

WG14458



Llywodraeth Cymru
Welsh Government

www.cymru.gov.uk

Welsh Government

Consultation Document

Review of Nitrate Vulnerable Zones in Wales

Date of issue: **23 December 2011**
Action required: Responses by **16 March 2011**



Overview

The Nitrates Directive (91/676/EC) aims to reduce water pollution by nitrates from agricultural sources and to prevent such pollution occurring in the future.

The Directive requires the Welsh Government to identify surface or groundwaters that are, or could be high in nitrate from agricultural sources.

Nitrogen is one of the nutrients that can effect plant growth. Surface waters also have to be identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water.

Once a water has been identified, all land draining to that water is designated as a Nitrate Vulnerable Zone. Within these zones, farmers must observe an action programme of measures which include restricting the timing and application of fertilisers and manure, and keeping accurate records.

We have undertaken a review of all Nitrate Vulnerable Zones and are seeking the public's views before making a final decision.

How to respond

To respond to the consultation, please send your comments, either electronically or in hard copy to the address below.

Further information and related documents

Large print, Braille and alternative language versions of this document are available on request.

The Nitrates Directive (91/676/EC) can be accessed here: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0676:EN:HTML>

Should you wish to ask any questions about the Directive or how Nitrate Vulnerable Zones are designated, you can email the dedicated inbox at: water@wales.gsi.gov.uk

Contact details

For further information:

water@wales.gsi.gov.uk

Water Policy

Welsh Government

Cathays Park

Cardiff

CF10 3NQ

Data protection

How the views and information you give us will be used.

Any response you send us will be seen in full by Welsh Government staff dealing with the issues which this consultation is about. It may also be seen by other Welsh Government staff to help them plan future consultations.

The Welsh Government intends to publish a summary of the responses to this document. We may also publish responses in full. Normally, the name and address (or part of the address) of the person or organisation who sent the response are published with the response. This helps to show that the consultation was carried out properly. If you do not want your name or address published, please tell us this in writing when you send your response. We will then blank them out.

Names or addresses we blank out might still get published later, though we do not think this would happen very often. The Freedom of Information Act 2000 and the Environmental Information Regulations 2004 allow the public to ask to see information held by many public bodies, including the Welsh Government. This includes information which has not been published. However, the law also allows us to withhold information in some circumstances. If anyone asks to see information we have withheld, we will have to decide whether to release it or not. If someone has asked for their name and address not to be published, that is an important fact we would take into account. However, there might sometimes be important reasons why we would have to reveal someone's name and address, even though they have asked for them not to be published. We would get in touch with the person and ask their views before we finally decided to reveal the information.

Contents

Section	Title	Page
1	Introduction	2
2	Responding to this consultation paper	3
3	Background	5
4	Designated Areas	6
5	Action Programme requirements	6
6	Timeline Overview	8
7	Proposals for designating new NVZs in Wales	9
8	Appeals	12
9	Action programme	13
10	Next Steps	34
11	Summary of Questions	35
Annex 1	Methodologies	38
	Combined NVZ area map	43
	Surface Water NVZ map	44
	Groundwater NVZ map	45
	Eutrophic water NVZ map	46

1. Introduction

The EC Nitrates Directive (91/676/EEC) is intended to reduce water pollution caused by nitrates from agricultural sources and to prevent any further pollution. The Directive is transposed in Wales by the Nitrate Pollution Prevention (Wales) Regulations 2008. Since the introduction of the Directive in 1991, Member States are required to assess and designate areas as Nitrate Vulnerable Zones (NVZs) and produce an Action Programme of measures to reduce levels of Nitrogen entering watercourses.

Member States are required to review their implementation of the Directive every four years. The outcome of the review is used to make appropriate amendments to the NVZs and/or the measures in the Action Programme. The last review undertaken by the Welsh Government in 2007 resulted in the designation of 2.3% of the land area of Wales as Nitrate Vulnerable Zones and introduced a strengthened range of measures in the Nitrates Action Programme that farms located within NVZs must implement to comply with the Directive.

This consultation document is part of the current review and invites opinions from individuals and organisations on proposals to:

- Revise the coverage of Nitrate Vulnerable Zones
- Modify the Action Programme measures implemented within the Nitrate Vulnerable Zones.

The NVZ proposals have potential implications for all farmers **in existing NVZs and in new NVZs**. The general location of these designated areas are indicated at Annex 1.

Implementation of the Nitrates Directive in Wales has evolved with our understanding of the Directive and as the evidence base for nitrate pollution has grown. The proposed new NVZs for designation follow the latest evidence and data from the Environment Agency about waters in Wales that are classed as nitrate polluted waters under the Directive.

The proposed revisions to the existing Action Programme take account of our 'Working Smarter' commitment to reduce bureaucracy in the farming industry, and builds upon informal consultation with a wide range of stakeholders and research into the effectiveness of the existing measures. We have considered recommendations made by the Farming Regulation Task Force in England (as set out in the 'Macdonald Report') on the Nitrates Directive. These include the 'earned recognition' principle of rewarding good practice with less frequent inspections.

Implementation of the proposals in the Action Programme following the designation process will ensure compliance with the Directive and will contribute to an integrated approach to tackling diffuse pollution in water courses. This will in turn contribute to meeting other European water quality Directives in Wales, such as the Water Framework Directive and Groundwater Directive.

This consultation document covers all elements of the proposed changes to NVZs and Action Programme. The maps at Annex 1 show the new **indicative** NVZ areas. These maps are also available on the What's in Your Backyard section (WIYBY) of the Environment Agency website¹

All Action Programme proposals in this consultation document are underpinned by detailed scientific evidence generated through research commissioned by the Department for Environment, Food and Rural Affairs (Defra) in consultation with the Welsh Government. The research was carried out across England and Wales, therefore the conclusions and evidence base are applicable to both countries.

This consultation also invites opinions on:

- Rationalising the Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations 2010 (SSAFO).

The proposals aim to remove the duplication that currently exists between the Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations 2010 and the Nitrate Pollution Prevention (Wales) Regulations 2008 and simplify compliance with both sets of Regulations. We propose standardising the calculation of storage capacity to that of the NVZ Action Programme. This will have potential implications for **all farmers** in Wales and further information can be found in section 9d.

Full details of the rationale and methodology for designation as well as the Action Plan is outlined in full in this document.

2. Responding to this consultation paper

The Welsh Government invites views and comments on the proposed revision of NVZ coverage and the individual Action Programme proposals. Comments are welcome from all interested parties and in particular, farmers, farm consultants, trade and industry bodies.

While consultees may wish to comment on the proposed NVZs and on the proposed changes to the Action Programme rules, these are requirements of the Nitrates Directive or have been discussed with the European Commission in some detail. The Welsh Government is obliged to implement the Nitrates Directive fully in its current form, and is not in a position to make changes to the basic requirements.

¹ http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=nvz

Specific questions have been posed throughout this consultation document. Please refer to these questions when submitting your response.

Comments are requested by 16th March 2012

Please send your comments to:

Water Policy team
Welsh Government,
Cathays Park,
Cardiff
CF10 3NQ

(02920) 823192

Email: water@wales.gsi.gov.uk

The Welsh Government will make available all responses to this consultation paper or deposit them in its libraries, unless a respondent specifically asks for his or her response to be treated as confidential. Should you wish some or all of your response to be treated as confidential, please indicate this clearly. Confidential responses will, nonetheless, be included in any statistical summary of numbers of comments received or views expressed.

The Welsh Government will inform all respondees of the outcome of this consultation and the final decision on designating NVZs.

3. Background

Nitrate loss from agriculture

Water is a vital resource and over the past fifty years, more intensive farming methods have led to an increase in overall loadings of Nitrogen to land, and the loss of some of this Nitrogen into the aquatic environment.

A significant proportion of the UK's nitrate input to the aquatic environment originates from diffuse water pollution which can be described as individual small sources of water pollution, that collectively cause a significant impact. One of which includes sources from agricultural activities.

The Member States of the European Union adopted the Nitrates Directive in 1991. The Directive is designed to reduce pollution from nitrates originating from agricultural sources to surface and groundwater systems.

There are two main reasons for ensuring nitrate concentrations in coastal waters, estuaries, rivers, lakes and groundwaters are maintained below prescribed limits:

- High nitrate concentrations can contaminate drinking water sources. As prescribed in the EC Drinking Water Directives (80/778/EC and 98/83/EC), water companies are required to provide drinking water containing nitrate concentrations less than 50 mg/l.
- High nitrate concentrations can contribute to an overall deterioration in water quality and lead to eutrophication, where nutrient enrichment can result in an undesirable disturbance of the aquatic ecosystem. High levels of nutrients such as nitrate can encourage prolific growth of aquatic organisms including toxic algal blooms and can reduce the oxygen status of water (deoxygenation) leading to fish kills. This reduces the biodiversity and conservation value of aquatic systems as well as the navigational and recreational value of water bodies.

In addition to the Nitrates and Drinking Water Directives, the Welsh Government also has an obligation under the Water Framework Directive to improve and enhance the quality of water in Wales. These include:

- surface freshwater (including lakes, streams and rivers)
- groundwaters
- groundwater dependant ecosystems
- estuaries
- coastal waters out to one mile from low-water.

The Directive requires member states to achieve 'good status' on all water bodies by 2015 in the first instance, through the implementation of River Basin Management Plans and targeted improvement plans.

4. Designated Areas

The 1991 Nitrates Directive established a broad framework for reducing nitrate pollution from agriculture throughout Europe. The Directive requires Member States to establish Action Programmes, which set out specific good agricultural practice measures for farmers to follow in order to reduce nitrate pollution. It also requires Member States to apply the Action Programme either throughout their national territory (whole Wales NVZ designation), or to specific areas where farmers have to implement the measures (with farmers in other areas being subject only to other national baseline standards).

Where Action Programmes are not applied throughout their national territories, Member States have to designate NVZs using specific tests and review these designations every four years. The tests require the designation of land draining into:

- Groundwaters or surface fresh water systems that contain, or could contain (e.g. due to an upward trend) if protective action (i.e. applying Action Programme measures) is not taken, nitrate concentrations above 50 mg/litre; a significant part of which comes from agricultural sources;
- Freshwaters (e.g. lakes, rivers), estuaries, coastal waters and marine waters that are (or may become so in the near future if protective action is not taken) eutrophic when Nitrogen compounds (e.g. nitrate from fertiliser or manure) enrich the waters and cause accelerated growth of higher forms of plant life and algae. This produces an undesirable disturbance to the balance of organisms and to the quality of water.

The Nitrates Directive requires reviews of both the extent of the NVZs and the effectiveness of the Action Programme every four years. The outcomes of the reviews should be used to make appropriate amendments (i.e. revise the NVZs and/or the Action Programme measures).

5. Action Programme requirements

The Nitrates Directive requires farmers within designated NVZs to follow Action Programme measures with the aim of reducing nitrate pollution. The Action Programme consists of statutory measures of good agricultural practice, including:

- controlling the dates (closed periods) and conditions under which Nitrogen fertiliser and organic materials are spread;
- having sufficient facilities for storage of manures and slurries;
- limiting Nitrogen fertiliser applications to the crop requirement only;
- limiting quantities of organic material applied per hectare per year;
- limiting the total quantity of organic material plus excreta applied at farm level;
- controlling the areas where Nitrogen fertilisers (both organic and inorganic) can be applied;
- controls on application methods; and

- preparing plans and keeping adequate farm records.

The measures outlined in the Nitrates Directive are intended to contribute to sustainable development by limiting and/or reducing agricultural losses of nitrate through good agricultural practice coupled with limits on fertiliser and slurry/manure loadings and timings, whilst promoting sustainable and adaptable farming. Good practice measures to limit losses of other pollutants are also included.

