

<b>Title:</b> Agriculture England, Water England - The Nitrate Pollution Prevention (Amendment) Regulations 2013 <b>IA No:</b> DEFRA1448  <b>Lead department or agency:</b> Defra  <b>Other departments or agencies:</b> Environment Agency	<b>Impact Assessment (IA)</b>		
	<b>Date:</b> 27/11/2012		
	<b>Stage:</b> Final		
	<b>Source of intervention:</b> EU		
	<b>Type of measure:</b> Secondary legislation		
<b>Contact for enquiries:</b> Alex Bowness 020 7238 6710 alex.bowness@defra.gsi.gov.uk			
<b>Summary: Intervention and Options</b>			<b>RPC Opinion:</b> <span style="background-color: #90EE90;">RPC Opinion Status</span>

Cost of Preferred (or more likely) Option			
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, Measure qualifies as One-Out?
-£8.3m	£2.9m	-£0.03m	Yes   OUT

**What is the problem under consideration? Why is government intervention necessary?**

The Nitrates Directive is aimed at reducing water pollution from agriculture and requires the Government to review both our designation of Nitrate Vulnerable Zones (NVZs), and the Action Programme of measures that applies inside them, every four years. New evidence shows that the area covered by NVZs should now be reduced, but that within NVZs some further measures to reduce nitrate pollution are needed. New designations and rules will come in two phases, the bulk by 1 March 2013, the rest by 1 July 2013, to help reduce nitrate pollution from agriculture to water. The shape of the Action Programme is informed by responses to public consultation, scientific evidence and on negotiations with the European Commission.

**What are the policy objectives and the intended effects?**

The objective is to support agriculture and reduce the burden of reporting for farmers, improve the environment, and fulfil our obligations under the Directive. The Nitrates Directive seeks measures that reduce water pollution from agriculture. The measures within the Action Programme are aimed at reducing nitrate pollution from agriculture that are cost-effective and will gain Commission approval. Government will be looking to improve 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 increased losses of another pollutant).

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)**

The government response resulted in a combination of the options presented at consultation stage plus the renewal of the derogation. Designating all of England (the 4<sup>th</sup> consultation option) was ruled out at that stage. Three options are presented.

Option 1 – ‘Doing Nothing’ - maintain the existing Action programme within discrete zones. This is the counterfactual against which other options are being assessed. Doing nothing poses EU Infraction risks and is not considered as a genuine option. Option 2- Proposals focusing on reducing some reporting requirements, maintaining the targeted approach and applying for a derogation to allow more livestock manure to be used on grassland farms. This Option provides the greatest benefits to dairy businesses but there are additional environmental costs arising from higher estimated greenhouse gas losses.

Option 3- As in Option 2 –but without the derogation application..

<b>Will the policy be reviewed?</b> It will be reviewed. <b>If applicable, set review date:</b> 01/2016					
Does implementation go beyond minimum EU requirements?				Yes / No / N/A	
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.		<b>Micro</b> Yes	<b>&lt; 20</b> Yes	<b>Small</b> Yes	<b>Medium</b> Yes
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)				<b>Traded:</b>	<b>Non-traded:</b> 0.1m p.a

***I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.***

Signed by the responsible Minister: \_\_\_\_\_ **Richard Benyon** \_\_\_\_\_ Date: \_\_\_\_\_ **25th April 2013** \_\_\_\_\_

# Summary: Analysis & Evidence

# Policy Option 1

Description:

## FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2013	Time Period Years 4	Net Benefit (Present Value (PV)) (£m)		
			Low: 0	High: 0	Best Estimate: 0

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	0
High	0	0	0
Best Estimate	0	0	0

### Description and scale of key monetised costs by 'main affected groups'

NA - this is the counterfactual against all other options are assessed. Under this option the current derogation that exempts farmers from needing to reduce the number of cows they are allowed per hectare (stocking density) would expire and would imply a financial cost of £2.9m. The avoidance of this financial cost through a new derogation is included here among the benefits of Option 2. Similarly the associated environmental impacts are included among the costs of Option 2.

### Other key non-monetised costs by 'main affected groups'

Maximum of 5 lines

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	0
High	0	0	0
Best Estimate	0	0	0

### Description and scale of key monetised benefits by 'main affected groups'

Maximum of 5 lines

### Other key non-monetised benefits by 'main affected groups'

Maximum of 5 lines

Key assumptions/sensitivities/risks

Maximum of 5 lines

Discount rate (%)

3.5

## BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:	In scope of OIOO?	Measure qualifies as
Costs: 0	No	NA
Benefits: 0		
Net: 0		

# Summary: Analysis & Evidence

# Policy Option 2

**Description:** Preferred option to implement new action programme and apply for a derogation

## FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2013	Time Period Years 4	Net Benefit (Present Value (PV)) (£m)		
			Low: £0.2m	High: -£17.4m	Best Estimate: -£8.3m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	£1.7m	£6.4m
High	0	£7.9m	£29.0m
Best Estimate	0	£4.2m	£15.6m

### Description and scale of key monetised costs by 'main affected groups'

**New Territories:** cost of new slurry stores (PV of £0.6m) and administrative burden to farms new to NVZ (PV of £1m). **Action Programme (AP):** increased ammonia (PV of £1.5m) and increased cost to farmers of fertiliser (PV of £0.2m). Both from extension of period in which farmers are prohibited from spreading manure (closed period). **Derogation:** increased GHG losses from permitting farmers to spread more manure (PV of £11.5m) administrative cost (PV of £0.4m) and new on-farm measures (PV of £0.3m).

### Other key non-monetised costs by 'main affected groups'

Potential increase in fertiliser costs to farmers from increasing the maximum amount of nitrogen that can be applied (Nmax) for crops with robust evidence of need.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	£1.8m	£6.6m
High	0	£3.2m	£11.6m
Best Estimate	0	£2.0m	£7.3m

### Description and scale of key monetised benefits by 'main affected groups'

**New Territories:** environmental benefit from extension of closed period (PV of £0.8m) and administrative saving to farms removed from NVZ (PV of £1.6m). **Action Programme:** environmental benefit of reduced GHG and nitrate losses from extension of closed period (PV of £1m) and reduced administrative burden for low intensity farmers (PV of £0.1m). **Derogation:** benefit to farmers of maintaining a higher number of dairy cows per hectare and fertiliser saving (PV of £3.7m).

### Other key non-monetised benefits by 'main affected groups'

Reduced risk of N pollution from including organic sources of nitrogen when calculating the nitrogen limit for most crops. Increased crop yields from increasing the Nmax for crops (this is the maximum amount of nitrogen permitted to be applied to a crop) with robust evidence of need. Reduced risk of N pollution from revised nitrogen efficiency factors. Environmental benefits and fertiliser savings from allowing spreading closer to watercourses for farms using precision techniques.

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

The analysis assumes that there is full compliance with both the current and proposed AP, that there will be no additional environmental costs as a result of removing farms from an NVZ area and that farmers will not need to increase their storage capacity in order to comply with the extended closed period. Relaxing these assumptions would increase the costs of this option.

## BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £0m	Benefits: £0.03m	Net: £0.03m	Yes	OUT

# Summary: Analysis & Evidence

# Policy Option 3

**Description:** Implement new action programme and do not apply for a derogation

## FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2013	Time Period Years 4	Net Benefit (Present Value (PV)) (£m)		
			Low: 0	High: £0.4m	Best Estimate: £0.2m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	£3.3m
High	0	£0.9m	£3.4m
Best Estimate	0	£0.9m	£3.4m

### Description and scale of key monetised costs by 'main affected groups'

**New Territories:** capital cost of new slurry stores (PV of £0.6m) and administrative burden to farms new to NVZ (PV of £1m).

**Action Programme:** environmental cost of increased ammonia from (PV of £1.5m) and increased cost to farmers of fertiliser (PV of £0.2m). Both from extension of closed period.

### Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	£0.9m	£3.4m
High	0	£1.0m	£3.8m
Best Estimate	0	£0.9m	£3.6m

### Description and scale of key monetised benefits by 'main affected groups'

**New Territories:** environmental benefit from closed period (PV of £0.8m) and administrative saving to farms removed from NVZ (PV of £1.6m).

**Action Programme:** environmental benefit of reduced GHG and nitrate losses from extension of closed period (PV of £1m) and reduced administrative burden for low intensity farmers (PV of £0.1m).

### Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
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## BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £0m	Benefits: £0.03m	Net: £0.03m	Yes	OUT

## 1.0 Problem under consideration

Implementing the Nitrates Directive contributes to Defra's strategic priority of improving water quality and indirectly to improving the natural environment more generally. Because the Directive's immediate impact is on the way farmers manage their land, it is also important to the productivity and competitiveness of the farming industry.

Leaching of nitrates into water courses can have an adverse effect upon ecosystem health, including water, biodiversity, climate, as well as human health. However control measures to minimise leaching can be put in place to protect water courses. The Nitrates Directive has been in force since 1991 and requires Member States to establish a code of good agricultural practice to be applied by farmers on a voluntary basis throughout their national territory. In addition, the Directive requires an Action Programme of measures to be implemented by farmers either within areas of the country draining to nitrate-polluted waters (Nitrate Vulnerable Zones) or across the whole of the country (Whole Territory Approach). These measures are designed to reduce the level of nitrate leaching into both groundwater and surface watercourses and thereby protect ecosystems and improve water quality.

The Nitrates Directive requires Government to review both the designation of Nitrate Vulnerable Zones (NVZs), and the Action Programme (AP) of measures that applies inside them, every four years. The Government is required to do this for England, and have any new designations and measures in place by 1 January 2013.

The Government has also applied for a derogation from the Nitrates Directive in England through the introduction of Regulations which would:

- Amend Regulation 12 of the Nitrate Pollution Prevention Regulations 2008, which limits the amount of livestock manure applied to the land each year to 170 kg N/ha, to allow a higher limit of 250 kg N/ha per year on grassland farms; and
- Establish the application procedures and additional mandatory controls that must be followed by individual farms wishing to benefit from a derogation.

