Km2): *10.21*

Monitored Nitrate data for sites in zone ID: 107

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	400D0363
Easting	457500
Northing	423000
Total Inorganic Nitrogen concentration 95%ile (mg/l)	43.51
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	NA
Trend (upward, downward, stagnation):	NA

Monitoring Site ID	400D0367
Easting	455600
Northing	420900
Total Inorganic Nitrogen concentration 95%ile (mg/l)	14.17
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	NA
Trend (upward, downward, stagnation):	NA

Monitoring Site ID	400D0380
Easting	457480
Northing	424790
Total Inorganic Nitrogen concentration 95%ile (mg/l)	12.68
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	NA
Trend (upward, downward, stagnation):	NA

Results for 2012 monitoring data.

Monitoring Site ID	400D0363
Easting	457500
Northing	423000
Total Inorganic Nitrogen concentration 95%ile (mg/l)	27.94
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	0.01
Trend (upward, downward, stagnation):	Downward

Monitoring Site ID	400D0367
Easting	455600
Northing	420900
Total Inorganic Nitrogen concentration 95%ile (mg/l)	14.82

Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	14.82
Trend (upward, downward, stagnation):	Stagnation

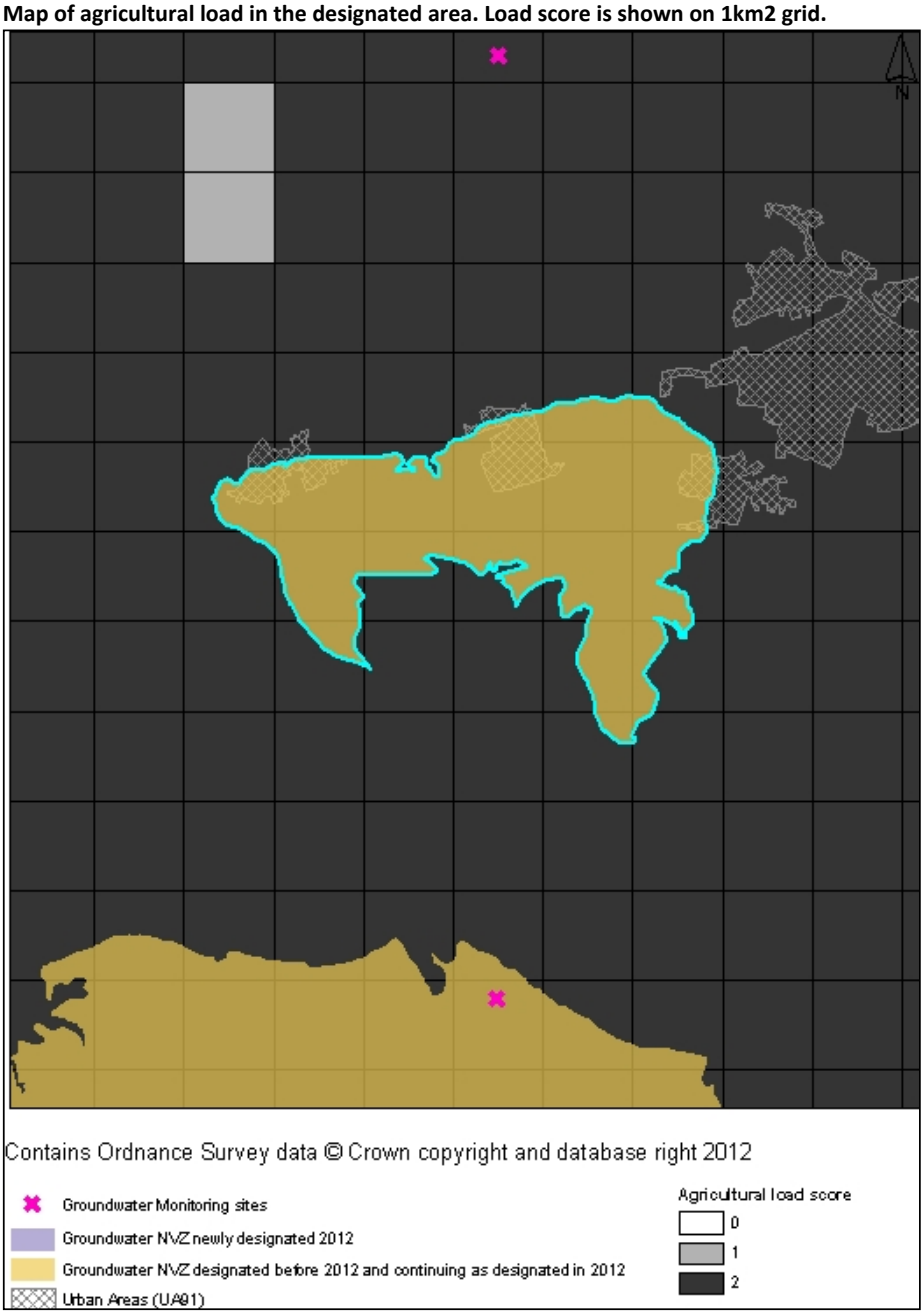
Monitoring Site ID	400D0380
Easting	457480
Northing	424790
Total Inorganic Nitrogen concentration 95%ile (mg/l)	13.36
Future predicted 95%ile Total Inorganic Nitrogen estimate (mg/l)	9.8
Trend (upward, downward, stagnation):	Downward