There are specific benefits arising from implementing the measures required by the Nitrates Directive, including:

- Reducing the escape of nitrate and other nutrients into the water environment to reduce further the risk of eutrophication and excessive plant growth.
- Helping to ensure industries dependent on high water quality remain viable, these include recreation and tourism, fisheries and agriculture, horticulture and food processing.
- Helping to protect habitats important for wildlife conservation and to prevent decreases in biodiversity.
- Helping to maintain and improve the quality of drinking water, and reduce the complexity and cost of water treatment.

In addition to the risk of nitrate pollution, loss of applied Nitrogen by leaching and surface runoff represents an economic loss to farmers. Manures and slurries are a valuable resource as they provide available Nitrogen to plants. Adequate allowance for the nutrients supplied in organic materials can therefore reduce the need for applications of more costly bagged mineral fertiliser. As a result, more efficient, targeted applications of Nitrogen coupled with better accounting for the nutrient value in applied organic fertilisers can lead to lower overall fertiliser costs for individual farm businesses.

The existing Action Programme measures have been in place since January 2009, and are set out in detail in the Welsh Government publication “Nitrate Vulnerable Zones in Wales – Guidance for Farmers” (2009 Edition) available from www.wales.gov.uk.

The main requirements of the existing Action Programme are that farmers should:

- Not apply organic manure containing high readily available Nitrogen (such as slurries and poultry manures) on land during the following inclusive dates (the closed periods):

Table 1 – closed periods for manure with high readily available Nitrogen

Soil type	Grassland	Tillage land
Sandy or shallow soil	1 September to 31 December	1 August to 31 December
All other soils	15 October to 15 January	1 October to 15

		January
--	--	---------

- Not apply manufactured Nitrogen fertiliser on land during the following inclusive dates (the closed periods)

Table 2 – closed periods for manufactured fertiliser

Grassland	Tillage land
15 September to 15 January	1 September to 15 January

- Ensure adequate storage capacity is available to allow for the annual closed periods (comes into force January 2012)
- Limit Nitrogen applications (from both manufactured fertiliser and organic materials) to crop requirements, after allowing for Nitrogen supply from the soil and other sources
- Limit the total amount of Nitrogen in livestock manure applied to agricultural land, whether directly by animals whilst grazing or by spreading, to an average of 170kg/ha across the whole holding.
- Spread no more than 250kg/ha total Nitrogen in organic material on any area of the farm (the field limit)
- Not apply manufactured fertiliser or organic materials when the soil is waterlogged, flooded, frozen or snow covered; or if the field is steeply sloping.
- Spread organic materials and fertilisers as accurately as possible and in a way which does not contaminate watercourses (manufactured Nitrogen fertiliser must not be spread within 2 meters of a surface water, and organic manure must not be spread within 10 meters)
- Keep adequate farm records, including the timing and level of manure/slurry and manufactured Nitrogen fertiliser applications.

The Environment Agency Wales (EA(W)) is responsible for enforcement of the Nitrates Directive in Wales, including Action Programmes measures. The Action Programme requirements also fall under the scope of the Single Payment Scheme (SPS) cross-compliance measures. Accordingly, where relevant, inspections assess compliance with NVZ Action Programme measures and penalties can be applied to SPS payments where breaches are found.

6. Timeline Overview

The Nitrates Directive requires us to review both our designation of NVZs, and the Action Programme of measures that applies inside them, every four years. We are required to do this, and have any new designations and measures in place by 1 January 2013. The outcome of this process, particularly the shape of the Action Programme, will depend not only on your responses to this consultation but also on negotiations with the European Commission.

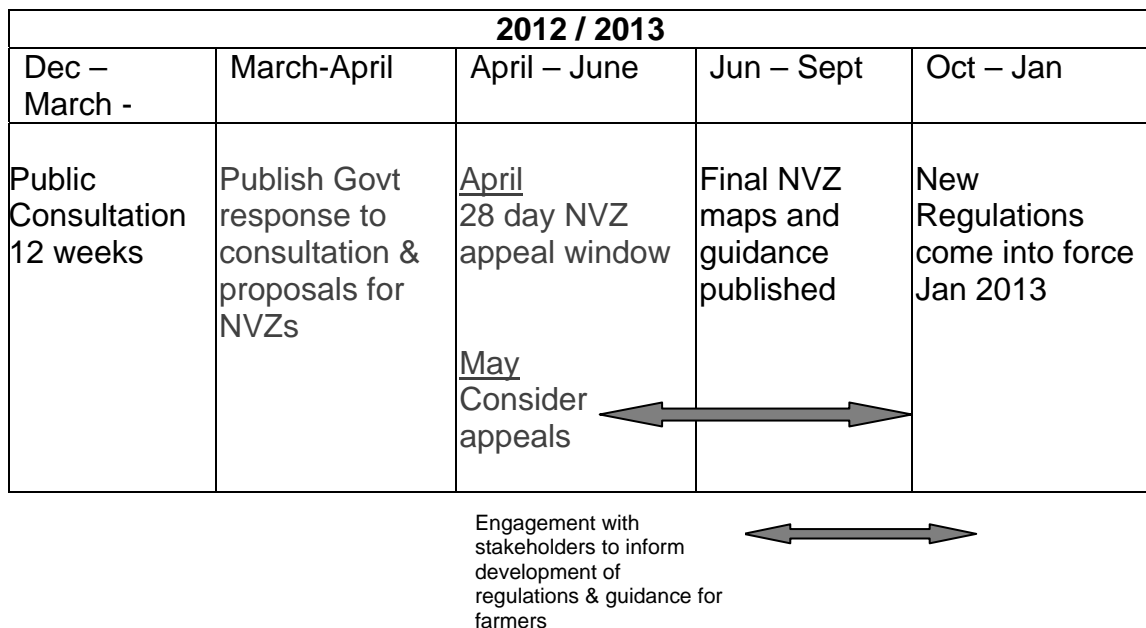
This consultation is a key stage in the current review of the designation of NVZs and consideration of the Action Programme. To get to this stage work has been ongoing for the last 12 months on both the methodology (discussed in section 7) which will be used to identify NVZs and the Action Programme (discussed in section 9).

Looking forward, if we designate discrete NVZs, we will aim to publish firm recommendations, with field level maps on where these will be, in April 2012. There will then be a period during which any challenges to the recommended designations could be made, and following consideration and adjudication of these appeals, we intend to publish final NVZ boundaries in autumn 2012, to be applied through regulation from 1 January 2013 onwards.

In parallel with this consultation, we will be discussing the Action Programme with both the Commission and farming representatives. During the first three months of 2012 we will be reviewing your responses to this consultation and using the evidence you provide, to support our discussions with the Commission. We aim to publish our final proposals for NVZ boundaries and Action Programme around April 2012, although the precise timing is also dependent on discussions between the UK and the European Commission.

The chart below seeks to summarise this time line.

Chart 1 - Timeline Overview



7. Proposals for designating new NVZs in Wales

Under the Directive we have two options to review and designate land. Our first option requires **as a minimum**, the designation of discrete Nitrate Vulnerable Zones that drain into polluted waters, within which an Action Programme of measures is implemented by farmers. Our second option under the Directive is to designate ‘whole territory’ NVZs and apply the Action Programmes across the whole of the nation. Most of the northern EU

countries have opted for the 'whole territory' approach, including the UK in respect of Northern Ireland.

Option 1 – Targeted approach to designation of discrete NVZ areas.

To date we have taken a targeted approach and designated NVZs, which currently cover approximately 2.3% of land in Wales. This is consistent with the objective of the Directive, which aims to reduce pollution where it occurs and ensure that those who contribute to it take action to reduce the pollution. In other words, this approach encapsulates the 'polluter pays principle'. It also ensures that burdens are not imposed on those whose land does not drain to nitrate-polluted waters and therefore ensures that any costs are directly associated with implementation of the Directive.

However, the four yearly cycle of reviewing water quality creates uncertainty for farmers, whose land may be removed from NVZ designation at one round and then re-designated at the next, or vice versa. This can make it difficult for farmers to take a long term view and make the right investment decisions for their business. Having land within an NVZ requires landowners to bear the extra costs of complying with the Action Programme. The four-yearly cycle requires a significant resource from both Welsh Government and the Environment Agency in both developing and implementing the appropriate methodologies.

Adoption of the targeted approach would mean modest changes to the current designation picture for 2012/13. The total area designated would increase from 2.3% to 2.5%. This change includes a number of new NVZs as well as some land which would no longer be an NVZ owing to sustained improvements in water quality. A description of the methodology and the potential areas that would be designated as NVZ are included in Annex 1.

Proposed Designations

A key part of this review has been the development of the NVZ Methodology Working Group. The group was set up during this review process to ensure that the method for identifying NVZs makes use of the best techniques and data available, and in particular learns the lessons from previous experience. The group consisted of farming representatives and independent academics who have been able to inform and challenge the development of the methodology throughout. The establishment of this group, which included representatives from the National Farmers Union, Country Landowners Association, National Farmers Union (Cymru) and Farmers Union of Wales, has provided a high level of transparency to a very technical process and has enabled informed debate, challenge and change. The details of the membership of the Group is included as part of Annex 1.

The methodologies employed in this review were developed by the NVZ Methodology Working Group. The group reviewed the evidence available and the various methods of analysing the data in accordance with the requirements of the Directive. Once agreed and signed off by the group, the methodologies were then used by the Environment Agency to develop the draft NVZ boundaries.

A number of local quality assurance workshops were then held where the suggested areas were looked at in detail using local knowledge to identify any

anomalies in the data. These workshops were attended by local Environment Agency Wales staff with the Farming Unions attending as observers.

The Environment Agency has completed a review of waters in Wales that may be polluted by nitrates from agricultural sources and has provided its data to the Welsh Government.

The full methodologies will be published by the Environment Agency on behalf of the Welsh Government in February which will include the full rationale behind the designations. A summary of the methodologies is included at Annex 1 of this document.

Option 2 – Whole Wales NVZ designation.

As an alternative, we could introduce a whole Wales approach to designating NVZs and apply the Action Programme throughout Wales. This has been done in Northern Ireland. We know that we need to improve water quality (including phosphate and sediment, not only nitrate) across much of the country to meet the requirements of the Water Framework Directive – based on the 2009 baseline, 33% of all water bodies in Wales are at ‘good’ status.

A ‘Whole Wales’ designation would provide an opportunity to develop an integrated approach to a number of different though related issues. When we consider the many-stranded requirements of the Water Framework Directive, as well as other key objectives on air quality and reducing greenhouse gas emissions, there are likely to be efficiency gains. Using a single legal instrument to set a baseline level of farming nutrient management would give us the opportunity to coordinate action aimed at achieving our objectives and make the base line rules as simple as possible.

Such an approach would make it difficult to determine the costs on the agriculture industry attributable to implementation of the Nitrates Directive. It may appear that costs would be higher than with discrete NVZs though being able to coordinate basic measures to deliver the Water Framework Directive, air quality and climate change policy objectives within one instrument would facilitate minimising the costs on the industry overall by ensuring that measures were fully integrated.

Q1 - Do you prefer Option 1 (continuing with discrete NVZ designations), or Option 2 (applying the Action Programme to a ‘Whole Wales’ NVZ designation)? Please include comments on the advantages and disadvantages of the two options and the reasons why you prefer one over the other.

Q2 - Do you have comments on the areas proposed for designation as NVZs in Wales shown on the indicative maps (at Annex 1) given the Nitrates Directive's basis on which nitrate polluted waters must be identified and land draining into those waters must subsequently be designated?

