EXPLANATORY MEMORANDUM TO

THE AGRICULTURE (CROSS COMPLIANCE) (No.2) REGULATIONS 2009

2009 No. 3365

1. This explanatory memorandum has been prepared by the Department for Environment, Food and Rural Affairs and is laid before Parliament by Command of Her Majesty.

2. Purpose of the instrument

2.1 This instrument revokes and replaces SI 2009 No. 3264 as the update to the previous cross compliance SI (2005 No. 3459). This instrument amends incorrect dates that were included in SI 2009 No 3264; clarifies the timing of the application of the standards for agricultural land not in agricultural production; includes an additional clause to ensure that the standard for land not in agricultural production is not at odds with measures undertaken by farmers under the industry's voluntary Campaign for the Farmed Environment and corrects the description of the role of Natural England in acting as a delegated agent. It sets out requirements for farmers who are in receipt of Single Payment Scheme or area or animal related aid under Rural Development Programmes and includes changes required to standards following revision of the underlying EU legislation and changes to consolidate and simplify some of the existing standards of Good Agricultural and Environmental Condition following public consultation held in Spring 2009.

3. Matters of special interest to the Joint Committee on Statutory Instruments

3.1 None

4. Legislative Context

4.1 These Regulations revoke and replace the Agriculture (Cross compliance) Regulations 2009 (SI 2009 No 3264) which revoked and replaced the Common Agricultural Policy (CAP) Single Payment and Support Schemes (Cross compliance) (England) Regulations 2005 (SI 2005/3459). The 2005 Regulations provided for the administration of Council Regulation (EC) No 1782/2003 and Commission Regulation (EC) No 796/2004 in relation to the establishment of a cross compliance control system for direct support schemes under the CAP. They are available on the OPSI website, together with the accompanying Explanatory Memorandum (at http://www.opsi.gov.uk/si/si2005/uksi_20053459_en.pdf). The Agriculture (Cross compliance) Regulations 2009 (SI 2009 No 3264), which this instrument revokes and replaces to introduce corrections and adjustments to the policy for land not in production, are also available on the OPSI website, together with the accompanying Explanatory Memorandum (at http://www.opsi.gov.uk/si/si2009/uksi_20093264_en_1).

4.2 Following the CAP Health Check, Council Regulation (EC) No 1782/2003 and Commission Regulation (EC) No 796/2004 were replaced by Council Regulation (EC) No 73/2009 and Commission Regulation (EC) No 1122/2009 respectively. The 2009 Regulations update references to this EC legislation and remove redundant provisions. Council Regulation No 73/2009 (replacing No 1782/2003) requires the addition of standards on water abstraction (with effect from 01/01/2010) and prevention of nitrate pollution (with effect from 01/01/2012).

5. Territorial Extent and Application

5.1 This instrument applies to England.

5.2 In order to reflect the diversity of landscapes, environments and farming practices across the UK, standards of Good Agricultural and Environmental condition are set at devolved level.

This approach was validated by the judgement of the European Court of Justice in case C-428/07 (Horvath v Secretary of State for Environment, Food and Rural Affairs).

6. European Convention on Human Rights

6.1 As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

7. Policy background

- ***What is being done and why***

7.1 Cross compliance requires that farmers meet environmental and other standards as a condition for subsidy payment under the Single Payment Scheme (SPS) and also as a baseline for Environmental Stewardship (ES) payments under the Rural Development Programme, England. Defra needs to make changes to a number of cross compliance standards in England following changes to the EU rules as part of the CAP Health Check. At the same time, this provides the opportunity to rationalise and simplify the existing standards where possible.

7.2 In order to comply with changes to the framework in Annex III of Council Regulation 73/2009 for Good Agricultural and Environmental Condition standards (which form part of the overall cross compliance standards and are set by Member States in accordance with an EU level framework) this instrument introduces new standards aimed at protecting water resources that:

- From 1 January 2010, require all claimants who abstract water for irrigation purposes to comply with the Environment Agency's abstraction licensing regime. This is already required domestically under the Water Resources Act 1991.
- From 1 January 2012, require all claimants to comply with the restrictions on spreading manure and fertilizer near watercourses, boreholes, wells and springs contained in the Nitrate Pollution Prevention Regulations 2008 and to keep a map showing these features and associated areas where manure and fertilizer may not be spread. This is already required domestically for all farmers in Nitrate Vulnerable Zones (which cover 70% of England).

These new standards represent the minimum requirement under the EU framework.

7.3 In addition to changes driven by EU legislation, Defra consulted in Spring 2009 on further changes to simplify and consolidate a number of the existing standards and reduce the administrative burden on farmers:

- 4 soil standards have been bought together into the 'Soil Protection Review' and greater emphasis has been placed on farmers undertaking risk assessment, in particular the need for farmers to wait for a Secretary of State exemption to access waterlogged soil is replaced with a mechanism for farmers to identify risks and mitigation measures.
- Requirements for land not in agricultural production have been partially relaxed in recognition of the greater role farmers will have in soil risk assessment and also in recognition of the launch of the Campaign for the Farmed Environment (the standard has been altered so as not to conflict with environmentally friendly practices encouraged under the Campaign) and the abolition of set-aside (restrictions on storage and non-agricultural activities have been relaxed to enable farmers to undertake such activities, as previously permitted on set-aside land).
- Clarification of the exemption for the traditional maintenance of hedgebanks has been inserted into the standard for the protection of hedgerows and watercourses.