### Case for Government Intervention

Reactive nitrogen has both positive and negative outcomes. In the agricultural context it can increase soil fertility and productivity and thus increase crop yields. One way in which reactive nitrogen is formed is through the production of Ammonia by the Haber–Bosch process and then used in agriculture to increase food, feed and fuel production. While the use of nitrogen as a fertiliser and chemical product has brought enormous benefits, losses of fertiliser nitrogen to the environment lead to many negative side effects on ecosystem health, including water, biodiversity, climate, as well as human health.

Nitrogen is an essential nutrient for plant growth and is therefore vital in food production. However, the use of nitrogen in manures and manufactured fertilisers poses risks to water quality (nitrate, ammonium), air quality (Ammonia and nitrous oxide – a greenhouse gas), biodiversity and soil quality. Over application and application during wet periods of organic fertilisers results in leaching of reactive nitrogen which harms water courses, biodiversity and reduces water quality.

The Water Framework Directive requires Member States to achieve 'good status' in all water bodies (surface and groundwater) by 2015 or such later date or such lower objective as may be justified in River Basin Management Plans adopted under that Directive. The Nitrates Directive (1991) and the Urban Waste Water Treatment Directive were confirmed as basic (obligatory) measures to implement the objectives of the Water Framework Directive. England faces a series of problems affecting the quality of its rivers, lakes, estuaries, coastal and marine waters, and ground waters.

Work is progressing to define the scale of the problem and the reasons for failure of water bodies. What we do know is that sensitive areas have to be specially protected because they provide vital services to society (nitrates from agriculture is the primary reason for 70% of Groundwater Drinking Water Protected

Area failures, Faecal Indicator Organisms from agriculture are the cause of 80% of bathing water failures against the revised standards and 25% of the phosphate that causes Surface Water failures is from farming). Analysis by the Environment Agency indicates that the greatest agricultural pressure is diffuse pollution (number of small sources) but it is also noteworthy that inappropriate management of slurry is reported to be responsible for over 60% of the serious pollution incidents caused by agriculture. Agriculture as a sector has been responsible for between 15- 20% of serious water pollution incidents over the past 5 years.

## 2.0 Introduction

This Impact Assessment (IA) is a final IA of the 2013-2016 Nitrate Action Programme and has been developed in light of responses to the consultation 'The Protection of Waters against Pollution from Agriculture: Consultation on Implementation of the Nitrates Directive in England 2013-2016', which closed in March 2012. It provides an assessment of the costs and benefits of the different proposals in the new Action Programme. The Government response on Nitrates was published on 28 August 2012, delivering many of farmers' demands. The Government are to designate discrete areas as 'Nitrate Vulnerable Zones' rather than the whole of England. Defra is negotiating the continuation of the grassland-derogation for the coming four years to help dairy farmers. We have introduced reduced red-tape exempting non-intensive farmers from record keeping; reduced inspection for responsible farmers with nutrient management plans; and increased flexibility for specialist grass and top fruit producers. However, some concerns raised in the consultation could not be addressed in the short time available. The Government have therefore announced that three studies by industry experts will explore flexible start and end dates for closed periods (when nitrate application to land is prohibited), the case for a two-tier grassland derogation, and review of the regulations relating to the construction standards for structures on farms storing slurry and fuel oil.

The Nitrates Directive requires, as a minimum, that Member States designate discrete Nitrate Vulnerable Zones (NVZs) that drain into polluted waters and within which an Action Programme (AP) of measures is implemented by farmers. As an alternative, Member States may apply Action Programmes across the whole of their national territory. Ten EU countries have opted for the latter approach, including the UK in respect of Northern Ireland

To date, in England the Government have opted to take a targeted approach and designate NVZs which currently cover approximately 62% of land in England. 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. 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 the minimum of additional costs associated with implementation of the Directive. We propose to continue with a targeted approach under the new AP.

Because the Government has opted to take a targeted approach for England, the Nitrates Directive requires the Government to review the designation of NVZs, and the AP of measures that apply within them, every four years. This IA assesses the impact of proposals for the new AP.

The existing AP has been in place since January 2009 and many of the most recent surface and ground water monitoring results have shown a reduction in nitrate concentrations<sup>1</sup>. This improvement can in part be attributed to the effect of the current and previous APs.

In selecting the final package of measures to meet the obligations under the Nitrates Directive the Government has sought the best proposals for achieving the following goals:

- Improving the efficiency with which all sources of nitrogen are used on farms

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<sup>1</sup> based on monitoring data collected by the Environment Agency over the period 1980 – 2009



- Achieving as cost-effectively as possible reductions in losses of nitrogen from agriculture (with associated benefits of improving water and air quality, and enhancing biodiversity)
- Minimising pollution swapping (i.e. reducing losses of one pollutant that results in increasing the losses of another pollutant)
- Delivering coherent interventions on Defra's two main priorities – supporting agriculture and improving the environment
- Reducing the burden of reporting for farmers

### Current Water Pollution Levels

Much has happened since the last review. In broad terms nitrate pollution has fallen, though there have been some areas where it has increased. It is difficult to ascribe causes with certainty, though one important factor in addition to the effect of the Nitrates Action Programme is likely to have been the continuing reduction in the use of manufactured nitrogen fertilisers.

One aspect of enhancing the environment is the implementation of the Water Framework Directive, and the size of this task is becoming increasingly clear. At present only about 28% of water bodies meet the Directive's objective of good status. To raise this figure, the Government announced on 22 March 2011 its intention to take a catchment-based approach (working with local people to find local solutions to local challenges) to meeting the Directive's aims more widely. This was an approach that the Task Force on Farming Regulation strongly endorsed in its report to the Government, published in May.

Figure 1 shows the extent of the formal recommendation for NVZ designations made by the Environment Agency to the Secretary of State in August 2012. In total about 59% of England was recommended to be NVZs using the agreed formal methodology. This is a reduction from the current 62% designated. The 59% figure may be slightly reduced further following the consideration of the formal appeals process which is ongoing in parallel to the preparation of this IA.

### **Overview of proposed new NVZ area:**

The proportion of agricultural land in England covered by current NVZ Regulation is estimated to be around 63%. This is expected to fall by 3% to around 59%. The impact of the proposed changes on farms designated as being within an NVZ area is set out in tables 1 and 2. Overall we expect a net reduction of 6,700 farmers within NVZs.

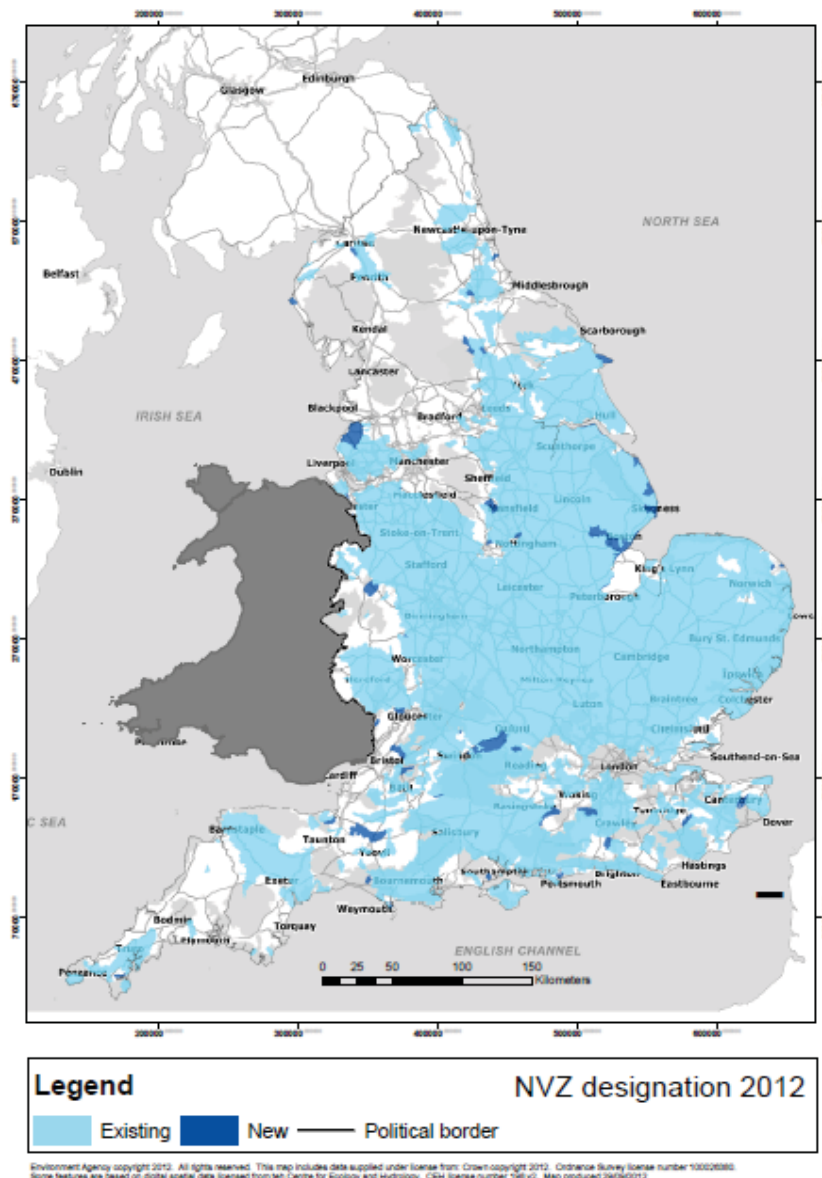
**Table 1: Commercial dairy farms - England**

	Total farms in NVZ from 2013	In	Out	Net change
National	3,800	120	460	-340

**Table 2: All commercial farms - England**

	Total farms in NVZ from 2013	In	Out	Net change
National	106,000	2,700	9,400	-6,700

**Figure 1 Recommended NVZ Designation**



### Action Programme for 2013-2016

Within NVZs farmers must comply with certain long-standing good farming practices aimed at reducing nitrate pollution. As a set of measures they are known as the “Action Programme”. Basically these are:

- Introducing “closed periods”, when slurry and manufactured fertilisers must not be put on the land because there is no crop demand for it and it is very likely to pollute fresh water. Closed periods broadly cover autumn and early winter. (The upside of this is that saving slurry to apply it when its nutrients can be used by plants reduces manufactured fertiliser bills.)
- Having sufficient storage capacity for the slurry to ensure it can be kept until the time is right to use it.
- Planning all fertiliser (including manure) applications carefully to meet crop needs.
- Recording what has actually been applied, so that adjustments can be made in year as necessary.