8. Appeals

If a whole Wales approach (option 2) is not the preferred option and we continue to designate discrete areas, we intend to publish the Environment Agency's recommendations for NVZ boundaries in April 2012.

When the recommended NVZ boundaries are published you may not agree with those proposals on the basis that you feel areas proposed for inclusion should not be included. If that is the case, you will be able to appeal against that recommendation.

This section is intended to help you understand the timing and opportunity for those appeals. **We are not seeking or accepting appeals at this stage as the maps we have included here are intended to be indicative: they are not firm recommendations and open to change.**

Appeals can be made on either or both of the following grounds:

- **The land does not drain into water which the Welsh Ministers are minded to identify as polluted within the meaning of the Nitrates Directive; or**
- **The land drains into water that the Welsh Ministers should not identify as polluted within the meaning of the Nitrates Directive.**

These two grounds for appeal will be established through regulations. Appeals will be limited to factual matters in relation to the way in which land drains into water bodies and the level of pollution in water bodies. If you wish to appeal, you will need to provide appropriate evidence to support your case.

The appeals will be handled by the Planning Inspectorate who are currently developing the process. They will issue full details of the appeal process (including guidance, forms and appeal deadline) early in 2012 prior to the publication of the field level NVZ designations (expected at Easter 2012). A 28 day window for making appeals will be advertised in the Government's response document. Publishing appeal arrangements in advance of the Welsh Government response to the consultation will allow landowners sufficient time to fully consider the appeals mechanism prior to the appeal window opening.

If the Welsh Government decides to opt for a whole territory approach then the provisions for appeals will be withdrawn from the process as the Whole of Wales will be subject to the regulations rather than discrete areas.

9. Action programme

Existing Action Programme Measures

The proposals in this consultation for changes to the Action Programme reflect developments in our understanding of the pathways of agricultural pollution and key inputs of research commissioned by Defra. The early findings of this research was shared with farming representatives at a stakeholder workshop in April 2011 to explore the advantages and disadvantages of differing options.

The Welsh Government, jointly with Defra, has been continually reviewing the existing measures to establish their effectiveness in reducing nitrate pollution. Many of the most recent surface and groundwater monitoring results have shown a reduction in nitrate concentrations, and can, in part, be attributed to the effect of the current and previous Action Programmes.

Some of the key Action Programme measures, such as the storage requirements, have yet to fully enter into force. When they do, they are likely to take a number of years to have full effect, especially on groundwater. There are also wider trends in agriculture that are not driven by the NVZ Action Programme but may contribute significantly to the reduction of water pollution. For example, there has been a long-term downward trend in the application of Nitrogen fertiliser to grassland, and livestock numbers have fallen in recent years, which will tend to reduce nitrate pollution.

As a result we consider it too early to meaningfully analyse the success of the existing Action Programme. Therefore, other than where new evidence has been generated, the proposals contained within this consultation document are mainly focused on reducing bureaucracy rather than making significant changes to the Action Programme and farming practices.

Proposals for the NVZ Action Programme

This section outlines the changes we propose, or are considering, making to the measures in the existing Action Programme. Most aspects will remain as they are now, but where there is evidence that measures can be improved upon we have developed proposals for further consideration. In selecting a final package of measures we will be looking for the best suite of proposals that support an economically viable farming industry whilst achieving the following goals:

- reductions in losses of Nitrogen from agriculture (with associated benefits of improving water quality and enhancing biodiversity);
- Improving the efficiency with which all sources of Nitrogen are used on farms;
- Minimising pollution swapping (i.e. reducing losses of one pollutant that results in increasing the losses of another pollutant);

- Delivering coherent interventions to support agriculture whilst improving the environment;
- Fulfilling our obligations under the Nitrates Directive;
- Reducing the burden of reporting for farmers.

When commenting on the proposals you should be aware that the Nitrates Directive specifically lists measures that must be implemented by the Welsh Government within an Action Programme. Therefore there is little scope to remove completely many of the basic measures.

The proposed measures are based on research and evidence. However we have presented options or alternatives for consultation purposes and in reaching a final decision on the way forward we will have to consider the best 'package' of proposals to achieve the above goals.

The consultation proposals address the following issues:

- **Rates and limits on the field application of organic manures and manufactured Nitrogen fertilisers**
- **Closed periods for spreading**
- **Restrictions on spreading**
- **Storage of organic manures**
- **Planning nutrient use and keeping records**
- **Cover crops**

Q3 - How do you think the proposed Action Programme changes will impact on the practical management of typical farm enterprises in the new or existing zones?

9 (a). Rates and limits on the field application of organic manures and manufactured Nitrogen fertilisers

We intend to maintain the three key application limits at the levels they are now. These are:

- in any twelve month period, the total amount of Nitrogen in organic spread manure on any given hectare must not exceed 250kg.
- in any calendar year the total amount of Nitrogen in livestock manure applied to the agricultural land (either directly whilst grazing or by spreading) must not exceed an average of 170kg/ha.
- the existing Nmax limits which stipulate the maximum amount of crop available Nitrogen that may be applied to a specific crop.

However, we propose to make the following technical changes.

Contribution of all organic materials to Nmax

We propose to make a technical change to the Nitrogen-containing materials that must be included in Nmax calculations.

Nitrogen fertilisers are defined in the regulations and include those derived from plant or human sources. At present the Regulations require farmers to only count farm livestock manures and manufactured Nitrogen fertilisers in their Nmax calculations. Nitrogen derived from sewage sludge (biosolids), compost or other organic manures that do not originate from farm livestock are excluded from the calculations.

We consider that the Nitrogen in all organic manures should be counted in the Nmax calculation. This would ensure that assessments of the crop available Nitrogen supplied to crops is more accurate and therefore the chance of applying more Nitrogen than the crop requires will be reduced, thus reducing the likelihood of pollution. Crop yields will not be penalised as it will still be possible to apply the optimum amount of Nitrogen that a crop requires.

Alternatively, we could maintain the current narrow Nmax rule. This would continue the risk of nitrate pollution (and quite probably other pollution such as phosphate, since Nitrogen is not the only nutrient these materials contain). In addition some farmers may be near their Nmax limit already in their calculations using the existing limited range of Nitrogen sources.

Q4 - Do you agree that crop available Nitrogen from other organic materials should count towards the Nmax limits?

Livestock manure Nitrogen efficiency standard values used in Nmax

The current Regulations require farmers to establish the total amount of Nitrogen available for crop uptake in organic manure that contributes towards the Nmax limit.

The amount of Nitrogen available for crop uptake in organic manure can be established using minimum manure Nitrogen efficiency standard values. These values represent the percentage of the manure total Nitrogen content that has the same effectiveness as manufactured Nitrogen fertiliser.

Table 3 sets out the current standard values in Wales, and those that will come into force from January 2012. These are some of the lowest standard values in the EU.

Recent research has been carried out in England and Wales to review the scientific evidence concerning livestock manure Nitrogen efficiency values. Manure Nitrogen efficiency was measured during 127 replicated field experiments in different geographical locations where soil types, rainfall patterns, land uses (i.e. cereals, potatoes, sugar beet and grassland), manure types, manure application timings and methods, and soil incorporation strategies were different.

The evidence showed that with current good farming practice methods of application, it is realistic to expect higher Nitrogen efficiency values with cattle and pig slurry than those set to apply from 1 January 2012. It showed that significantly more of the original Nitrogen content was available for crop

uptake with spring and summer applications than with autumn and winter applications.

We propose to increase the manure Nitrogen efficiency values for cattle and pig slurries to ensure that all crop available Nitrogen is taken into account when considering Nitrogen plans, and to encourage the uptake of good practice. Table 3 also sets out the manure Nitrogen efficiency standard values that we propose for the next Action Programme.

Table 3 - Proposed manure Nitrogen efficiency standard values for adoption in the next NVZ Action Programme in Wales (% of total manure Nitrogen).

Manure type	Current NVZ AP From January 2009 until 31 December 2011	Current NVZ-AP From January 2012	Proposed values for next NVZ- Action Programme
Cattle slurry	20	35	40
Pig slurry	25	45	50
Poultry manures	20	30	30
Farm Yard Manure	10	10	10

Advantages

- Updating the manure Nitrogen efficiency standard values will help ensure the Action Programme is based on the most up-to-date evidence.
- Recognising the full Nitrogen contribution that organic manures make to meeting crop demand will reduce the need for additional manufactured Nitrogen fertiliser and should increase farming efficiency.
- This proposal should also encourage a move to best practice in the handling and timing of applying organic manures to land, which will reduce nitrate pollution and manufactured fertiliser bills.

Disadvantages

- Changing the Nitrogen efficiency standards so soon after the introduction of the January 2012 standard values may cause confusion.

Q5 - Do you agree with the proposed changes to the Nitrogen efficiency standard values used in Nmax?

Q6 - What concerns or benefits do you think this change may raise?

Organic Manure Nitrogen Field Limit for Composts

The Farming Regulation Task Force (the Task Force) in England received concerns that the application of the Nitrogen field limit is inappropriate for some slow release organic manures such as compost. The Task Force considered the current field limit does not allow enough of these materials to be used to satisfy plant needs in some instances.

Table 4 sets out the total Nitrogen content and readily available Nitrogen in green compost (commonly made from landscaping and garden ‘wastes’) compared to cattle Farm Yard Manure (FYM). Green composts have a lower readily available Nitrogen than cattle FYM, therefore they pose much less of a nitrate leaching risk, even at higher rates of application. We therefore propose to allow the application of green composts to supply up to 500kg/ha of total Nitrogen in any two year period.

Table 4: Typical nutrient content values of composts

	Dry matter %	Total Nitrogen content kg N/t fresh wt	Readily available Nitrogen kg N/t fresh wt
Green compost	60	7.5	<0.2
Cattle Farm Yard Manure – old	25	6.0	0.6

Q7 - Do you consider the limit of 500kg/ha of green compost total Nitrogen in any two year period is workable?

Q8 - Are there any working restrictions we should consider to ensure we are not creating any unintended adverse consequences?

Organic Manure Nitrogen Field Limit for composts used as mulch

The fruit growing sector have highlighted that the current NVZ Regulations with respect to the use of compost in fruit orchards are an impediment to improved production and profitability. The mandatory NVZ organic manure Nitrogen field limit of 250 kg/ha of manure total Nitrogen in a (rolling) 12 month period, was viewed as a potential impediment to improved UK top-fruit production.

The use of green compost as mulch on agricultural land at application rates in excess of the current NVZ limit of 250 kg/ha of total Nitrogen represents a very low risk of nitrate leaching to the environment. The proven benefits of compost application to the yields of some crops (e.g. fruit) due to mulching is likely to improve the uptake of soil Nitrogen by the crop (and thus reduce the risk of soil Nitrogen being leached). There is a reported increased yield (by nearly 50%) of apple numbers and weight, and improved soil/plant moisture supply following compost application.

We therefore propose to change the organic manure Nitrogen field limit for compost used as a mulch for top fruit production to 1000kg/ha of total Nitrogen in any 4 year period.

Q9 - Do you agree that a limit of 1000kg/ha of compost total Nitrogen in any 4 year period when used as mulch for top fruit production is workable?

Q10 - Do you have concerns about and/or can you identify benefits from such a change?

Derogation from the Livestock Manure-Nitrogen Farm Limit of 170 kg total N/ha/annum.

In 2009, the European Commission granted Great Britain a derogation from the Livestock Manure-Nitrogen Farm Limit, enabling grassland farmers with grazing livestock to farm with a Nitrogen loading of up to 250 kg of total Nitrogen per hectare per calendar year (total N/ha/yr) subject to a successful annual application being approved annually and satisfying certain conditions aimed at reducing the levels of Nitrogen and phosphorus entering waters.