Land Use Model results

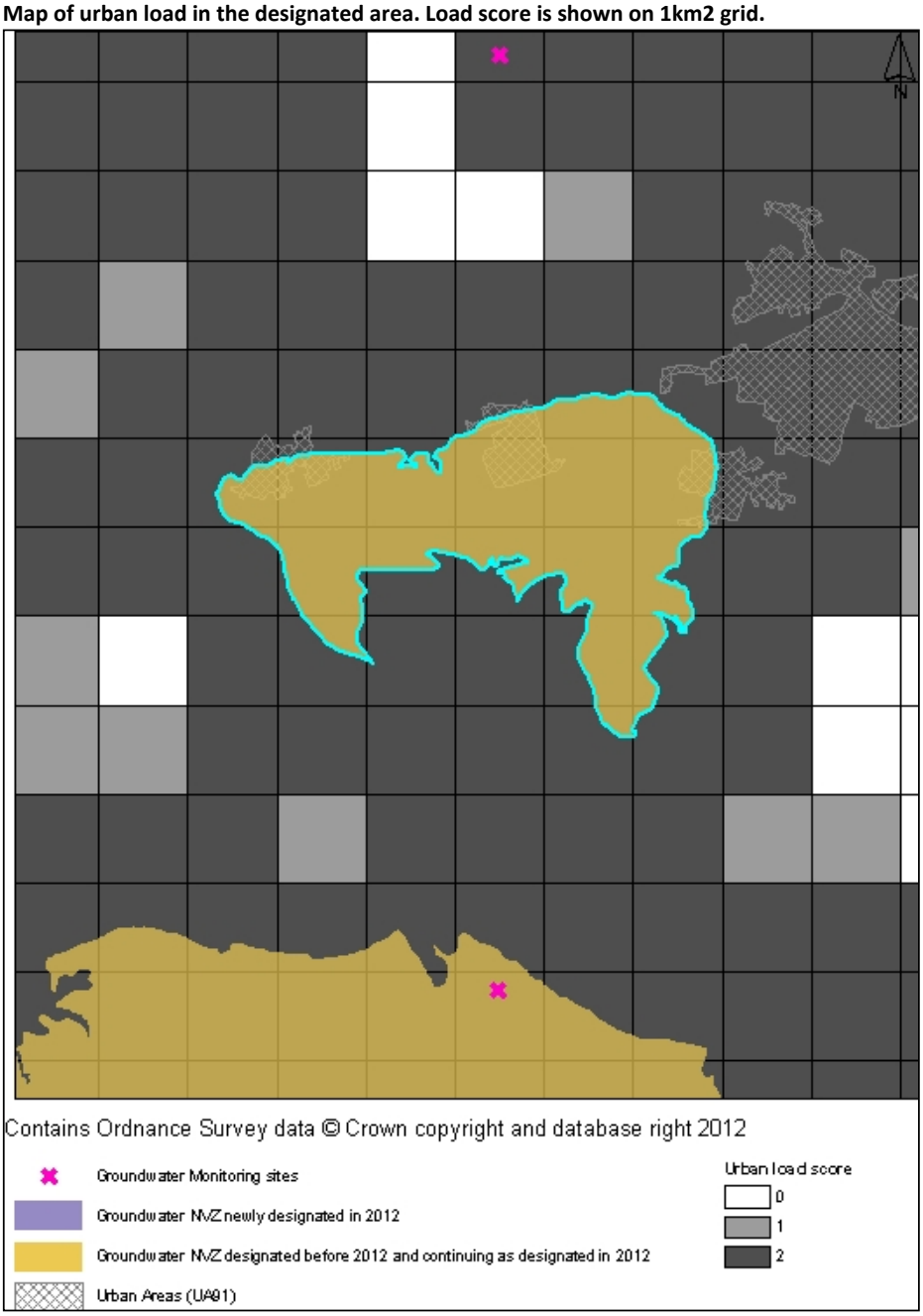
Urban and agricultural load were included in the assessment to identify if agriculture provides a main contribution of nitrate to the groundwater.

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.