Many of the measures to reduce nitrates (manure storage, nutrient management) are also those that reduce other contaminants. These include phosphates, greenhouse gases, faecal contamination of



bathing waters and ammonia emissions to air. The cost effectiveness of measures improves the full range of environmental improvements they bring are considered together.

The Government has now published its response following the consultation. The response outlines a range of modest, evidence-based changes to the action programme. These include an extension of the closed period on medium and heavy land, a reduction in record-keeping for low intensity farmers, and a reduced priority for inspection for farmers who complete a full nutrient management plan.

### 3.0 Analysis

#### 3.1. Summary of Options

Three options are considered:

'Doing Nothing' - maintain the existing Action programme within discrete zones (this poses EU Infracton risks) and is not considered as a preferred option. Some dairy farms currently have a derogation that exempts them from needing to reduce the number of cows they are allowed per hectare (stocking density). Doing nothing will mean that the derogation will expire, and that the farms that receive it would need to reduce the number of dairy cows per hectare on their farm at an estimated financial cost of £2.9m. Doing nothing would have no additional benefits since there is no change to current position. This is the counterfactual against which all options are being assessed.

Option 2- A package of proposals focusing on reporting requirements that reduce and simplify NVZ regulation but maintains current targeted approach and includes a successful application for a new derogation which allows a higher quantity of livestock manure to be applied per year on grassland farms.

Option 3- As in Option 2 but without the successful derogation application.

The costs and benefits of Option 2 and 3 are set out below. Since Option 3 is the same as Option 2 but without the derogation, the costs/benefits are not set out in detail.

Option 2 is the preferred option. Option 2 provides the greatest benefits to all farmers within the proposed NVZs through maintaining the targeted approach, providing greater flexibility for some specialist grass growers and fruit growers and reduced paperwork for low intensity farmers. Option 2 also includes the negotiation of a derogation from the Commission to allow more livestock manure to be used on grassland farms. This specifically benefits dairy businesses who, without the derogation, may have to leave the industry. Defra wish to continue the derogation to support the dairy industry through the current dairy crisis. There are additional environmental costs arising from the granting of the derogation through higher estimated greenhouse gas losses.

The estimated costs and benefits of Option 2 are outlined in Table 3.

**Table 3: Costs and Benefits of Option 2 over the 4 year period (£millions)**

Year	2013	2014	2015	2016	PV
<b>Costs</b>					
1. Derogation	3.3	3.3	3.3	3.3	12.2
2. Action Programme	0.5	0.5	0.5	0.5	1.7
3. New Territories	0.2	0.4	0.4	0.4	1.6
<b>Total</b>	4.0	4.2	4.2	4.2*	15.6*
<b>Benefits</b>					
1. Derogation	1.0	1.0	1.0	1.0	3.7
2. Action Programme	0.3	0.3	0.3	0.3	1.2
3. New Territories	0.7	0.7	0.7	0.7	2.4
<b>Total</b>	2.0	2.0	2.0	2.0*	7.3*

<b>NPV</b>					
<b>Net Present Value</b>	-2.0	-2.2	-2.2	-2.2	-8.3*

(Note figures may not sum due to rounding) \*These best estimates are as seen on summary pages 1, 3 and 4

The NPV of Option 2 is -£8.3m. This suggests that the costs of Option 2 outweigh the benefits by £8.3m. The highest costing component of the option is the derogation. The majority of this cost is due to the higher estimated greenhouse gas losses from allowing farmers to have a higher stocking density. Two key benefits have higher contributions to the NPV than the other benefits. The first is the administrative saving of removing 9,400 holdings from the NVZ area. The second is the economic benefit to dairy farmers of maintaining their stocking densities by receiving a derogation.

The alternative option is Option 3. The estimated costs and benefits of Option 3 are outlined in Table 4.

**Table 4: Costs and Benefits of Option 3 over the 4 year period (£millions)**

Year	2013	2014	2015	2016	PV
<b>Costs</b>					
<b>1. Action Programme</b>	0.5	0.5	0.5	0.5	1.7
<b>2. New Territories</b>	0.4	0.4	0.4	0.4	1.6
<b>Total</b>	0.9	0.9	0.9	0.9*	3.4*
<b>Benefits</b>					
<b>1. Action Programme</b>	0.3	0.3	0.3	0.3	1.2
<b>2. New Territories</b>	0.7	0.7	0.7	0.7	2.4
<b>Total</b>	1.0	1.0	1.0	1.0*	3.6*
<b>NPV</b>					
<b>Net Present Value</b>	0.1	0.1	0.1	0.1*	0.2*

\*These best estimates are as seen on summary page 4

The NPV of Option 3 is £0.2m. This suggests that the benefits of Option 3 outweigh the costs by £0.2m. Option 3 is the same as Option 2 minus the costs and benefits of the derogation. The costs and benefits of the Action Programme and new territory designations remain the same as in Option 2.

### 3.2. Methodology

#### a) Variables of Interest

- Some proposals within the reviewed Nitrates Directive will increase capital costs to farmers. The benefits from more efficient manure application include potential reductions in 3 types of pollution: (i) Greenhouse Gas (GhG) emissions to air; (ii) Ammonia emissions to air; and (iii) Nitrate-N and soluble phosphorus emissions to water. There is also the potential benefit to farmers of reduced synthetic fertiliser costs and time savings from reduced administrative costs.

#### b) Valuations

- The full range of variables that are impacted by the different proposals and their monetary value used in the analysis is given in table 5 below. Although the central cost of carbon for non-traded GhG emissions in the UK is estimated to £58tCO<sub>2</sub>e in 2014 the full range of the monetary cost estimate is £29-£87 per tonne of CO<sub>2</sub>e, a range of +- 50%. Similarly the damage cost estimate associated with Ammonia emissions fall over a large range. The central estimate used in the analysis is £2,238 but the full range is £1,745 to £2,543 per tonne, a -22% +14% range. Sensitivity analysis has been carried out but only discussed in the text where it makes a meaningful impact on the outcome of the central analysis i.e. it changes the sign of the NPV.
- Monetary costs/benefits of changes in emissions and fertiliser demand is estimated by change in tonnes multiplied by monetary value per tonne.

4. The monetary estimates of the costs and benefits of the individual proposals are set out in the next section. The analysis assumes that there is full compliance with both the current and proposed AP. Should compliance be less than that assumed in the baseline then costs and benefits will both be less but the net monetary effect will be in the same direction.

**Table 5: Variable impacted on and their monetary value**

Variable	Monetary Value (£)
<b>Capital cost</b>	Will vary by proposal
<b>Operational costs</b>	Will vary by proposal
<b>Fertiliser savings (t)</b>	£345 per tonne of product or £1,000 per tonne of nitrogen
<b>GhG savings (t)</b>	£29 to £87 per tonne in 2011 prices <sup>2</sup>
<b>Ammonia savings (t)</b>	£1745 to 2543 per tonne of ammonia <sup>3</sup>
<b>Nitrate-N savings (t)</b>	£716 per tonne of nitrogen <sup>4</sup>

### c) Time Horizon

5. The costs and benefits of the proposals have been assessed over a 4 year period. The time period is 4 years because the Nitrates Directive Action Programme and territory designations will be reviewed in 2016, and the derogation will expire. However we recognise it is likely that the measures contained within the Action Programme would have environmental benefits greater than those assessed over the 4 year period if they were to continue beyond 2016. The ratio of costs to benefits for Options 2 and 3 is constant after year 1, and so could be used to give an indication of the relative costs and benefits beyond 2016.

## 3.3 Results

**Option 2:** A package of proposals focusing on reporting requirements that reduce and simplify NVZ regulation but maintains current targeted approach and includes a successful application for a derogation which allows a higher quantity of livestock manure to be applied per year on grassland farms.

The regulations assessed in this option can be split into three parts:

1. New Territory Designations
2. Revised Action Programme
3. Derogation

The analysis set out below looks at each of these parts in order. Each section consists of a brief explanation of the change to regulations, the method we have used to calculate the costs and benefits, and our estimates of the costs and benefits based on the best available information.

### 3.3.1. New Territory Designations

Defra decided to continue with discreet NVZ designation, rather than designate the whole of England as a NVZ. The 4 yearly review has resulted in a reduction in the area covered by NVZs from 62% to around 59% of England. This reduction reflects a gradual, though clear downward trend in nitrate pollution over the last four years. It means that about 9,400 holdings will be de-designated compared with 2,700 being brought into NVZs.

#### Costs

The costs set out below have been split into three sections. The first two sections consider the costs to farms that have been put in an NVZ for the first time. These costs consist of the capital costs to dairy, beef and pig farmers of new slurry stores, and the administrative burden of complying with the regulations. The final section considers the potential costs to the environment of removing holdings from the NVZ areas.

<sup>2</sup> <http://www.decc.gov.uk/assets/decc/11/cutting-emissions/carbon-valuation/3136-guide-carbon-valuation-methodology.pdf>.

<sup>3</sup> Range of £1,745-£2,543/t taken from: <http://archive.defra.gov.uk/environment/quality/air/airquality/panels/igcb/guidance/damagecosts.htm>

<sup>4</sup> Estimate taken from Defra project 'Economic benefits of measures to reduce diffuse water pollution from agriculture (DWPA) in England'

## a) Capital Costs

### Farm Types Affected: Dairy, Pigs and Beef

New NVZ farms will need to ensure that they have sufficient slurry storage to comply with the NVZ regulations that prohibit the spreading of slurry during the closed period. The largest cost to newly designated farms will be the cost to the intensive livestock sectors of investing in new slurry stores. The cost faced by each farm will vary depending on the existing storage capacity, and the numbers, breed and age of livestock on that farm.