Less than 1% of farmers farming in Nitrate Vulnerable Zones applied to use this derogation in 2011 in Wales.

Whilst uptake to date has been consistently low, we believe the number of farmers wishing to take advantage of the derogation in future may increase. Therefore we plan to negotiate with the European Commission for a further four year extension (until 2016). While many of the derogation conditions are likely to remain unchanged, we intend to seek to reduce some of the administrative burdens associated with the derogation (e.g. the requirement to submit Fertilisation Accounts to the Environment Agency Wales).

Q11 - What are your views as to whether or not the Derogation should be renewed?

9(b). Closed periods

Closed periods for Organic Manure

The Nitrates Directive requires the establishment of 'closed periods' that prohibit the spreading of organic manures that contain high readily available Nitrogen (i.e. manures that have more than 30% of the total Nitrogen content in a form that can be readily taken up by the crop; these include slurry, poultry manures and liquid digested sewage sludge) to land at times of the year when the risk of nitrate loss is high, that is when the ground is generally wet and crop growth (therefore nitrate demand) is low.

Table 5: Existing Closed Periods for organic manures that contain a high readily available Nitrogen

	Grassland	Tillage land
Sandy or shallow soils	1 September to 31 December	1 August to 31 December
All other soils	15 October to 15 January	1 October to 15 January

These closed periods are in the autumn and early winter, and are times of year when plant growth is limited, resulting in low nutrient uptake and a high risk of nitrate loss

Research has been undertaken by ADAS/Rothamsted Research to investigate the effect on Nitrogen pollution of extending the closed period. The research has shown that the later in the winter slurry is applied, the less nitrate leaches from the soil. On sandy/shallow soils, leaching from slurry applied after mid-late January is negligible. On medium/heavy soils, leaching is considerably reduced at this time compared with slurry applied in November. However 5-10% of what is applied can still be lost to water under average rainfall conditions due to rapid drainage through soil cracks or by surface runoff. Leaching from these soils can be detectable even from slurry applied at the end of March. These results show that closed periods are important to eliminate high risk nitrate leaching situations.

In the absence of any other considerations, the evidence might suggest longer closed periods on medium/heavy soils. However it is difficult to set mandatory closed periods that eliminate the risk of leaching, yet allow practical beneficial application of manures to agricultural land. There is already a limited time in spring for the application of slurry if growing crops are not to be damaged or grass is to be suitable (uncontaminated) for grazing or silage making. Moreover, if more slurry is applied in summer, ammonia losses are likely to increase. There is therefore a balance to be struck between minimising nitrate losses by spreading manures later, and keeping ammonia losses down by spreading before it gets too warm. The policy aim is to encourage manure application in spring and summer to meet the period of high crop Nitrogen requirement whilst achieving a more integrated approach to minimising potential pollution.

There are also further practical considerations on the question of extending closed periods. One of the most significant is the impact an extension would

have on storage requirements due to the Nitrates Directive requiring more storage capacity than needed for the closed period alone. We consider it would be disproportionate to require farmers who have only recently built new stores at considerable expense to further extend their stores now. While the environmental benefit would be modest, the cost of installation would be very high.

The current storage rules were designed to ensure that farmers could always comply with closed period and spreading limitations rules. This results in requirement for 26 weeks storage capacity for pig slurry and poultry manure and 22 weeks storage capacity for all other slurry, including cattle slurry.

We have developed the proposals below so that the construction of additional storage capacity should not be required. Table 6 below assists in explaining this issue

Option 1 - Keep the existing closed periods

Advantages

- The industry is familiar with the existing closed periods, though for some they will only apply from 1 January 2012. This option therefore avoids change before the existing closed periods have been able to have their full impact.
- We would avoid imposing a further round of significant costs on farmers for storage construction, some of whom will have only recently built stores in good faith to meet the current rules.
- Ensures a reasonable period to get manures onto the land in spring, and so secures a balance between environmental protection and the beneficial application of manure.

Disadvantages

- Some pollution risk does occur immediately after the end of the closed period.

Option 2 - Extend the end of the closed period by two weeks for all soils other than sandy or shallow soils.

Advantages

- The evidence shows that the pollution risk is higher on these soils than it is in sandy / shallow soils due to rapid drainage through soil cracks or in surface runoff, and therefore this option would reduce that specific risk.
- The existing storage capacity requirement exceeds the end of the closed period by approximately 6 weeks. Therefore increasing the length of the closed periods by two weeks would mean that slurry stores currently compliant with the Directive would not become non-compliant.

Disadvantages

- The extension of the closed period would reduce the period available for spreading on key crops, making managing farm activities more difficult.
- The extension of the closed period would reduce the spare storage capacity for farmers to manage slurry production at the end of the closed period. If the weather is wet, or the ground takes a long time to dry out, the spare storage might not be enough.

Option 3 – extend the closed period by one month for all soils other than sandy or shallow soils.

Advantages

- The evidence shows that the pollution risk is higher on these soils than it is in sandy / shallow soils due to rapid drainage through soil cracks or in surface runoff, and therefore this option would reduce that specific risk.

Disadvantages

- The extension of the closed period would reduce the period available for spreading on key crops, making managing farm activities more difficult.
- The extension of the closed period would leave little spare storage capacity for farmers to manage slurry production at the end of the closed period. If the weather is wet, or the ground takes a long time to dry out, there would be a greater chance that spare storage capacity would not be sufficient.

Table 6: Summary of the closed period date options, (where the option would result in a change from the existing Action Programme the text is provided in italic)

Option 1 Keep as existing	Grassland	Months	Tillage land	Months
Sandy or shallow soils	1 Sept to 31 Dec	4	1 Aug to 31 Dec	5
All other soils	15 Oct to 15 Jan	3	1 Oct to 15 Jan	3.5

Option 2 Extend by 2 weeks for soils other than sandy or shallow	Grassland	Months	Tillage land	Months
Sandy or shallow soils	1 Sept to 31 Dec	4	1 Aug to 31 Dec	5
All other soils	<i>15 Oct to 31 Jan</i>	3.5	<i>1 Oct to 31 Jan</i>	4

Option 3 Extend by 1 month for soils other than sandy or shallow	Grassland	Months	Tillage land	Months
Sandy or shallow soils	1 Sept to 31 Dec	4	1 Aug to 31 Dec	5
All other soils	15 Oct to 15 February	4	1 Oct to 15 February	4.5

Q12 - Which of the three closed period options do you prefer?

Q13 - Do you have any comments or further evidence on any of the options that you think the Welsh Government should be aware of?

Rainfall Banding

The Task Force on Farming Regulation in England recommended making the start and end-dates flexible, and to reflect differences in rainfall and growing season across the country.

We have reservations as to whether flexible end dates to the closed periods are practical. Even when weather conditions mean slurry could be applied later in the autumn, or shortly before the end of the closed period in winter, the scientific evidence shows that there would still be a high risk of its Nitrogen content being leached by rain before it could be taken up by crops. This would risk harm to the environment, and would be a waste of valuable Nitrogen in the slurry. There is also concern that variable ends to closed periods would be unenforceable because weather forecasts are not accurate over the necessary time period (about two weeks).

In England, Defra are proposing to bring forward by two weeks the end of the closed period for sandy or shallow soils in areas with up to 750 mm average annual rainfall per year (to 15 December for both grassland and arable). This is with the intention of reflecting that in areas of less rain there is less leaching. We are not consulting on this proposal as there are very few areas, if any, where this flexibility could be applied in Wales. The map at Annex X shows the broad areas of the country within within this rainfall band (the map does not show the soils criteria).

Furthermore we believe that this proposal adds unwanted complexity to the existing Action Programme and does not take into account the fact that nitrate leaching is not related to rainfall alone.

Q14 - What are your views on whether the Welsh Government should consider bringing forward by two weeks the end of the closed period for sandy / shallow soils in areas with up to 750 mm average annual rainfall per year (to 15 December for both grassland and arable)?

9(c). Restrictions on manure spreading

Research on the duration of closed periods has highlighted the increased risk of nitrate loss in the period immediately following the closed period on medium/heavy soils. In order to manage this risk the existing Action Programme already restricts the rate of spreading immediately following the closed period until the end of February so that the maximum amount of slurry that may be spread at any one time is 50 m³/ha in one application and no repeat application is permitted within three weeks. To further reduce the risk, yet allow practical beneficial application of manures, organic fertilisers and soil conditioners to agricultural land we propose to reduce these rates.

This section explores whether further restrictions on the spreading of slurry immediately after the closed period is a better mechanism to prevent nitrate leaching than extending the closed period.

Restrictions on manure applications outside the closed period

We propose to limit the amount of slurry that can be spread between the end of the closed period and the end of February to 30m³/ha of slurry (and other liquid manures with high readily available Nitrogen) in a single application if ground conditions are suitable, and still require a three week period between each individual application. We do not propose any change to the limit on poultry manure.

Advantages

- We are often told of the perceived adverse impacts of ‘national slurry spreading day’ immediately after the end of the closed period. Reducing the volume of slurry that may be spread in a short space of time would reduce the risk presented by many farmers spreading slurry simultaneously.
- Reduces the potential for high nitrate leaching risk situations such as direct run-off of Nitrogen containing material at a time of the year when the soil is at or near to field capacity.
- Managing the risk of leaching in this way would enable continued application of manures to agricultural land at the start of the season and may avoid the need to extend the closed periods.

Disadvantages

- Could put pressure on existing storage capacity by limiting volume to be spread.

Q15 - Do you think that reducing the quantity of slurry that can be spread immediately after the closed period is a better or worse mechanism for managing nitrate leaching than extending the closed periods?

Q16 - If the application rate during this period were reduced, do you agree with the suggested reductions in the rate of application?

Q17 - What further points should the Welsh Government take into account when considering this issue?

Applying organic manures & manufactured Nitrogen fertiliser

As well as managing pollution through determining when organic manures can be spread, and at what rate, the current rules also seek to reduce pollution by requiring organic manure to be spread in as accurate a manner as possible, using slurry spreading equipment that has a low spreading trajectory (i.e. below 4 meters from the ground, unless the equipment used can achieve an average slurry application rate of not more than 2mm per hour when operating continuously and is used on land with a low risk of run off). The rules also restrict the spreading of organic manures or manufactured Nitrogen fertiliser close to surface water.

The purpose of these rules is to reduce harmful ammonia pollution to air, to prevent spray drift (by limiting the spreading trajectory) and to ensure that there is a reasonable buffer between land where slurry has been applied and watercourses.

We wish to further encourage the uptake of more precise slurry spreading techniques which minimise the risk of pollution. Such techniques make good business sense because they ensure crops get the full benefit from slurry applications whilst minimising the losses of valuable Nitrogen to water and air. We therefore wish to recognise the different risks associated with broadcast or more precise slurry spreading methods by allowing those using more precise techniques and equipment to spread closer to watercourses than at present.

The proposed amendment would allow farmers to spread organic manures to within 6 metres of surface water if using more precise spreading techniques. Otherwise the 10 metre restriction remains.

The Action Programme would include a definition of precision spreading equipment and techniques which would include band spreading (trailing hoses and shoes) and shallow injection.

Advantages

- This proposal would encourage accurate spreading of slurry and utilisation of slurry nutrients over a larger field area than presently allowed.
- The wider adoption of more precise application would result in more efficient use of the Nitrogen in organic manures, increasing crop yields and/or reducing the need to buy manufactured fertilisers.
- Studies of more precise slurry spreading techniques have shown they significantly reduce ammonia emissions compared with broadcast spreading.

Disadvantages

- Increased risk of pollution by placing slurry closer to watercourses.

Q18 - Do you agree with the proposals to reduce the minimum distance for spreading slurry near watercourses if more precise equipment is used?