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



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)
400D0363	457500	423000	11/09/2001	41.6
400D0363	457500	423000	28/11/2003	35.4
400D0363	457500	423000	25/02/2004	37.1
400D0363	457500	423000	21/10/2004	42.3
400D0363	457500	423000	29/06/2005	41.5
400D0363	457500	423000	06/07/2006	63.1
400D0363	457500	423000	06/07/2006	63.3
400D0363	457500	423000	06/06/2007	42.1
400D0363	457500	423000	25/04/2008	40.2
400D0363	457500	423000	24/04/2009	38.8
400D0367	455600	420900	02/03/2000	12.6
400D0367	455600	420900	14/09/2001	13.2
400D0367	455600	420900	17/02/2005	12.9
400D0367	455600	420900	10/11/2005	12.7
400D0367	455600	420900	14/07/2006	13.6
400D0367	455600	420900	01/11/2007	13.9
400D0367	455600	420900	19/11/2008	13.5
400D0367	455600	420900	06/10/2009	13.3
400D0373	459800	421400	06/05/1999	10
400D0373	459800	421400	11/09/2001	9.6
400D0373	459800	421400	24/04/2002	0.2
400D0373	459800	421400	14/02/2003	9.8
400D0373	459800	421400	27/11/2003	8.1
400D0373	459800	421400	01/04/2004	8.1
400D0373	459800	421400	06/07/2005	6.8
400D0373	459800	421400	29/06/2006	7.3
400D0374	457480	424790	06/05/1999	0.2
400D0374	457480	424790	16/12/1999	11.7
400D0374	457480	424790	11/09/2001	0.2
400D0374	457480	424790	22/11/2002	12.2
400D0374	457480	424790	28/11/2003	11.4
400D0374	457480	424790	26/02/2004	0.2
400D0374	457480	424790	21/10/2004	0.2
400D0374	457480	424790	06/07/2005	0.2
400D0374	457480	424790	09/11/2005	0.2
400D0374	457480	424790	13/11/2006	0.7
400D0380	457480	424790	26/02/2004	11.7
400D0380	457480	424790	21/10/2004	11.9
400D0380	457480	424790	06/07/2005	11.6
400D0380	457480	424790	09/11/2005	11
400D0380	457480	424790	06/07/2006	11.9
400D0380	457480	424790	06/07/2006	12
400D0380	457480	424790	13/11/2006	12.3
400D0380	457480	424790	07/06/2007	9.9
400D0380	457480	424790	01/11/2007	11.7
400D0380	457480	424790	20/05/2008	12.3
400D0380	457480	424790	19/03/2009	11.7
400D0380	457480	424790	28/05/2009	11.3
400D0380	457480	424790	10/11/2009	10.9
49100180	454100	422500	08/11/1978	1.4
49100180	454100	422500	03/04/1984	0.3

49100180	454100	422500	03/07/1986	0.5
49100180	454100	422500	06/05/1987	3.6
49100180	454100	422500	06/05/1987	5
49100180	454100	422500	29/07/1987	2
49100180	454100	422500	09/09/1987	0.5
49100180	454100	422500	07/10/1987	0.5
49100180	454100	422500	02/11/1987	0.5
49100180	454100	422500	19/03/1990	19.6
49100180	454100	422500	19/09/1990	0.2
49100180	454100	422500	03/08/1995	18.2
49100180	454100	422500	03/08/1995	16.4
49100180	454100	422500	24/09/1997	24
49100191	454300	422100	03/04/1984	0.6
49100191	454300	422100	03/07/1986	0.5
49100191	454300	422100	08/10/1986	4.2
49100191	454300	422100	06/05/1987	1.6
49100191	454300	422100	06/05/1987	0.5
49100191	454300	422100	29/07/1987	0.7
49100191	454300	422100	07/10/1987	0.5
49100191	454300	422100	02/11/1987	0.5
49100191	454300	422100	25/05/1988	0.1
49100191	454300	422100	19/03/1990	0.2
49100191	454300	422100	18/09/1990	0.2
49100191	454300	422100	30/07/1991	0.2
49100191	454300	422100	30/07/1991	32.2
49100195	454300	422000	03/04/1984	0.1
49100195	454300	422000	03/07/1986	0.5
49100195	454300	422000	08/10/1986	0.5
49100195	454300	422000	06/05/1987	0.5
49100195	454300	422000	29/07/1987	0.6
49100195	454300	422000	09/09/1987	0.5
49100195	454300	422000	07/10/1987	0.5
49100195	454300	422000	02/11/1987	0.5
49100195	454300	422000	19/03/1990	0.2
49100195	454300	422000	30/07/1991	0.2
49100199	454300	421900	03/04/1984	0.1
49100199	454300	421900	03/07/1986	0.5
49100199	454300	421900	08/10/1986	0.5
49100199	454300	421900	06/05/1987	0.5
49100199	454300	421900	29/07/1987	0.6
49100199	454300	421900	09/09/1987	0.5
49100199	454300	421900	07/10/1987	0.5
49100199	454300	421900	02/11/1987	0.5
49100199	454300	421900	19/03/1990	0.2
49100199	454300	421900	18/09/1990	0.2
49100199	454300	421900	30/07/1991	0.2
49100199	454300	421900	03/08/1995	0.1
49100200	454300	421500	08/11/1978	0.6
49100200	454300	421500	05/08/1982	0.1
49100200	454300	421500	03/04/1984	0.1
49100200	454300	421500	03/07/1986	0.5
49100200	454300	421500	08/10/1986	0.5
49100200	454300	421500	06/05/1987	0.5
49100200	454300	421500	29/07/1987	0.5
49100200	454300	421500	09/09/1987	0.5
49100200	454300	421500	07/10/1987	0.5
49100200	454300	421500	02/11/1987	0.5
49100200	454300	421500	19/03/1990	0.2

49100200	454300	421500	18/09/1990	0.2
49100200	454300	421500	30/07/1991	0.2

References

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

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