Under the NVZ regulations, pig and poultry farms are expected to have 6 months manure storage capacity and dairy and beef farms 5 months. Farms that are not in NVZ territories are required to have 4 months of storage capacity under Silage, Slurry and Agricultural Fuel Oils (SSAFO) regulations, although the calculation of storage capacity is slightly different to under NVZ regulations. Newly designated indoor pig, dairy and beef farms are the most likely to need to purchase new slurry stores because they are the most likely to have slurry based systems. By contrast, poultry farms are less likely to need to invest in new stores because poultry manure tends to be solid, and so can be stacked in fields. Tables 6 and 7 compare the storage needed by model dairy and pig farms under the Nitrates Directive and SSAFO regulations respectively. We assume that the additional storage requirement for beef farms per cow is the same as for dairy farms.

The typical farms are consistent with those set out in the 'Mitigation Methods User Guide' produced by ADAS in 2011 as part of Defra project WQ0106.

**Table 6: Storage Requirement for model dairy farm in NVZ areas compared to SSAFO regulations (m<sup>3</sup>)**

Rainfall	NVZ 5 months (22 wks)	SSAFO 4 months (18 wks)	Difference
600mm	1618	1466	152
800mm	1670	1536	134
1000mm	1723	1607	116

**Table 7: Storage Requirement for model pig farm in NVZ areas compared to SSAFO regulations(m<sup>3</sup>)**

Rainfall	NVZ 6 months (22 wks)	SSAFO 4 months (18 wks)	Difference
600mm	2843	1994	849
800mm	2981	2152	829
1000mm	3119	2310	809

The analysis assumes that only pig, dairy and beef farms face the capital costs of new slurry storage. We assume full compliance with SSAFO prior to the farms being in an NVZ, and full compliance with the Nitrates Directive once they are in the NVZ. The average volume of extra storage required was calculated on a per animal basis by ADAS using PLANET software. We have scaled this up to the national level using the livestock numbers in the newly designated areas based on Defra's June Survey Census data in 2010<sup>5</sup>. The analysis uses 2011 prices in each year. It implicitly assumes that the price of building a slurry store relative to purchasing other goods does not change over the 4 year appraisal period.

The costs of additional slurry storage capacity have been assumed to be £54/m<sup>3</sup> for steel or concrete stores, and £44/m<sup>3</sup> for lagoons<sup>3</sup> based on the cost of an above ground steel/concrete tank in 'The Farm Management Pocketbook' adjusted for inflation (Nix, 2013). It is assumed that farms take out a loan to

<sup>5</sup> Outdoor pig farms and dairy farms with fewer than 100 dairy cows have been excluded. This is based on expert judgement on the types of farms with slurry based systems

pay for the slurry storage which they pay back over 20 years and pay 7% interest costs. It is assumed that the value of the storage depreciates over the 20 year period, after which it is written off.

Table 8 summarises the range in capital costs totalled for all newly designated farms:

**Table 8: Amortised Capital Costs (£millions)**

Year	2013	2014	2015	2016	PV
Low: All Large Farms with Steel Concrete (£millions)**	0.2	0.2	0.2	0.2	0.6
High: Low + All Small Farms with Lagoon (£millions)**	0.2	0.2	0.2	0.2	0.6
Central**	0.2	0.2	0.2	0.2	0.6*

\*This best estimate is quoted as a monetised cost on summary pages 3 and 4

\*\*These estimates were used in calculating the annual and PV cost estimates on summary pages 3 and 4

## b) Administrative Burden

### Farms Affected: All those new to the NVZ area

All farms that are newly designated as NVZs will incur costs of administration in order to comply with NVZ regulations. Each new NVZ farm will need to carry out the following administrative tasks:

1. Familiarising with the NVZ regulations by reading through leaflets and guidance.
2. Calculating volumes and quantities set out in the regulations, such as the capacity of manure stores and farm and crop nitrogen limits
3. Producing and maintaining a nitrogen management plan.

The overall administrative cost to individual farms will vary according to farm type, farm size, and the extent to which farms keep existing records of nutrient levels and fertiliser applications. The estimated administrative annual costs per farm are estimated from the 'NIT18 Economics Report' which was commissioned by Defra and published alongside the consultation document for the revised Nitrates Directive. The report summarises the average estimated administrative costs per farm to arable, dairy, pig and poultry farms of complying with the NVZ Action Programme. We have made some adjustments to these figures to estimate the administrative costs to grazing livestock, horticultural, mixed and unclassified farms<sup>6</sup>. We have also made adjustments to estimate the proportion of ongoing costs stemming from each administrative task.

Please see the 'NIT18 Economics Report' available on the Defra website for an explanation of the method and assumptions<sup>7</sup>. Table 9 summarises some of the key assumptions that were made in the report:

<sup>6</sup> Grazing livestock farms are assumed to incur the same administrative costs as dairy farms. Horticultural farms are assumed to have the same costs as arable farms. Mixed and unclassified farms are assumed to have costs midway between those of dairy and arable farms.

<sup>7</sup> <http://www.defra.gov.uk/consult/files/20111220nitrates-directive-consult-vid3.pdf>



**Table 9: Summary of Key Assumptions**

Variable	Assumption
Cost of farmer's time	£20 per hour. This is consistent with the hourly wage of a farmer in 2011 prices as set out in the Annual Survey of Hours and Earnings (2011), adjusted for non wage costs as set out in the Standard Cost Model.
Time spent reading leaflets	8 hours
Farm size	Larger farms will incur higher costs of calculating capacity and manure management planning because they need to disseminate information throughout the business. Medium sized farms were assumed to spend the average amount of time on these activities. The average was multiplied by a factor for small and large farms respectively. The factor varied according to farm type.

The different administrative costs to newly designated farmers of complying with the NVZ Action Programme are summarised in Table 10.

**Table 10: Administrative costs to newly designated NVZ farms over the 4 year appraisal period (£millions)**

Year	2013	2014	2015	2016	PV
Reading leaflets**	0.1	0.1	0.1	0.1	<b>0.5</b>
Calculating volumes and quantities**	0.1	0.1	0.1	0.1	<b>0.3</b>
Forming and recording a nutrient management plan**	0.1	0.1	0.1	0.1	<b>0.3</b>
<b>Total</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>1.0*</b>

\*This best estimate is quoted as a monetised cost on summary pages 3 and 4

\*\*These estimates were used in calculating the annual and PV cost estimates on summary pages 3 and 4

The estimated PV of the administrative cost to newly designated farms over the 4 year period is £1 million.

### c) Environmental Costs

#### Farm Types Linked to Environmental Costs: Dairy, Pigs and Poultry

Those farms that are removed from the NVZ areas may choose whether or not to continue the Action Programme measures aimed at reducing water pollution. Expert judgement suggests that there is little difference in nutrient management practices in and out of NVZ areas for arable farms, and so we would expect the removal of cropping farms from NVZ areas to be minimal.

The IA assumes no additional costs as a result of removing farms from an NVZ area. This assumption is based on two considerations:

1. Designating an area as no longer a NVZ assumes that the area is no longer considered to be at risk of high levels of nitrate pollution. This suggests that the farm's activities are unlikely to cause environmental and economic costs.
2. Since the removed farms have the infrastructure (storage) and will get greater benefits from spreading in spring and summer, there is an incentive to continue with the approach to spreading that the Nitrates rules require. Before farmers had the additional slurry storage, the farms may have been forced to spread slurry at times of the year when the soil is wet and a large amount of nitrate would have been washed away due to a lack of storage space. However with the additional storage they will be in a better position to apply nitrogen to match crop need. This will be more cost effective as it will mean that there is less need to purchase additional manufactured fertiliser.

## Benefits

The benefits set out have been split into three sections. The first is a cost saving to the farmers who have been removed from the NVZ areas and so no longer need to meet the reporting requirements set out in the regulations. The second is a cost saving to farms who have been newly designated as NVZ areas and are likely reduce their fertiliser costs.

### a) Administrative Cost Savings

Farms Affected: All those removed from NVZ areas.

Farms that have been removed from NVZ areas will no longer need to carry out the administrative tasks required for compliance with the regulations. This will result in a time saving to the farmers equal to the time that they would have dedicated to reading leaflets, calculating N limits and producing a nutrient management plan when they were in a NVZ. We assume that those leaving the NVZ area would take half as long to read leaflets as someone who is new to NVZs because they would already be familiar with the majority of the regulations. We assume that the time saving from no longer calculating the capacity of field stores would be negligible since farms that remain in the NVZ would be expected to spend very little time on it. We assume that the time saving from no longer needing to undertake crop planning and manure N calculations would be equal to the time cost to farms entering the NVZ, since these tasks require a similar degree of effort each year.

Table 11 summarises the cost savings from those farms removed from the NVZ area. The present value of the savings over the 4 year appraisal period is £1.6 million.

**Table 11: Reduction in the administrative burden to farms removed from NVZ area over the 4 year appraisal period (£millions)**

Year	2013	2014	2015	2016	PV
Reading leaflets**	0.2	0.2	0.2	0.2	0.7
Crop plan and manure N calculations**	0.2	0.2	0.2	0.2	0.8
<b>Total</b>	<b>0.4</b>	<b>0.4</b>	<b>0.4</b>	<b>0.4**</b>	<b>1.6*</b>

\*This best estimate is quoted as a monetised benefit on summary pages 3 and 4

\*\*These estimates were used in calculating the annual and PV benefit estimates on summary pages 3 and 4

### b) Benefits to the Farmer

Farm Types Affected: Dairy, Pigs and Poultry

The research by ADAS suggests that the impact of the NVZ regulations to new farmers is a reduction in the fertiliser costs to the farmer. The cost reduction is due to improved timing of fertiliser applications leading to improved fertiliser efficiency.

### c) Environmental Benefits

## Farm Types Linked to Environmental Benefits: Dairy, Pigs and Poultry

All newly designated farms will need to adhere to the NVZ Action Programme. While a number of Action Programme measures may result in some benefit to the environment, by far the largest benefit will stem from livestock farms adhering to the closed spreading period. Newly designated dairy, pig and poultry farms will need to ensure that they have sufficient manure storage to enable them to comply with the closed spreading periods. By adhering to the closed spreading periods, farmers will be ensuring that they do not spread manure with high readily available nitrogen at times when the risk of run-off is highest.