Q19 - Is the proposed minimum distance from watercourses (6 metres) correct, or does it pose an unacceptable risk of pollution?

Q20 - Do you have any comments on how this proposal could work or be improved?

9(d) Storage of Organic Manures

Calculating the capacity of storage vessels

Under the Nitrates Directive, the slurry storage capacity must exceed that required for storage throughout the closed period. This is to ensure that farms have enough slurry storage to comply with the closed periods, and prevent the spreading of slurry at inappropriate times of year. These rules are environmentally important.

In calculating the required capacity we include estimated volumes of water (whether rainwater or wash waters) and other liquids that find their way into slurry stores during the autumn and winter months.

The current rules require that farms that produce livestock manure must provide the following storage capacity requirements:

- 26 weeks storage capacity for pig slurry and poultry manure
- 22 weeks storage capacity for all other slurry, including cattle slurry

We do not propose to change these rules.

As signalled at the beginning of this consultation we are also considering aspects where we can reduce the burden and duplication of Regulation. One such area of duplication is the existing Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations 2010 (SSAFO). These regulations apply both within and outside of NVZs, and require farmers building or substantially renovating stores to have four months' storage capacity. The SSAFO Regulations and Nitrates Regulations have different calculation methods for the way that rain water is accounted for. Currently farmers in NVZs are required to calculate storage by both methods and work to the one that gives the larger volume.

There is in fact very little difference in the volume of storage required for four months as calculated using the SSAFO method (based on a 1 in 5 years highest rainfall amount) and five months as calculated by the NVZ Action Programme method (based on average rainfall). The difference is estimated

to be the equivalent of around an extra two weeks for cattle and an additional six weeks for pigs.

To remove the duplication and simplify compliance with both sets of Regulations, we propose standardising the calculation of storage capacity to that of the NVZ Action Programme method for all farmers. If accepted, the storage capacity requirement will be increased throughout Wales (including outside NVZs) to 5 months (based on average rainfall). This would not impose any other NVZ Rules on farms outside NVZs.

The proposal will have a variable impact farmers in different areas due to different rainfall rates over Wales.

We also recognise that some people will have less storage than required under the revised requirement. We therefore propose to make a transitional provision which would mean that enforcement action would not ordinarily be taken solely on the basis of the volume of storage available. However, if in the future any stores were renovated or replaced they would be required to comply with the results of the new calculation.

Advantages

- This proposal would reduce regulatory duplication by providing one method of calculation which would apply to determine all slurry storage capacities.
- It would mean that farmers in NVZs only have to perform one calculation.
- The proposal would also make clear that in terms of slurry storage, there is very little if any difference in the treatment of farmers inside and outside NVZs (except for pig and poultry farmers, who require six months of storage).

Disadvantages

- Some farmers outside NVZs would need additional capacity when renovating or rebuilding their stores.

Q21 - Do you agree with this proposed change to the SSAFO calculation? What other factors should be considered?

Storage of solid livestock manures in field heaps

In contrast to many other Member States, temporary field heaps of solid manure are an important part of farming practice in Wales which, if not permitted, would have a significant impact on farming operations and would incur significant additional costs for the construction of stores with an impermeable base and effluent collection facilities.

The current NVZ Action Programme has rules on what types of manure may be stored in field heaps, the location of these heaps and the maximum storage time. Manure may only be stored in temporary field heaps if it is solid

enough to be stacked in a free-standing heap and does not give rise to free drainage from within the stacked material.

Since the last review of the Action Programme research has been carried out on the leaching that occurs from solid manure heaps. Leachate production volumes and nutrient losses during solid manure storage were measured from pig FYM, cattle FYM and poultry manure heaps stored for a range of time periods, and from contrasting management practices (e.g. covered or uncovered heaps). The highest total Nitrogen concentrations in leachate were generally measured in the first one to two months from the start of leachate generation, after which only small volumes of leachate containing Nitrogen at low levels were measured.

In other countries there have been concerns that leaving a field heap in situ for a year would lead to a high risk of nitrate leaching. These results show that this is not the case. Based on this scientific evidence, we intend to continue focusing controls on the location of temporary field heaps of solid manure – i.e. preventing field heaps being located on land with rapid hydrological connectivity to a watercourse or groundwater. We intend to retain the current requirements in the Action Programme and no changes are proposed.

Q22 - Do you agree that the Action Programme does not require any amendments with respect to the storage of solid livestock manures?

9(e) Planning Nutrient Use and Keeping Records

One key issue raised by the farming community is the extent of the planning and record-keeping requirements under the Nitrates Regulations and the complexity of the guidance. We are committed to reducing this burden, and have developed a number of proposals aimed to achieve this.

Nutrient Management Planning

It has long been recognised that nutrient management planning is good farming practice. Good nutrient management enables farmers and land managers to better assess the fertiliser required for the range of crops they plan to grow. By matching the usage of fertiliser closely to crop requirements farmers can save money, time and resources as well as minimise the risk of nutrient pollution. We wish to encourage more farmers to adopt nutrient management as a routine part of farm management.

To comply with the NVZ Action Programme, farmers are currently required to plan the application of Nitrogen to crops. As a minimum the Directive requires the Nitrogen planning process to include the following steps:

- Calculate the amount of Nitrogen in the soil that is likely to be available for uptake by the crop during the growing season (i.e. the “soil Nitrogen supply”);

- Calculate the optimum amount of Nitrogen that should be applied to the crop, taking into account the soil Nitrogen supply (i.e. the crop Nitrogen requirement);
- Calculate the amount of Nitrogen from any planned applications of organic manure that is likely to be available for crop uptake in the growing season in which it is spread (i.e. the crop available manure Nitrogen); and
- Calculate the amount of manufactured Nitrogen fertiliser required.

The Nitrates Directive states that actions set out in the Code of Good Agricultural Practice (CoGAP) must be made compulsory in NVZs. Our CoGAP states that you should carefully work out the amount of Nitrogen fertiliser each crop needs, taking into account soil Nitrogen supply, and ensure that you do not exceed the crop Nitrogen requirement.

As with the existing Action Programme we do not propose to specify the format in which the nutrient management plan must be made and kept. In the event of a farm inspection, the farmer or land manager would be responsible for demonstrating that the planning process has been undertaken.

In line with the Working Smarter programme we want to explore whether the principle of 'earned recognition' can be applied in NVZs i.e. good farming practise, such as nutrient management planning, is rewarded with less frequent inspections.

Keeping records – the general burden

Record keeping has been the accepted way of demonstrating compliance with the Regulations to date, and there is some scope to reduce the level of detail set out in the Regulations.

The advice in the CoGAP is the minimum that we must require of farmers under the terms of the Directive. This is a straightforward need to keep accurate records of the application of Nitrogen-containing materials to crops.

We wish to receive your views about whether we can/should enact the 'polluter pays' principle i.e. exempt from the regulations extensive or small farming systems where the cost of compliance would be disproportionately burdensome compared to the environmental benefit. This would need to be done through reliance on pre-defined categories in order to avoid incurring significant financial or resourcing costs in terms of designation and or appeals.

For example, farms could be exempted on the basis of small size (as done by a number of other Member States), type (e.g. extensive hill grazing where Nitrogen leaching, ammonia and nitrous oxide emissions are generally very low), or other categories such as Less Favoured Areas status.

An alternative is to "low intensity". One possibility is to relate the level of Nitrogen applications to the anticipated crop Nitrogen requirement for maximum economic production. We could, for example, define low intensity farming systems as ones in which less than 50% of the Nmax limit is applied (NB 50% is used here purely for illustration purposes, it is not a proposal).

Another alternative would be to explore using EU thresholds which relate to area for cereals (less than 5 hectares) and animal numbers for Dairy, Beef,

Pigs and Poultry (10,10, 10 and 1000 head respectively). Use of the EU thresholds would eliminate only a small proportion of the arable cropping area and livestock from the NVZ regulations. It would however eliminate a significant number of holdings from the administrative burden of the NVZ Action Programme.

It may be that a combined threshold is required to deal with mixed enterprises which are below the chosen criteria in all of the categories, but represent significant numbers in total. This complexity is less likely to be required with the EU thresholds, which are already very low.

Q23 – How do you think the Welsh Government could enact the earned recognition principle?

Q24 - How else do you think the record keeping burden could be reduced whilst maintaining the environmental benefits of the Nitrates Directive?

Q25 - What low intensity farming systems do you consider should not have to keep Nitrates Regulations records?

Q26 - Should “low intensity” be defined in terms of the Nmax limit, manure Nitrogen applications, or both? Or should other factors be part of the definition (and if so, what are they)? For your preferred way of defining “low intensity”, what level(s) of the relevant measures would be appropriate?

Q27 - Are there any situations where the above should not apply?

Keeping records – removing duplication

We are aware of instances where similar records are required by different sets of rules. For example Organic Control Bodies require certified organic farmers to keep records to prove compliance with the Organic Standards. These may also show compliance with the Nitrates Regulations, and those records are checked by the Organic Control Bodies. Provided that compliance with the organic standards provides the assurances we need, we propose to exempt certified organic farms from the need to keep records.

This exemption could be extended to other assurance schemes provided there was sufficient confidence that:

- the record-keeping required by the quality assurance scheme would show compliance with the Nitrates Regulations, or
- the application of fertilisers was at a level low enough to ensure compliance with the Nitrates Regulations.

Where assurance might be provided by accredited private sector or third-party audit, arrangements must be agreed / in place that any farm not meeting the requirements of the scheme relevant to the Nitrates Regulations will not retain membership without correcting those deficiencies.

Q28 - Do you agree in principle that certified organic farms should not have to comply with the record keeping requirements of the Nitrates Regulations?

Q29 - What other quality assurance schemes are you aware of that keep sufficient records to enable exemption from the need to keep Nitrate Regulations records? We would be interested to discuss suggestions with those responsible for running such quality schemes.

9(f) Cover crops

The Nitrates Directive does not explicitly require cover crops to be included in the Action Programme – they are included in the Directive as an optional measure. A number of other Member States make use of cover crops, and they are currently under consideration as a measure for greening of the Common Agricultural Policy.

We consulted on the use of cover crops throughout NVZs in 2007 but consultees rejected the idea, and Ministers agreed. However, the available evidence indicates that when used in the right way they can be a significant and cost-effective measure for tackling diffuse water pollution from arable land. Research carried out by ADAS showed that the presence of cover crops reduced the concentration of nitrate in leachate by about 25% on farmland where manure was not part of the crop rotation. Where manure was included in the rotation, this effect was greater – about a 40% reduction. We are only proposing the issue of cover crops in certain circumstances and therefore the overall benefits of reduced leaching to groundwater is estimated at around 10%. Allowing volunteers and natural regrowth, plus where necessary sowing other crops to establish a cover following harvest, was as effective in reducing nitrate leaching as purpose sown cover (such as stubble turnips). In practice, therefore, it would be possible to minimise cost by using minimum tillage methods, cheap seed and, where appropriate, using the crop for grazing.

In light of the evidence outlined above, we are considering including cover crops in the Action Programme. We recognise that cover crops would not suit all soils and farming systems. In general, it is where soils are lighter that spring crops are favoured, and therefore where the soil will be bare over the winter. A further consideration in the assessment of cost-effectiveness is securing secondary benefits. As the cost of removing nitrate from drinking water is high, preventing nitrate leaching into drinking water sources (mainly groundwater) is particularly cost-effective.