We estimated reductions in GhGs, nitrate and ammonia losses in the new NVZ areas using figures provided by ADAS. ADAS provided estimates of reductions in losses for the whole NVZ area from the lower pig, cow and poultry manure applications that would stem from farms adhering to the closed period. The reductions in losses were estimated using the same method as set out in 'Nitrates Action Programme: Impacts on Greenhouse Gas Emissions and Diffuse Nitrogen Pollution' which was commissioned by Defra and produced by ADAS alongside the consultation. We used data from ADAS to calculate the estimated loss reductions per pig, cow and poultry-head. These figures were multiplied by the number of animals in the new NVZ area in order to estimate the reduction in pollutant losses from new farms entering NVZ. These quantities were then multiplied by the values set out in Table 5 to obtain estimates of the environmental benefit.

We estimate that the benefit to the environment from the new NVZ farms adhering to the NVZ Action Programme will fall within the range £0.5million to £0.9 million over the 4 year appraisal period. In the absence of better information, the central estimate is the midpoint of this range, with a present value of £0.7million. The relative sizes of the benefits from GHG, ammonia and nitrate are given in Table 12.

**Table 12: Environmental benefits from new NVZ farms over 4 year period (£millions)**

Year		2013	2014	2015	2016	PV
GHGs**	Low	0.0	0.0	0.0	0.0	0.1
	High	0.1	0.1	0.1	0.1	0.3
	Central	0.1	0.1	0.1	0.1	0.2
Ammonia**	Low	0.1	0.1	0.1	0.1	0.4
	High	0.2	0.2	0.2	0.2	0.6
	Central	0.1	0.1	0.1	0.1	0.5
Nitrate**	Central	0.0	0.0	0.0	0.0	0.1
	Low	0.2	0.2	0.2	0.2	0.6
	High	0.3	0.3	0.3	0.3	1.0
<b>Total</b>	<b>Central</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.8*</b>

(Note, figures may not sum due to rounding)

\*This best estimate is quoted as a monetised benefit on summary pages 3 and 4

\*\*These high, low and central estimates were used in calculating the annual and PV benefit estimates on summary pages 3 and 4

### 3.3.2. Action Programme

#### 1. Extension of the closed period

The existing Action Programme prohibits the spreading to land of organic manures with a high readily available N content during the closed period. Manure is classed as having a high readily available N content if more than 30% of the total N content is in a form that can be readily taken up by the crop. Examples of these manures are pig and cattle slurry and poultry manure. The closed periods set out in the existing AP are set out in Table 13.

**Table 13: Current closed periods**

	Grassland	Tillage land
<b>Sandy or shallow soils</b>	1 Sept to 31 Dec (4mths)	1 Aug to 31 Dec (5mths)
<b>Medium or heavy (all other) soils</b>	15 Oct to 15 Jan (3mths)	1 Oct to 15 Jan (3½mths)

The AP does not prohibit all manure spreading within closed periods, only those with a high readily available N content. For example, farm yard manure, which is more solid and mixed with straw has a lower readily available N content and so could be spread during the closed period.

Organic manures that contain high readily available nitrogen cannot be applied to land at times of the year when the risk of nitrate loss is high. The risk of nitrate loss is high when the ground is wet and crop growth, and therefore nitrate demand, is low. As Table 14 shows, the closed period is longer for tillage land (land being prepared for crops) than for grassland for a given soil type. The table also shows that sandy and shallow soils have a longer closed period than all other soils.

The revised AP will extend the closed period for medium and heavy soils by two weeks at the end of the current closed period. Table 14 shows how the dates of the closed period will change for medium and heavy soils.

**Table 14: Closed periods extended by 2 weeks for medium and heavy soils**

	Grassland	Tillage land
<b>Sandy or shallow soils</b>	1 Sept to 31 Dec (SAME)	1 Aug to 31 Dec (SAME)
<b>Medium or heavy (or other ) soils</b>	15 Oct to 31 Jan (CHANGE)	1 Oct to 31 Jan (CHANGE)

The extension of the closed period will not affect capital costs for those farmers already complying with NVZ regulations because the storage capacity required by the Regulations<sup>8</sup> will still exceed the length of the closed periods, as required by the Directive<sup>9</sup>. The operational costs to farmers will be minimal as the practical impact is less flexibility on when slurry can be spread in the spring. Pig and poultry farmers already within NVZs are required to have 6 months manure storage capacity and dairy and beef farms 5 months. The analysis assumes that the 2 week increase in the closed period will use some of the existing theoretical spare storage capacity. Therefore existing storage capacity will be sufficient to meet the new closed periods but the spare capacity will be reduced.

Research to investigate the effect on nitrogen pollution of extending the closed period was undertaken by ADAS/Rothamsted Research on behalf of Defra (2011).

## Costs

The research suggests that extending the closed period will result in increased ammonia losses and increased cost of nitrogen fertiliser.

### a) Environmental Costs

#### Farm Types Linked to Cost: Dairy, Pigs and Poultry

Increasing the length of the closed period will mean that less manure can be applied in the winter months. This may cause farmers to apply more slurry in summer. If more slurry is applied in summer,

<sup>8</sup> 6 months storage capacity for pig slurry and poultry manure, and 5 months storage for all other slurry, see Regulation 34(5) of the Nitrate Pollution Prevention Regulations 2008.

<sup>9</sup> Annex III, paragraph 1, subparagraph 2 requires the capacity of storage vessels to “exceed that required for storage throughout the longest period during which land application in the vulnerable zone is prohibited ...”

ammonia losses are likely to increase because more manure would be applied when it is warmer and risks of volatilisation into ammonia are higher.

## b) Costs to the Farmer

### Farm Types Affected: Dairy, Pigs and Poultry

Extending the closed period will mean that the time period during which organic fertilisers can be applied would be shorter. This may result in a higher reliance on synthetic fertilisers, which come at a higher cost to the farmer. This effect is expected to be small because the extension to the closed period is small (2 weeks) and covers a period when little fertiliser of any sort (organic or mineral) would normally be applied to the land.

## **Benefits**

### Environmental Benefits

#### Farm Types Linked to Benefit: Dairy, Pigs and Poultry

The benefits of extending the closed period arise due to a reduction in GhG emissions from better manure N utilisation and reduced nitrate-N leaching to water.

The research demonstrated that the later in the winter slurry is applied, the lower nitrate leaching is. On sandy/shallow soils, in low to moderate rainfall areas, 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, about 10% of what is applied can still be lost to water in low to moderate rainfall areas due to rapid drainage through soil cracks or by surface runoff. These results show that closed periods are important in reducing the risk of nitrate leaching in high risk areas. The research also suggested that extending the closed period would lead to a reduction in soluble phosphorus losses.

In the absence of any other considerations, the evidence might suggest longer closed periods on medium/heavy soils and also, although to a lesser extent, on sandy/shallow 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. 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 goal is to encourage manure application in spring and summer to meet the period of high crop N requirement and to achieve a more integrated approach to minimise potential pollution.

## **Summary**

Table 15 below sets out the annual impact on costs and emissions. The NPV is assessed over a 4 year period as the AP could be reassessed after 4 years.

**Table 15: Impact on costs and emissions**

<b>Year</b>	1
<b>Capital costs of extra slurry storage (£)</b>	Zero
<b>Annual amortised costs (£)</b>	Zero
<b>Additional operation costs</b>	0
<b>Synthetic fertiliser usage (t)</b>	Neg
<b>GHG emissions (tCO<sub>2</sub>e)</b>	-2,500
<b>Ammonia-N emissions (t)</b>	+200
<b>Nitrate-N emissions (t)</b>	-200
<b>Soluble Phosphorus emissions (t)</b>	-5

## **2. Reduce the volume of slurry that can be spread immediately after closed periods to 30m<sup>3</sup>/ha**



The current rules limit slurry spreading to 50m<sup>3</sup> per hectare at a time, with no repeat spreading within 3 weeks. The new AP will reduce this quantity to 30m<sup>3</sup> per hectare as a means of managing the risk of leaching immediately after the closed period when the soil moisture deficit remains small. This reduced figure is more aligned with existing on-farm practice as suggested by Farm Practices Survey results. As this figure is closer to normal practice we do not consider this will have an economic implication. It may however assist in preventing over application in some cases.

### **3. Rates and limits on the field application of organic manures and manufactured nitrogen fertilisers**

The Nitrates Directive sets a number of fertiliser allocation limits, three examples are as follows:

1. Organic Manure N Field Limit of 250kg/ha in any 12 months.
2. The Livestock Manure N Farm Limit of 170kg/ha/calendar year of nitrogen produced by farm livestock averaged across the agricultural area of the whole farm.
3. The N<sub>max</sub> limits that are to be calculated for specified crops.

The limits are aimed at preventing farmers from over applying manure or fertiliser to their fields. When farmers apply fertiliser in excess of the amount that can be taken up by the crop, the risk of pollution is high. The revised Action Programme will not change these limit levels. However, some changes are being made to the level of reporting and some of the calculations involved. These changes and the costs and benefits associated with these are set out below.

#### **i) Low intensity farms will be exempt from reporting on the limit to manure application of 250kg N/Ha**

In the current AP, all farms are required to calculate and record the amount of manure that they apply per hectare over each year in order to demonstrate that they are applying less than 250kg N/ha per field and no more than 170kg N/ha averaged over the whole farm. Farmers do not need to submit the records to the Environment Agency, but must be able to show the records to an inspector who requests to see them. The limit is in place in order to prevent over-application of manure, which would pose an excessive risk of nitrate leaching. However, some low intensity farms, such as grazing livestock farms have so little manure N that its sensible use is unlikely to pose a risk of over-application.

We are still defining 'low intensity' but it is likely to be livestock farmers who will be in a position to benefit and would have to meet the three conditions:

1. The farm will need to be over 80% grassland.
2. Overall livestock manure N loading will need to be below 100Kg/ha.
3. Manufactured N applications will need to be below 90Kg/ha.

When a holding meets these conditions, detailed field level records of fertiliser applications (as set out in current Regulation 42) would not be required. A farmer wishing to benefit from the exemption would need to be able to show that the exemption applied by recording the appropriate information once for the whole farm and this will be signed, dated and maintained. It is in effect a self certification/declaration that does not need to be recalculated each year if the circumstances do not change.