Our proposal would be to introduce a requirement to ensure cover crops on sandy soils over those areas designated as groundwater NVZs, where the ground would otherwise be left bare over winter. The NVZ maps would highlight where the ground water NVZs and sandy soils are, as defined in the existing regulations. Farmers would be required to establish or maintain a cover crop if the land would otherwise be bare between 1st September and 15th January (i.e. crop harvested before 1st September and following crop not planted until after 15th January). In such cases the cover crop would have to

be sown (or achieved in part through volunteers) by 15th September and not destroyed until after 15th December.

Advantages

- The available evidence suggests that the use of cover crops under these circumstances would take up significant quantities of nitrate over the autumn and winter period and thereby reduce leaching into groundwater, possibly by as much as 10%.
- This would be a cost-effective measure to reduce nitrate pollution from arable land.
- The presence of a crop would help reduce soil erosion.
- Crops such as stubble turnips could also feed livestock.

Disadvantages

- The presence of a cover crop could interfere with operations such as de-stoning of potato land, and preparation of a quality seedbed could be difficult in wet years.

Q30 - Do you think cover crops should be included in the Action Programme?

Q31 - If so, have we identified the correct circumstances (sandy soils over groundwater) for their use?

Q32 - Are the suggested dates appropriate? If not, what dates would you suggest?

Q33 - What actions do you consider should be defined to show compliance?

Proposals on the Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations 2010

The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations 2010, as amended, (SSAFO) lay down the construction standards and specifications for stores of these materials. Both the Nitrates Regulations and the SSAFO Regulations have the same aim; reducing the risk of water pollution. Both set out rules about slurry storage. Given the overlap in policy objectives, we intend to reduce the regulatory duplication by merging the relevant sections of the Nitrates Regulations and the SSAFO Regulations into one statutory instrument.

In doing so, we have only undertaken a selective review of the SSAFO Regulations, the existing rules on silage and fuel oils, and also the technical standards set out in the schedules remain unchanged. It is intended that the suggested changes will become part of the Nitrates Regulations. As now,

they will apply throughout the whole of Wales – their application will not be confined to discrete NVZs

The Regulation's are inconsistent in some respects, such as in the way the volume of slurry storage required must be calculated. So we intend to take the opportunity to simplify the Regulations by removing these anomalies. In addition to the earlier section on storage calculations we have a further two proposals on which we are consulting.

Regulation 6 exemption

The SSAFO Regulations were introduced to provide a minimum standard of safety for people in the farmyard and the environment, which is why they set construction standards and a minimum volume of storage for slurry.

When the regulations were introduced over 20 years ago, an exemption was enacted to avoid farmers who had recently invested in new infrastructure being required to make costly alterations for minimal environmental benefit. This was achieved through Regulation 6 of SSAFO, which says that the Regulations do not apply to slurry stores built before 1 March 1991, or stores for which irreversible commitments had been made by that date – such as the signing of construction contracts. Such stores were therefore not necessarily built to the specification set out in the Regulations, and may be smaller than the capacity required for stores to which the Regulations do apply.

By the time the revised Nitrates Regulations come into force, the SSAFO storage capacity and construction standard will be almost 22 years old. Stores benefitting from the exemption will, apart from those under construction when the rule entered into force, be older. As such, they will be nearing or at the end of their useful lives; the risk of pollution from ongoing leaks or catastrophic failure will be increasing significantly.

There is anecdotal evidence that the exemption is now acting as a perverse incentive in some cases: some farmers are avoiding refurbishing or replacing stores that they know have reached the end of their lives because doing so would mean that they would have to build a larger store. This could result in some people taking increased safety and environment risks

We consider that the public has a reasonable expectation, over two decades after the rules were first introduced, that all stores should now comply with the standards set out in the Regulations. Similar arguments apply in the case of silos and fuel storage tanks. We therefore propose to remove this exemption.

The Regulations will generally enter into force on 1 January 2013. To allow a reasonable time for business planning and adjustment, we propose that the exemption will be repealed from 22 December 2015. This coincides with the start of the second period of action under the Water Framework Directive, and would provide almost another 3 years for the exemption to run, meaning that stores to which the exemption then applied would be nearly 26 years old.

Alternatively, we could maintain the exemption. There would be no direct costs to farmers because there would be no new requirement. However, as existing stores get older and not all of them are replaced, there is likely to be a number of failures of stores resulting in adverse impacts on the environment

and costly work at public expense to clear up the pollution and possibly investigate and prosecute.

Q34 - Do you agree that the exemption in Regulation 6 should be repealed?

Q35 - Do you think the deadline for doing so (22 December 2015) is the right one?

Notification of storage

Regulation 9 requires farmers to notify the Environment Agency Wales (EA(W)) at least 14 days before material is first stored in a new or refurbished store. The purpose of this rule is to give the enforcement authority the opportunity to inspect the store and assure itself that it complies with the Regulations.

We consider that this is not an effective rule. If a store had been built which did not conform to the standards then enforcement of the rules at that stage would involve considerable expense for the farmer (to make amends) that could have been avoided by earlier intervention. If there were any doubts about compliance, there would therefore also be an incentive not to comply with the requirement to inform the EA(W).

We propose that during the planning phase of a new store (i.e. before irreversible decisions about site and construction method have been made) a farmer should be required to inform the EA(W)

- of the intended construction or renovation of the store,
- its intended purpose,
- its capacity,
- its location, and
- that construction will meet the SSAFO standards

Not to notify the EA(W) would be an offence

It would be assumed that a person constructing a store would select the site consistent with the Regulations and ensure that construction met the appropriate standards and volume. Notification to the EA(W) would enable it to inspect the proposed site and to raise concerns if it had any. A lack of objections or concerns from the EA(W) could not be taken as signalling its approval, but neither would it result in any delay as the notification process would not put a hold on development. If the store was not located in accordance with the Regulations or was badly constructed, the EA(W) would be able to make use of the full range of enforcement options to address the situation.

We consider that the immediate burden of this proposal on farmers would be neutral as its effect would merely be to change the timing of a notification to the EA(W). However, by enabling potential problems to be highlighted and addressed early, it could potentially provide significant savings for anyone who would otherwise have built a non-compliant store.

The alternative is not to make this change. Also cost-neutral in the short term, this option may result in the construction of non-compliant stores resulting in increased environmental risk and costs to farmers to correct defects.

Q36 - Do you agree that a person constructing a store should notify the EA(W) of his/her intention to do so before firmly committing to the project?

Q37 - How might we improve this provision?

Q38 - We have asked a number of questions, but are there any other issues about the Action Programme you would like to raise?

10. Next steps

Your responses to this consultation will help the Welsh Government to decide on the way ahead for the next 4 year period of the Action Programme. The Regulations giving effect to the revised NVZs and Action Programme are anticipated to come into force on 1 January 2013. In previous reviews we have recognised that a number of farmers will not be able to comply with some of the proposed measures straight away. We also recognise that slurry storage facilities and the amendment of the manure Nitrogen efficiency standard values may require further consideration of the timeline to phase in implementations.

Q39 - Do you consider all the Action Programme measures should be implemented from 1 January 2013?

To ensure that farmers are aware of, understand, and are able to fulfil their obligations under the proposed Action Programme, we will continue to identify effective mechanisms to provide advice and guidance.

11. Summary of Questions:

Q1	Do you prefer Option 1 (continuing with discrete NVZ designations), or Option 2 (applying the Action Programme to a 'Whole Wales' NVZ designation)? Please include comments on the advantages and disadvantages of the two options and the reasons why you prefer one over the other.
Q2	Do you have comments on the areas proposed for designation as NVZs in Wales shown on the indicative map (at Annex 1 given the Nitrates Directive's basis on which nitrate polluted waters must be identified and land draining into those waters must subsequently be designated)?
Q3	How do you think the proposed Action Programme changes will impact on the practical management of typical farm enterprises in the new or existing zones?
Q4	Do you agree that crop available Nitrogen from other organic materials should count towards the Nmax limits?
Q5	Do you agree with the proposed changes to the Nitrogen efficiency standard values used in Nmax?
Q6	Q6 - What concerns or benefits do you think this change may raise?
Q7	Do you consider the limit of 500kg/ha of green compost total Nitrogen in any 2-year period is workable?
Q8	Are there any working restrictions we should consider to ensure we are not creating any unintended adverse consequences?
Q9	Do you agree that a limit of 1000kg/ha of compost total Nitrogen in any 4 year period when used as mulch for top fruit production is workable?
Q10	Do you have concerns about and/or can you identify benefits from such a change?
Q11	What are your views as to whether or not the Derogation should be renewed?
Q12	Which of the three closed period options do you prefer?
Q13	Do you have any comments or further evidence on any of the options that you think the Welsh Government should be aware of?
Q14	What are your views on whether the Welsh Government should consider bringing forward by two weeks the end of the closed period for sandy / shallow soils in areas with up to 750 mm average annual rainfall per year (to 15 December for both grassland and arable)?

Q15	Do you think that reducing the quantity of slurry that can be spread immediately after the closed period is a better or worse mechanism for managing nitrate leaching than extending the closed periods?
Q16	If the application rate during this period were reduced, do you agree with the suggested reductions in the rate of application?
Q17	What further points should the Welsh Government take into account when considering this issue?
Q18	Do you agree with the proposals to reduce the minimum distance for spreading slurry near watercourses if more precise equipment is used?
Q19	Is the proposed minimum distance from watercourses (6 metres) correct, or does it pose an unacceptable risk of pollution?
Q20	Do you have any comments on how this proposal could work or be improved?
Q21	Do you agree with this proposed change to the SSAFO calculation? What other factors should be considered?
Q22	Do you agree that the Action Programme does not require any amendments with respect to the storage of solid livestock manures?
Q23	How do you think the Welsh Government could enact the earned recognition principle?
Q24	How else do you think the record keeping burden could be reduced whilst maintaining the environmental benefits of the Nitrates Directive?
Q25	What low intensity farming systems do you consider should not have to keep Nitrates Regulations records?
Q26	Should “low intensity” be defined in terms of the Nmax limit, manure Nitrogen applications, or both? Or should other factors be part of the definition (and if so, what are they)? For your preferred way of defining “low intensity”, what level(s) of the relevant measures would be appropriate?
Q27	Are there any situations where the above should not apply?
Q28	Do you agree in principle that certified organic farms should not have to comply with the record keeping requirements of the Nitrates Regulations?
Q29	What other quality assurance schemes are you aware of that keep sufficient records to enable exemption from the need to keep Nitrate Regulations records? We would be interested to discuss suggestions with those responsible for running such quality

	schemes.
Q30	Do you think cover crops should be included in the Action Programme?
Q31	If so, have we identified the correct circumstances (sandy soils over groundwater) for their use?
Q32	Are the suggested dates appropriate? If not, what dates would you suggest?
Q33	What actions do you consider should be defined to show compliance?
Q34	Do you agree that the exemption in Regulation 6 should be repealed?
Q35	Do you think the deadline for doing so (22 December 2015) is the right one?
Q36	Do you agree that a person constructing a store should notify the EA(W) of his/her intention to do so before firmly committing to the project?
Q37	How might we improve this provision?
Q38	We have asked a number of questions, but are there any other issues about the Action Programme you would like to raise?
Q39	Do you consider all the Action Programme measures should be implemented from 1 January 2013?

Annex 1: Description of the methodology for identifying individual NVZs

The areas recommended for designation are in line with the criteria set out in the Nitrates Directive - that is land draining to and contributing to the pollution of a “polluted” water, specifically:

- a **surface water** which has, or could have if action is not taken, a nitrate concentration greater than 50 mg per litre
- a **groundwater** which has, or could have if action is not taken, a nitrate concentration greater than 50 mg per litre
- a surface water which is **eutrophic**, or in the near future may become eutrophic if action is not taken.

This consultation includes maps of sufficient clarity to indicate the NVZs compared with existing designations and whether additional areas are identified or deleted. These maps are therefore an indication as to the possible extent of the NVZs.