#### **Costs**

Exempting low intensity farms from the manure nitrogen loading limit is not considered to impose a cost to the farmer or to the environment. There will not be an administrative cost since farmers will not need to apply for the exemption. We do not feel that there is a risk that N loading will increase as a result of the exemption because the farms that are eligible already have the opportunity to apply above 100Kg/ha manure N and 90kg manufactured N but choose not to.

## Benefits

### a) Removal of Administrative Burden

Farm Types Affected: Those that satisfy the criteria above. These are likely to be grazing livestock and organic farms, particularly in less favoured areas

Removing the need to keep records of manure application will result in a time saving to the low intensity farms. The best estimate of the saving from removing the administrative burden is £0.1million over the 4 year appraisal period. Please see Table 16 for annual costs.

We do not know the number of farms that will be eligible for the exemption, but it is likely that these will be predominantly grazing livestock and organic farms. While the proportion of organic farms that will be eligible is unclear, it is likely that the majority of grazing livestock farmers in Less Favoured Areas (LFA) will be eligible. For the purpose of this analysis we therefore assume that half of the 2065 LFA grazing livestock farms in the NVZ would be eligible to benefit from the exemption. The estimated time saved would be likely to increase depending on the proportion of organic farms that are eligible.

We assume that the time saving from the exemption will be equal to the cost of forming and recording a Nutrient Management Plan. The estimated cost is based on the costs to small, medium and large dairy farms set out in the 'NIT18 Economics Report' produced by ADAS. Based on the best available information, the saving is valued at £32, £48 and £70 per year for small, medium and large farms respectively.

**Table 16: Estimated saving per year if half of the LFA farms benefit from the exemption.**

Year	1	2	3	4	PV
<b>Administrative saving to low intensity farms**</b>	0.04	0.04	0.04	0.04	0.1*

\*This best estimate is quoted as a monetised benefit on summary pages 3 and 4

\*\*These estimates were used in calculating the annual and PV benefit estimates on summary page 3 and 4

### ii) **Farmers will include organic sources of nitrogen when calculating the nitrogen limit for most crops**

The current Action Programme sets out Nmax limits for specified crops. These are limits in the amount of readily available nitrogen that can be applied to a crop, and are based on the total amount of nitrogen that the crop needs to grow. For example, grass has a relatively high Nmax as the large amount of nitrogen applied results in increased growth, whereas peas and beans have a zero Nmax because they can meet their nitrogen requirement from the nitrogen in air. The Nmax limits are intended to reduce the risk of pollution due to over application of nitrogen in the form of fertiliser.

The revised AP will include a technical change to the nitrogen-containing materials that must be included when farmers calculate the Nmax limit for specified crops. At present the only materials that the Nitrates Regulations require farmers to count towards Nmax are farm livestock manures and manufactured nitrogen fertilisers. Any nitrogen derived from sewage sludge (biosolids), compost or other organic manures that do not originate from farm livestock are simply ignored. The new AP will remove this anomaly and enable the risk to the environment to be properly managed and provide a driver to increase the efficiency of nitrogen use.

Crop yields would not be impacted as a result of this change as it is still possible to apply the optimum level of N. Farmer costs could be reduced as the need to apply additional synthetic fertiliser could be reduced. However, any costs or benefits to the farmer are not expected to be significant.

There will be a benefit to the environment of reduced risk of N pollution (and potentially other pollutions such as phosphate). We do not have sufficient detailed information to be able to estimate these potential benefits and attempting to ascertain the necessary detail is likely to involve disproportionate cost. However, we do not expect these potential environmental benefits to be very large.

### iii) Increase total quantity of N that can be applied where there is robust evidence of crop need

Since the Nmax limits were established, some niche groups of farmers have provided evidence that the crops that they grow have a higher Nmax than specified in the regulation. Two such groups are:

1. Growers of grass for chlorophyll. Chlorophyll is produced by growing grass in a specific way that requires more nitrogen to be applied than ordinary grass does.
2. Growers of grass for protein. Members of the association of green crop driers cultivate high protein forms of grass, for use as feed for livestock, that also require more nitrogen than regular grass.

In both instances, there is evidence that increasing the Nmax limit in line with the crop need would not result in increased nitrate losses because the extra nitrogen applied would be taken up by the crop. Data from The British Association of Green Crop Driers (BAGCD) suggests that grass for dehydration is grown on around 1,500 ha, representing around 0.03% of the total current NVZ area, and 0.08% of the total area of managed grassland within the NVZ area. The BAGCD estimates that produce has a value of around £220 per tonne ex farm at approximately 90% dry matter, making the total output worth approximately £8-9 million annually.

The revised Action Programme proposes to allow these niche growers to work to a higher Nmax on the regular (at least every year) advice of a FACTs advisor. The FACTs advisor would need to provide a recommendation of the amount of fertiliser that needed to be applied based on crop need and soil tests.

Increasing the Nmax could increase the fertiliser costs to the farmers involved. However we believe that increasing the Nmax would be to the overall benefit of these niche farmers, because they would be able to reach higher crop yields without being in breach of the Nmax regulations. We do not expect there to be environmental costs in the form of increased nitrate losses, because in order to benefit from higher yield, growers will need to provide evidence of crop need and to implement the recommendations of a FACTs advisor. We do not have sufficient detailed information to be able to estimate these potential costs and benefits and attempting to ascertain the necessary detail is likely to involve disproportionate cost.

### iv) Increase to the manure nitrogen efficiency factor when calculating the N max

The manure nitrogen efficiency value tells the farmer how much nitrogen is readily available in manure. The manure nitrogen efficiency value varies according to livestock type (for example, the value for pig manure will differ to poultry manure) and also according to manure type (for example slurry has a higher value than solid and stackable farm yard manure because it contains more readily available nitrogen).

Farmers use the nitrogen efficiency factor when they calculate how much manure they can apply without exceeding the Nmax for each crop including grass. The revised AP will increase the nitrogen efficiency factors for cattle slurry and pig slurry. The current and revised nitrogen efficiency factors are set out in Table 17.

**Table 17: Current and Revised Nitrogen Efficiency Factors**

Livestock manure N efficiency standard values used in Nmax for adoption in next NVZ AP in England (% of total manure N)

Manure type	Current NVZ AP from January 2012	Proposed values in next NVZ AP
Cattle slurry	35	40
Pit slurry	45	50
Poultry manures	30	30
FYM	10	10

The increase in the manure nitrogen efficiency factors will mean that each kilogram of slurry will be assumed to contain more grams of nitrogen that will count towards the Nmax. This will mean that in order to comply with the Nmax, farmers will have to use a smaller volume of manure than at present.

The change will encourage farmers to apply manure at times of year at which losses are lower, and may also be encouraged to use precision spreading techniques (whereby fertiliser is applied directly to the ground rather than sprayed, for example via band spreading) in order to take full advantage of the nutrient within the pig and cattle slurry. Crop yields should not be harmed as a result of this change as it is still possible to apply the optimum level of N.

Farmer costs could be reduced as the need to apply additional synthetic fertiliser could be reduced. However, any costs or benefits to the farmer are not expected to be significant. We expect there to be a benefit to the environment of reduced risk of N pollution (and potentially other pollutions such as phosphate). We do not have sufficient detailed information to be able to estimate these potential benefits and attempting to ascertain the necessary detail is likely to involve disproportionate cost. We do not expect these potential environmental benefits to be very large.

#### **v) Allowance of slurry to be applied closer to watercourses when using precision techniques**

Precision slurry spreading techniques such as band-spreading and shallow injection reduce the risk of pollution, particularly ammonia, as these techniques allow the available nitrate to be absorbed in the ground more quickly resulting in reduced losses of ammonia. As a result they also significantly increase manure N use efficiency. We propose to encourage the use of these techniques by allowing farmers using these methods to spread manures closer to watercourses. Allowing farmers to do this should increase the area on which slurry can be spread and also reduce their fertiliser costs.

Although precision slurry spreading techniques minimise the risk of pollution and improve efficiency of manure spreading, the cost of the equipment (contractor) is considerably higher than that of conventional spreading. However, we do not propose to impose the use of precision spreading techniques and thus we would expect those farmers who already use, or plan to use, such equipment to take-up this opportunity in some cases. Therefore, the proposal is not assessed to impose any costs but does provide some farmers with increased flexibility. There will be some environmental benefits, and cost savings for the farmer, should farmers choose to take-up this opportunity. These are not expected to be large given that the option could only be applied in limited circumstances. Given this, and the fact that we do not have an estimate of the likely take-up, no benefit estimate is made.

## **4. Notification Procedure and Guidance**

#### **vi) Change in the notification procedure for new slurry stores whereby farmers notify the EA prior to building a new slurry store, and the EA may now choose to inspect prior to construction**

The 2008 Slurry, Silage and Agricultural fuel Oil Regulations (SSAFO) require farmers to notify the Environment Agency 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. However, 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.

The new rules will require 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 of the intended construction or renovation of the store, including the capacity, location and standard. The change to the notification procedure will not pose an additional cost to farmers, since they are currently required to notify the Environment Agency of new stores as before. However farmers will benefit from a reduced risk of building a store that does not meet the requirements of the Regulations and therefore needing to take remedial action before it can be used. We do not know the number of farms that have

needed to refurbish stores following an inspection. While the saving on an individual farm basis could be large, we expect the total saving to the industry to be small.

#### **vii) Re-issuing of guidance to include new regulations and to be easier to use**

The current guidance leaflets are in 9 separate leaflets and supplemented by other sources of information such as a Q and A section on the Environment Agency website and Rural Payments Agency cross compliance guidelines. Defra are taking the opportunity of the new regulations to discuss with farmers and regulators the format of the guideline to ensure the documents meet the needs of industry in as simple and unambiguous manner as possible.

#### **viii) Nitrogen Management Planning requirements**

We intend to reduce the priority for inspection for those farmers who complete and implement a full nutrient management plan.

### **3.3.3 Derogation**

The Government has applied for a derogation which allows a higher quantity of livestock manure to be applied per year on grassland farms. The Action Programme states that the amount of manure nitrogen applied on farms must not exceed 170kg N/ha/calendar year when averaged across the agricultural area of the whole farm. In practice, this is likely to restrict the stocking densities on farms, since if the number of animals exceeds the quantity of animals what would produce 170kg/N per ha the farmer would need to find another outlet for the excess.