Following this consultation and if the Welsh Government decide to continue with discrete NVZs, fully interactive field level maps will be published on the Environment Agency website. These maps can be used to determine whether individual parcels of land would fall within an NVZ and also the reason for its potential designation.

For information we have shown below on separate maps the extent and any potential changes of groundwater NVZs, the extent and any potential changes of surface water NVZs, and the extent and any potential changes of eutrophic NVZs. The map at figure 1 combines these areas (areas are designated under differing methodologies but the same area can be included under more than one designation method).

Methodology Working Group

The methods developed have been reviewed in detail during 2010 and 2011 by the Environment Agency, advised by a Defra Steering Group which included both UK and Welsh Government officials, stakeholders and independent academic experts. The ‘Methodology Working Group’ has been able to learn from the previous designation, and inform and challenge the development of the process.

We consider the use of the peer review process has improved the level of transparency of an otherwise very technical process.

The membership of the Methodology Working Group was:

Department for Environment Food and Rural Affairs.

Simon Crabbe,
Alex Bowness,
Alan D’Arcy

Welsh Government

James Dowling,
Tamlyn Rabey

Environment Agency

Robert Willows,
Alwyn Hart,
Simon Leaf,
Nigel Crane,
Ian Davey

Environment Agency (Wales)

Clare Blackledge

Countryside Council for Wales

Tristan Hatton-Ellis

WRc (Consultants for EA)

Andy Davey,
Rob Moore

Natural England

Lindsey Stewart
Alastair Burn

Independent Experts;

David Lerner (University of Sheffield)
Adrian Butler (Imperial College)
Anne Williams (British Geological Society)
Kevin Hiscock (University of East Anglia)
Stephen Maberly (Centre for Ecology and Hydrology)

Stakeholders

Michael Payne, National Farmers Union
Derek Holliday, CLA
Dafydd Jarrett, NFU Cymru
Rhian Nowell-Phillips, Farmers Union Wales
Sara Crocombe, Tenant Farmers Association
Luke de Vial, Wessex Water (for Water UK)

Methodology

The methodology used represents a robust and practical approach to the identification of polluted waters and NVZs, consistent with assessment approaches adopted for the Water Framework Directive (2000/60/EC) requirements and Groundwater protection. It makes use of all the available data; up to 20 years' worth of monitoring in some cases.

Surface Water Methodology

Surface waters affected by nitrate pollution were identified using a series of steps. These include dividing the country into a large number of surface water catchments in which all watercourses are deemed to be 'surface water'. The next step was analysing water quality monitoring data to find out whether the nitrate levels in the surface water were above 50mg/l. In parallel to this exercise, a modelling assessment of nitrate pollution in surface waters was undertaken which provides an additional assessment of the risk of nitrate pollution based on how the land is used. The combination of the results of these two methods provided an initial determination of whether the surface water was polluted.

Workshops were then held allowing local area Environment Agency staff to comment on the preliminary results of the assessment and to highlight, for example, where other sources of pollution may have been the reason for high nitrate levels. The workshops were attended by observers from external stakeholder groups. The next and final stages were to check whether the land that drains into the 'polluted' waters.

Figure 2 shows the land identified as draining to polluted surface water.

Surface water NVZs would cover 1.6% of Wales. For surface water NVZs some small areas have been added as shown on the indicative map. Please note that some of this land may remain designated because of polluted groundwater or eutrophication and therefore the percentage figures of the three indicative maps are not cumulative.

These maps are not intended to be definitive at this stage, but rather to give a good overall picture of the extent of likely designations based on the water quality analysis that has been carried out.

Groundwater Methodology

Groundwaters affected by nitrate pollution were identified using a series of steps. Water quality monitoring data was analysed to determine the mean nitrate concentration in mid 2010 and the predicted mean nitrate concentration in 2025 to determine if the water was, or was likely to become, polluted. If the mean current or predicted nitrate concentration of a groundwater exceeds 50mg/l, it is deemed to be polluted and these areas were mapped.

The area of the 'failed' groundwater is then determined. In parallel, as for surface water, an assessment of nitrate leaching to groundwater using land use data was modelled. The outputs of these 2 methods were combined to provide an initial assessment of whether a ground water was polluted, and the confidence of that conclusion. As for surface water, to incorporate local knowledge and understanding, the results were reviewed and modified where necessary by groundwater quality teams within the Environment Agency at local workshops, which were attended by observers from external stakeholder groups.

Land that is directly above a polluted groundwater does not necessarily drain into it and therefore the final stage was to use geology and other hydrogeological features such as surface water outflows and groundwater flow lines to delineate the catchments of the 'polluted' groundwater.

Figure 3 below shows the land identified as draining to polluted groundwater. Groundwater NVZs would cover 0.8% of Wales.

Methodology for eutrophic waters

Assessing eutrophication is complex. It describes a process of change rather than a state. It is not possible to assess whether a water is, or may become, eutrophic simply by reference to a single numeric threshold such as a nitrate concentration. Whether a water is eutrophic depends on a large number of variables in addition to the concentration of nutrients. It is necessary to consider the current condition of the water body, including its ecology, and whether undesirable effects and the growth of algae or plants are due to Nitrogen inputs. As with the surface and groundwater assessments, we are also required to consider whether such effects may occur if preventative action is not taken. All these elements are included in the methodology and conclusions are reached based on the weight of the evidence of eutrophication.

Criteria have been established for the relevant water types to decide whether waters are affected by eutrophication. The Environment Agency identified polluted waters if sufficient nitrate was present to promote eutrophication and the elevated nutrient concentrations were having an adverse impact on the plant life in the waters. Information on the impact on water quality and use (e.g. recreation or conservation value) of the water bodies was also considered. Therefore a number of factors were considered in order to come to a rounded judgement, taking into account the weight of evidence, as to whether an individual water was suffering from eutrophication or might do so without preventative action. Having identified candidate eutrophic water bodies the Environment Agency convened a national panel of its own and external experts to ensure consistency in application of the assessment procedure.

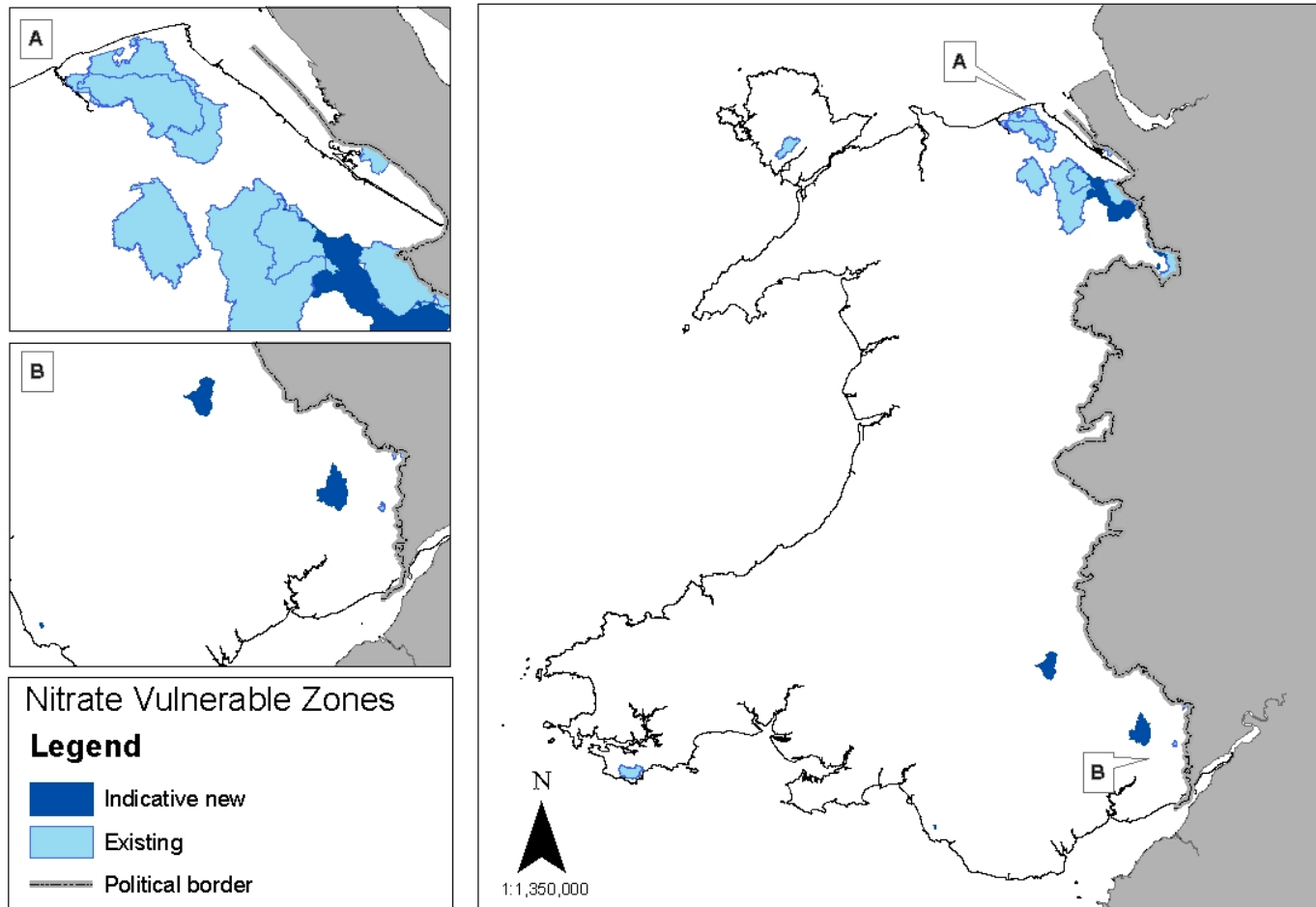
External, academic experts were included on the panel because of the greater degree of expert judgement that this methodology requires (compared with the surface and groundwater processes). Observers from stakeholder groups also attended the panel meetings. The final stage was that the land draining to these surface waters was identified.

Figure 4 below shows the land identified as draining to eutrophic water. Eutrophic NVZs would cover 0.3% of Wales.

Figure 1 combines the three individual maps. It shows all three classifications of NVZ, overlapping where this occurs. In total, taking account of the overlaps, about 2.5% of Wales would be indicative NVZs using this methodology. This compares with 2.3% that was identified following the consideration of appeals

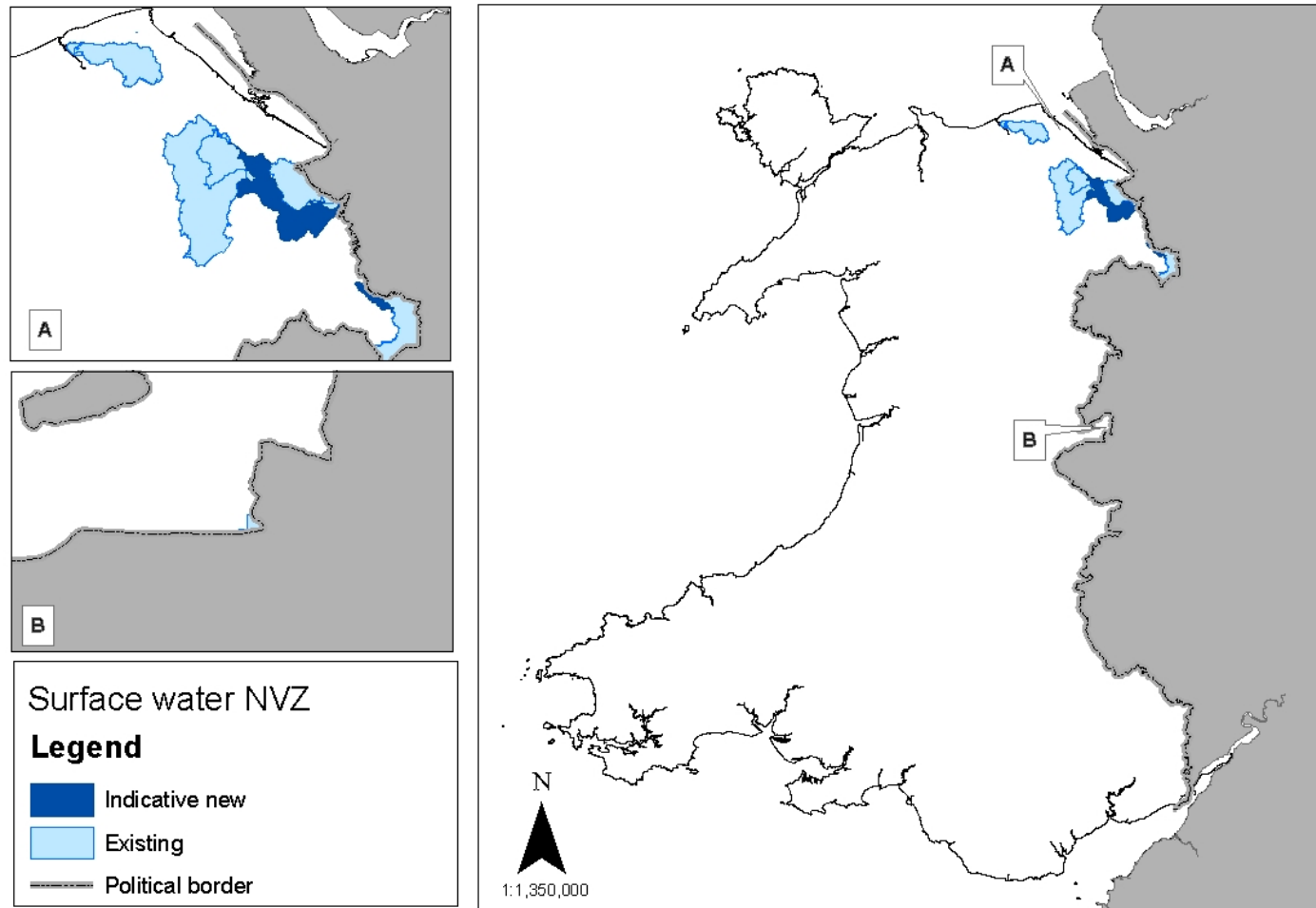
in the last round. The indicative NVZ figure of 2.5% may slightly rise or fall as new water catchment boundaries and as the indicative boundaries are firmed up with field boundaries or other features over the next few months.

Figure 1 – Combined NVZ areas



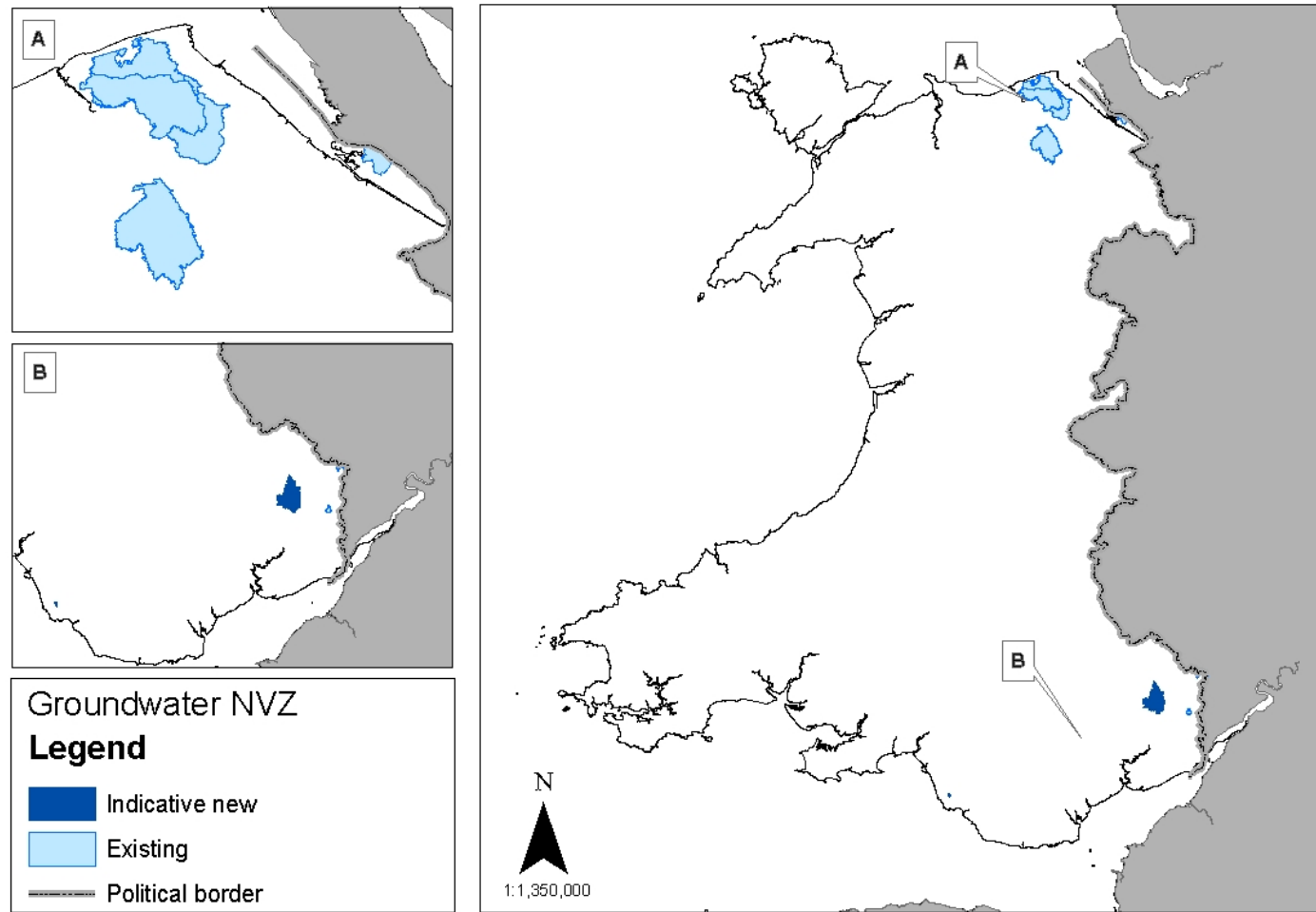
Esri and ArcGIS are registered trademarks of Esri Inc. All rights reserved. This map includes data supplied under license from: Crown copyright 2011. Ordnance Survey license number 100026380. Some features are based on digital spatial data licensed from the Centre for Ecology and Hydrology, CEH license number 19902. Map produced 14/11/2011

Figure 2 – Surface Water NVZ



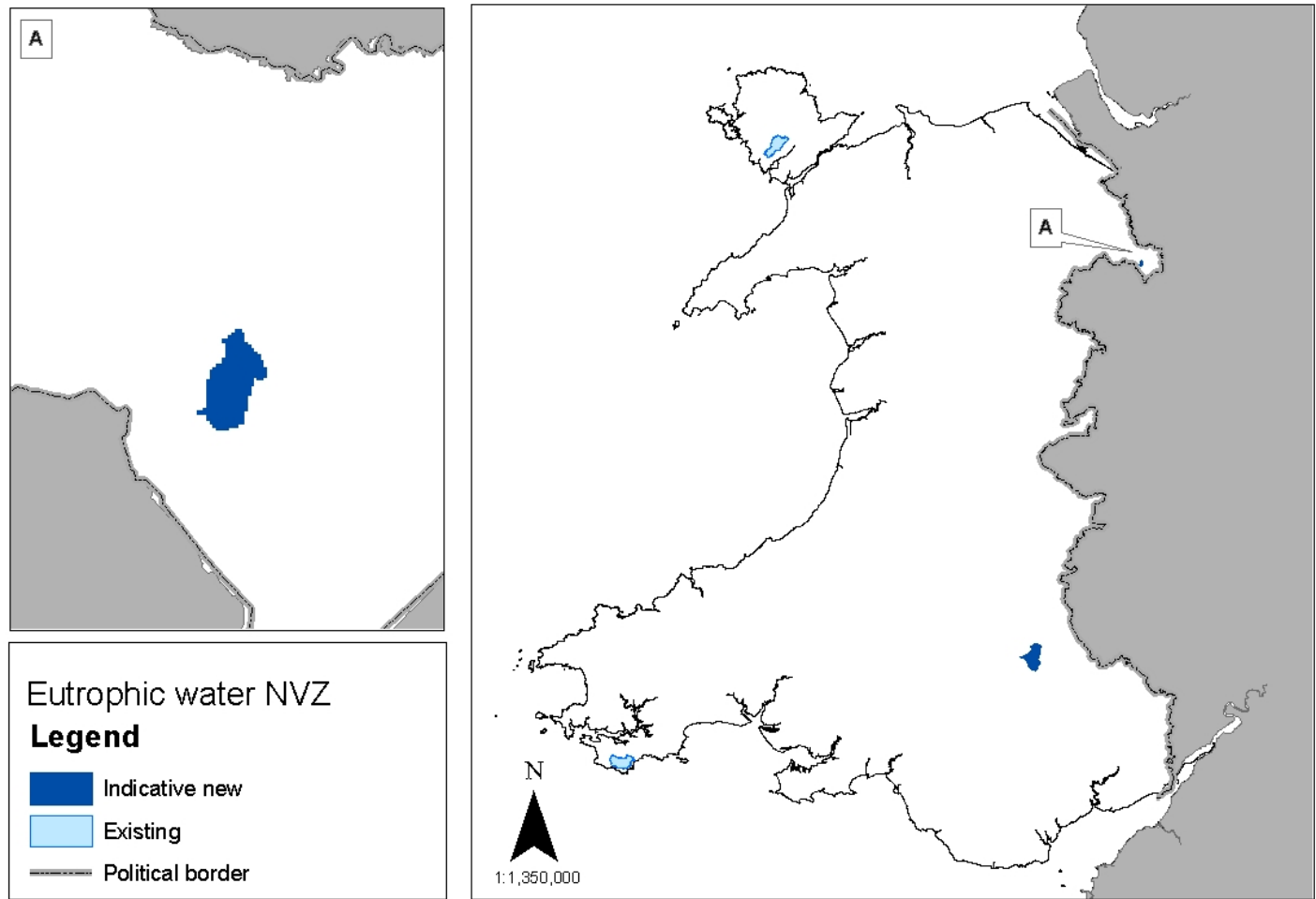
Environment Agency copyright 2011. All rights reserved. This map includes data supplied under license from: Crown copyright 2011. Ordnance Survey license number 100026380. Some features are based on digital spatial data licensed from the Centre for Ecology and Hydrology. CEH license number 198 u2. Map produced 14/11/2011

Figure 3 – Groundwater NVZ



Environment Agency copyright 2011. All rights reserved. This map includes data supplied under license from: Crown copyright 2011. Ordnance Survey license number 100026380. Some features are based on digital spatial data licensed from the Centre for Ecology and Hydrology. CEH license number 198 u2. Map produced 14/11/2011

Figure 4 – Eutrophic NVZ



Environment Agency copyright 2011. All rights reserved. This map includes data supplied under license from: Crown copyright 2011. Ordnance Survey license number 100026380. Some features are based on digital spatial data licensed from the Centre for Ecology and Hydrology. CEH license number 198 u2. Map produced 14/11/2011