The existing derogation will expire on 31<sup>st</sup> December 2012. The UK has applied to the Commission to extend the derogation on the existing terms and conditions.

#### What is the derogation?

The main elements of the derogation are outlined below:

1. It allows the application of manure N from grazing livestock (cattle, sheep, goats, deer and horses) up to a higher limit of 250 kg N per hectare per year on an individual farm if the farmer meets the conditions summarised below:

- a) the farmer must submit an application form in each year they wish to have a derogation
- b) at least 80% of the agricultural area of the farm must be grassland
- c) temporary grassland on sandy soils must only be cultivated in the spring
- d) ploughed grass must be followed with a crop with a high nitrogen requirement
- e) livestock manures must not be spread on grassland in the autumn before it is to be cultivated
- f) leguminous or other plants fixing atmospheric nitrogen must not be included in the crop rotation
- g) farmers must prepare a fertilisation plan and keep fertiliser accounts

2. It requires the authorities within Britain to:

- a) apply administrative controls to each farm benefitting from a derogation, including to the annual applications and fertiliser accounts
- b) establish additional and reinforced environmental monitoring within areas of the country benefitting from a derogation
- c) carry out field inspections at a minimum of 3% of farms benefitting from a derogation
- d) submit an annual report to the Commission on implementation of the derogation



## Affected Groups

On average, about 400 dairy farms have benefited from the derogation each year (425 in 2010, 404 in 2011, and 390 in 2012). In the analysis we assume that these farmers continue to apply for the derogation over the 4 year appraisal period

## Additional Measures on Farms with a Derogation

The following mandatory measures apply to derogated farms. These are ***additional*** to the measures required by the proposed Action Programme.

### *a) Additional measures concerning nitrogen*

- Livestock manures with a high readily available N content may not be spread on grassland that is to be cultivated in the autumn.
- Temporary grassland on sandy soils that is to be re-sown to grassland must be cultivated in the spring.
- Ploughed grass on all soil types shall be followed immediately by a crop with a high nitrogen requirement.
- The crop rotation shall not include leguminous or other plants fixing atmospheric nitrogen. This will not apply to clover in grassland with less than 50% clover or to other legumes that are under-sown with grass.

### *b) Additional measures concerning phosphorus*

- The results of soil sampling and analysis for phosphorus using an approved method must be available for each field or a maximum of a 5 ha area within each field. Sampling and analysis must be carried out at least once every 4 years using the approved method and any existing results must be no more than 4 years old.
- A phosphorus fertilisation plan must be prepared for each field using an approved method. The plan must take account of the crop P requirement, the supply of soil P and the P supplied from applications of organic manure. The plan must be kept up to date and appropriate field records kept of the cropping, soil P analysis and all applications of chemical phosphorus fertiliser and organic manure in each field.

## **Costs**

### a) Administrative Burden for the Farmer

Farms that choose to apply for a derogation will have some additional administrative tasks. These tasks are as follows:

- Submit an application for the derogation.
- Prepare a fertilisation plan. The plan will need to be completed at the start of the calendar year and will need to include:
  - a) Agricultural area of the farm, and the area of grassland as on 1 January;
  - b) A map of the farm indicating the location of individual fields;
  - c) A description of the housing and storage systems in place on the farm, including the volume of the manure storage available;
  - d) Expected numbers and type of livestock to be kept on the farm during the calendar year and an estimate of the manure nitrogen and phosphorus that these animals will produce;
  - e) Amount and type of livestock manure intended to be imported or exported during the year; and



- f) The foreseeable nitrogen and phosphorus requirement of each crop grown in each field on the farm, together with a plan on how applications of organic manure and manufactured fertiliser will be used to meet these requirements.

Almost all these records are based on existing requirements under the main Nitrates Regulations, and therefore do not represent additional administrative burdens. However, under the main Nitrates Regulations, points (d) and (e) only need to be undertaken at the end of the calendar year (not the start) and an estimate of manure phosphorus production is not necessary – these are additional requirements under the derogation. Furthermore, farmers are not currently required to plan their use of phosphate fertiliser to meet crop requirements. However, many are likely to already do this under other schemes (e.g. Environmental Stewardship) and there are many templates and computer software to help.

- *Keep field records of applications of manufactured fertiliser and organic manure.* Farmers are already required to keep field records of applications of organic manure and manufactured nitrogen fertiliser under the main Nitrates Regulations. The only additional requirement under the derogation is to keep records relating to phosphorus applications. Farmers may already do this under other schemes (e.g. Environmental Stewardship) and there are many templates and computer software to help.
- *Submit annual fertilisation accounts to the EA.* The accounts will need to be completed and submitted to the EA at the end of the calendar year and will need to include:
  - a) Actual numbers and type of livestock kept on the farm during the calendar year and an estimate of the manure nitrogen that these animals produced;
  - b) Amount and type of livestock manure imported or exported during the year;
  - c) The agricultural area of the farm and the areas covered by specified crops; and
  - d) A summary of inputs of manufactured nitrogen fertiliser.

There will be two routes available for submitting the accounts – by post or via an online option. A template form will be provided for accounts submitted by post. This is an annual requirement, although the process may be significantly quicker than for the first derogation period. All the information needed to complete the accounts will be readily available to the farmer from either their existing field records, fertilisation plan or records of livestock numbers (see above).

We estimate that the administrative cost to farms applying for the derogation is £0.5million over the 4 year appraisal period. The cost of the administrative burden has been estimated using the Standard Cost Model. Table 18 shows the underlying assumptions with respect to time, wage and population. The amounts of time that we assume that farmers spend on each task are consistent with the Impact Assessment that was carried out in 2009 considering the impact of the derogation.

**Table 18: Assumptions and Costs of Administrative Burden**

Cost type	Unit cost			Population	Total annual cost (£)
	Time (hr)	Wage (£/hr)	Unit cost (£/farm)		
Submit an application for a derogation	4	20	79	400	31,000
Prepare a fertilisation plan	2	20	32	400	13,000
Keep field records of fertiliser applications	8	20	130	400	52,000
Submit annual fertilisation accounts	4	20	65	400	26,000
<b>TOTAL</b>	<b>18</b>		<b>306</b>		<b>122,000*</b>

\*This best estimate is used in calculating the PV of the administrative burden of the derogation as quoted on summary page 3

b) Additional Measures for Farmers

1. Increased Phosphorus Sampling

70% of farms undertake regular testing (at least every 5 years) of the nutrient content (indices) of the soil (source Farm Practices Survey 2011, Defra). Assuming those farmers applying for the derogation have similar characteristics as overall farm population, it is reasonable to assume there will be an additional cost for approximately a third for farms applying for a derogation. The total area estimated to be covered by derogated farms is 47,000 ha, just under a third of which will require sampling. Assuming an average field size of 5 hectares (this is based on derogation requirement to sample at least every 5 hectares), thus soil sampling and analysis will need to be undertaken on an additional c. 9,000 fields over the whole 4 year period at a cost estimated at £50 per field (this cost is based on the price in the previous IA which was based on prices from a number of providers, plus inflation). Table 19 shows the estimated annual cost of this measure.

**Table 19: Estimated Costs Associated with Soil P Sampling**

Description	Units	Number	Cost £/unit	Total Annual Cost £
Soil sampling and analysis	fields	700	50	35,000*

\*This best estimate is used in calculating the PV of the cost of additional farm measures of the derogation as quoted on summary page 3

2. Ploughed grass must be followed immediately by a crop with a high N demand

Spring barley occupies c. 2% of land on dairy farms (Source: June Survey Census, 2010). Farmers cannot leave heavy soils to break down over winter as part of seed bed preparation and therefore an extra cultivation may be needed preceding the establishment of spring barley. We estimate that 800 hectares may need an additional cultivation per year with a power harrow at £40 per hectare (*Farm Management Pocketbook*, John Nix, 2012/13, adjusted to be in 2011 prices). Table 20 shows the estimated annual cost.

**Table 20: Estimated Costs of Additional Cultivation before Spring Barley**

Description	Units	Number	Cost £/unit	Total Annual Cost £
Extra cultivations	ha	800	40	32,000*

\*This best estimate is used in calculating the PV of the cost of additional farm measures of the derogation as quoted on summary page 3

c) Environmental

Allowing derogated farms to have higher stocking densities has an environmental cost in the form of higher greenhouse gas emissions. By permitting additional cows per hectare, the derogation will result in a greater amount of enteric fermentation and manure per farm. This in turn will result in higher methane and nitrous oxide emissions. The extent to which greenhouse gas emissions would rise due to the derogation would depend on the extent to which the stocking density would fall in its absence. We use three scenarios to assess the potential increase in GHG emissions, which are set out in part a) of the benefits section for this option.

Table 21 shows the estimated annual and total PV of the cost to the environment of maintaining a higher stocking density in each scenario.

**Table 21: Environmental cost from maintained higher stocking density (£millions)**

Year	Annual Cost	PV Total Cost
Low**	0.6	2.3
High**	6.8	24.9
Central **	3.1	11.5*

\*This best estimate is quoted as a monetised cost on summary page 3

\*\*These estimates were used in calculating the annual and PV cost estimates on summary page 3

We do not envisage any other environmental costs as a result of the derogation. The Nitrates Directive allows a derogation from the 170 limit if it can be demonstrated that it will not undermine the achievement of the environmental objective of the Directive, and also that it can be justified on the basis of objective criteria, such as:

- High net precipitation
- Long growing seasons
- Crops with high nitrogen requirement
- Soils with exceptionally high denitrification capacity

The grassland areas of England, where derogated farms are likely to be located, meet the above criteria:

- Net precipitation is high, commonly between 800 to 1200 mm per year.
- Rainfall typically exceeds potential evapo-transpiration for at least nine months of the year.
- Growing season of between 225 to 275 days a year.
- High output grassland is on soils with a good capacity for retaining moisture.

These favourable conditions mean that grass has a potential high nitrogen uptake of between 300 to 375 kg N/ha per year. Therefore, grassland farms stocked at a higher rate of 250 kg N/ha per year will be able to make effective use of the higher nitrogen inputs to the production system and are unlikely to experience higher losses of nitrate.

A full description of how the grassland areas of England meet the criteria established by the Directive is set out in the technical case supporting a derogation in Britain (Defra, 2008).

## Benefits

### a) Economic saving to Farmers of Maintaining Stocking Density

Farmers that apply for the derogation benefit from having a higher stocking density than they would otherwise have had. We used 3 scenarios to estimate the economic benefit to farmers of maintaining their stocking density:

1. Minimum Scenario. The benefit to farmers is equal to the cost to farmers of having the derogation. We assume that farmers will not apply for the derogation unless the benefit of doing so exceeds the costs to them of having the derogation.
2. Maximum Scenario. All farmers that apply for the derogation produce 250Kg N/Ha from manure on their farm per year. By applying for the derogation, they are avoiding reducing this to 170Kg N/Ha. We estimate that this will prevent them from needing to reduce the number of cows by 23,000 altogether (just under 60 cows per farm). We assume that the benefit from doing so is the average net margin per cow of £80 per year (based on FBS, 2010/11).
3. Central Estimate Scenario. All farmers that apply for the derogation have a stocking density that is 20% higher than the average NVZ dairy farm (based on June Survey, 2010). We assume that the stocking density is higher than average because farms with a higher stocking density get the greatest benefit from the derogation. We estimate that the derogation will prevent the farms from needing to reduce the number of cows by 10,000 altogether (30 cows per farm). As in the maximum scenario, we assume that the benefit from doing so is the average net margin per cow of £80 per year.

Table 22 shows the estimated annual and total PV of benefit to farmers of no longer needing to reduce their stocking density in each scenario.

**Table 22: Savings to farmers from higher stocking density £millions**

Year	Annual Saving	PV Total Saving
Low**	0.8	3.0
High**	2.1	7.6
Central**	1.0	3.5*

\*This best estimate is quoted as a monetised cost on summary page 3

\*\*These estimates were used in calculating the annual and PV cost estimates on summary page 3

### b) Fertiliser Saving to Farmers

There may also be some cost-savings to the farmer resulting from the proper planning of phosphate fertiliser use. The *Representative Soil Sampling Scheme in England and Wales* found that 35% of all grassland soils are above the recommended soil P analysis maintenance target of Index 2. This suggests that the value of the nutrients applied to the land is not being used to full efficiency. It is anticipated the proper sampling and analysis of the soil, informing the production of the fertilisation plan, will reduce the amount of P applied to land and the amount lost to the environment. This improved efficiency should be manifest in reductions in the purchases of manufactured fertiliser.

The average phosphate application rate to grass is 8 kg/ha (BSFP, 2008), and we assume that 80% of the derogated area is grass because each farm must have 80% grass to be eligible. The average dairy farm in an NVZ area has just over 70% grassland; therefore we feel it is reasonable to assume that derogated farms will have the minimum of 80% grass (June Survey, 2010). We estimate that the total derogated grassland area is 38,000ha. This gives a total phosphate application in the derogated area of 304,000kg. If 35% of this phosphate is found to be unnecessary, this leads to a reduction of 106,000kg

of phosphate. At an average cost of just under £0.60 per kg of phosphate fertiliser,<sup>10</sup> this means a saving to farmers of approximately £60,000 per year from reducing phosphate applications.

**Option 3:** as Option 2 but without the derogation. The cost and benefits of this option as the same as those set out above for the revised AP and new territory designation. The detailed analysis is not set out again but the summary of costs and benefits are set out in table 23.

**Table 23: Costs and Benefits of Option 3 over the 4 year period (£millions)**

Year	2013	2014	2015	2016	PV
<b>Costs</b>					
1. Action Programme**	0.5	0.5	0.5	0.5	1.7
2. New Territories**	0.4	0.4	0.4	0.4	1.6
<b>Total**</b>	0.9	0.9	0.9	0.9	3.4
<b>Benefits</b>					
1. Action Programme**	0.3	0.3	0.3	0.3	1.2
2. New Territories**	0.7	0.7	0.7	0.7	2.4
<b>Total**</b>	1.0	1.0	1.0	1.0	3.6
<b>NPV</b>					
<b>Net Present Value**</b>	0.1	0.1	0.1	0.1	0.2*

\*This best estimate is quoted as a monetised NPV on summary page 4

\*\*These estimates were used in calculating the annual and PV cost estimates on summary page 4

<sup>10</sup> P2O5 fertiliser prices vary widely so pricing is not an exact science. We have taken the estimated fertiliser cost in the previous IA for the derogation (2009) of £0.54 and adjusted for inflation. The previous figure was calculated by taking Triple superphosphate (46% P2O5) at £250 per tonne to put 1 kg P2O5 at 54 pence. See: [https://statistics.defra.gov.uk/esg/index/list.asp?i\\_id=052](https://statistics.defra.gov.uk/esg/index/list.asp?i_id=052) and <http://www.fwi.co.uk/Articles/2009/08/05/117021/fertiliser-market-report-nitrogen-steady-while-potash-eases.html>

## **Rationale and evidence that justify the level of analysis used in the IA (proportionality approach)**

The UK government has a legal obligation to improve water quality, as set out by the Water Framework Directive. Agriculture as a sector has been a high contributor to water pollution, and has been responsible for between 15- 20% of serious water pollution incidents over the past 5 years. Implementing the Nitrates Directive contributes to Defra's strategic priority of improving water quality and indirectly to improving the natural environment more generally.

The analysis in this IA is based on existing evidence from reports and surveys. Most notably, the IA draws upon previous work completed by ADAS for Defra, and data from the Defra June Survey. The existing evidence has been sufficient to assess the larger extent of costs and benefits associated with the options. No additional research has been commissioned for the purposes of the IA, as this would have involved disproportionate cost.

### **Risks and assumptions**

The Infraction risks of the 'Do nothing' option are high. The 'Do nothing' option will also result in Derogation not being granted.

This high risk is due the Commissions putting on hold previous infraction proceedings on condition that Defra would undertake further research on several key areas of disagreement. The research showed that the Action Programme needed to be amended by extending the end of the closed period by 2 weeks for particular soils and a slight increase in the nitrogen efficiency figures used. The research also demonstrated that we did not need to change the arrangements for storage of farm yard manure, nor did we need to extend the start of the closed period. The package presented is the minimum the Commission are likely to consider as adequate implementation of the Directive. Based on an evidence led policy the 'do nothing' option could not now be justified by Defra and the Commission would reinstate the infraction proceedings.

The amending Regulations should have come into force on 1 January this year, but have been unavoidably delayed, not least because the European Commission has delayed its decision to renew our grassland Derogation. The granting of the Derogation is subject to the Commission being satisfied as to the Action Programme. The 'do nothing' option would result in the Derogation not being granted.

The preferred option presented minimises the risk of infraction and of further delays in the Commission decision on the grassland Derogation.

The preferred option is not the least cost option. However, there is a clear policy rationale for adopting it, as explained in the main body of this IA.

To produce this IA it has been necessary to make a number of assumptions. There are explained above where used.

### **Direct costs and benefits to business calculations (following OIOO methodology);**

Options 2 and 3 constitute a modest net annual benefit to business of £0.03m. The benefit stems entirely from the measure in the revised Action Programme to reduce the administrative burden for low intensity farmers. The net benefit to business figure excludes the costs and benefits to business from all of the other action programme measures, and from the change to the NVZ territories. England is required to revise the NVZ territory areas and the Action Programme in order to meet the commitments of the Nitrates Directive. Failure to do so would result in England failing to comply with the Directive. The costs and benefits to business of the new territory designations and action programme are therefore out of scope of OIOO.

The figure also excludes the costs and benefits to business of the derogation. The OIOO methodology states that failure to take an available derogation where this may reduce costs to business would be considered as an 'In'<sup>11</sup>. The Government has applied for a derogation for dairy farmers. The EU may

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<sup>11</sup> 'One-In, One-Out Methodology' (2011), page 6. Available at: <http://www.bis.gov.uk/assets/biscore/better-regulation/docs/o/11-671-one-in-one-out-methodology>



reject this application, in which case it would be considered out of the capability of the Government to implement. Therefore, the absence of the derogation in Option 3 is treated as out of scope of OIOO.

The figure has been calculated using the OIOO methodology. The methodology involved converting the present value of the benefit of reducing the administrative burden for low intensity farms from 2011 prices in to 2009 prices. It then involved dividing this present value by the annuity factor set out in the OIOO methodology (see footnote 11) in order to obtain equivalent annual benefits.

The costs and benefits to business for Options 2 and 3 are set out in Table 24

**Table 24: Annual Costs and Benefits to Business £millions**

	Costs	Benefits	Net
Option 2 and Option 3	0	0.03	0.03

### Summary and preferred option with description of implementation plan.

The preferred option is to implement new action programme measures and being successful in applying for a grassland derogation. The changes proposed for the action programme are consistent with the scientific evidence and would address the threat of infraction.

Considering the balance of costs and benefits (and the broader environmental impacts including GHG emissions vs. the impacts on the farming industry) the Government has decided to implement Option 2. Option 2 provides the greatest benefits to all farmers within the proposed NVZs through maintaining the targeted approach, providing greater flexibility for some specialist grass growers and fruit growers and reduced paperwork for low intensity farmers. Option 2 also includes the negotiation of a derogation from the Commission to allow more livestock manure to be used on grassland farms. This specifically benefits dairy businesses who, without the derogation, may have to leave the industry. Defra wish to continue the derogation to support the dairy industry through the current dairy crisis. There are additional environmental costs arising from the granting of the derogation through higher estimated greenhouse gas losses.

We intend to implement these proposals in two phases. The first will establish the large majority of the new NVZs and amend the action programme as soon as possible, and by 1 March 2013 at the latest, to ensure that farmers gain the benefits of the proposed changes at the earliest opportunity, and to provide as much transition period as possible for other measures. The second phase will implement any further changes to NVZs that are needed to reflect the outcome of the later NVZ appeal cases, and will also implement the provisions of the new Commission Decision on the grassland derogation, expected to be made in February 2013.

Farmers will be supported in understanding and applying the new rules through revised guidance and the ability to speak to both the Farming Advice Service and the Environment Agency where they are uncertain of the rules.