7.4 A 12 week consultation ran from 4th March to 27th May 2009 covering the changes detailed above, the mitigation of the loss of the environmental benefits of set aside and the introduction of a requirement to place 6m buffer strips adjacent to water courses. A total of 212 responses were received and the consultation received media coverage in the farming press and

national media (primarily relating to the proposals to recapture the environmental benefits of set-aside).

- ***Consolidation***

7.5 This instrument replaces SI 2009 No 3264 Agriculture (Cross Compliance) Regulations 2009. As this instrument does not amend another instrument, no consolidation of legislation is necessary.

8. Consultation outcome

8.1 A 12 week consultation ran from 4th March to 27th May 2009 covering:
- Whether a mandatory or voluntary approach to mitigation of the loss of the environmental benefits of set-aside should be taken
- Whether a mandatory or voluntary approach to the use of buffer strips for the protection of watercourses from agricultural pollution should be taken
- A proposal to implement restrictions on the spreading of manure and fertilizer near watercourses (as required by the revised EU regulation) with effect from 01/01/2012.
- A proposal to bring together four existing soils standards into one and replace the need for farmers to seek a derogation to access waterlogged soil with a tool to help farmers manage soil risks.
- A proposal to introduce a new requirement with effect from 01/01/2010 of compliance with the existing abstraction licensing regime where water is abstracted for irrigation (as required by the revised EU regulation).
- A proposal to alter the requirements for the management and use of land not in agricultural production.
- A proposal to clarify the standard protecting hedgerows and water courses to make clear that traditional hedgebank maintenance is permitted

8.2 A total of 212 responses were received from organisations (57) and individuals (155, of which 26 were farmers) across the agricultural and environmental sectors. The majority of respondents only addressed one issue – the mitigation of the loss of the environmental benefits set-aside, for all other issues the maximum response rate was 66 responses (a proforma for responses was provided, but many respondents only gave views in response to questions on mitigating the loss of the environmental benefits of set aside and did not give a view on the other issues).

8.3 Following the consultation it was decided that for the mitigation of the loss of the environmental benefits of set-aside and the use of buffers strips a voluntary approach will be taken. For all other areas the majority of respondents agreed with the recommended proposals which this instrument implements.

8.4 A detailed analysis of the consultation responses is available from http://www.defra.gov.uk/corporate/consult/gaec/summary-responses.pdf.

9. Guidance

9.1 The Rural Payments Agency will provide all farmers subject to cross compliance with updated guidance that gives details of all cross compliance requirements and highlights the changes made to the existing rules. In addition a revised Soil Protection Review form had been developed in conjunction with farming stakeholders and is accompanied by revised guidance for soils management. As well as these guidance documents, cross compliance is covered by a 'Farm Advisory Service' (FAS) which manages a website containing further information, writes articles for the farming press and holds events for farmers and farm advisors. In 2010 the FAS will raise awareness of and provide information on the changes and new requirements introduced through this instrument.

10. Impact

10.1 The impact on business, charities or voluntary bodies is a one off cost on farmers of £3.5m (for reading new guidance and completing soil risk maps) and £160k annually for recording risks from access to waterlogged soil. Benefits over 4 years are estimated to be in the range of £22-36m, resulting from improved soil quality and reduced erosion losses.

10.2 The impact on the public sector is a one off cost of £674k (for incorporation of changes in RPA data system and provision of slope maps to assist farmer's risk assessment for soil erosion) and an annual cost of £106k for additional inspection of new standards on water protection and checking farmers soil risk records.

10.3 An Impact Assessment is attached to this memorandum and available from http://www.defra.gov.uk/corporate/consult/gaec/ia.pdf.

11. Regulating small business

11.1 The legislation applies to small business (the majority of farms are small businesses so this legislation applies primarily to small businesses).

11.2 To minimise the impact of the requirements on firms employing up to 20 people, the approach taken was to consult with farmers, to design standards that are accessible and easily understood by them and to provide advice and guidance through the RPA helpline and Farm Advisory Service. For buffer strips and the mitigation of the loss of the environmental benefits of set-aside a voluntary approach is being taken.

11.3 The basis for the final decision on what action to take to assist small business is feedback received from farmers and other stakeholders during consultation and data from the impact assessment.

12. Monitoring & review

12.1 The Common Agricultural Policy (of which cross compliance forms part) will be subject to review by the at the end of 2012 and the outcomes of that review will be monitored for potential impacts on this instrument. In the meantime feedback will be sought from farmers on guidance materials and advice services during implementation and incorporated into further revisions of guidance and advice materials in 2010 and 2011. Performance against the cross compliance standards themselves is monitored annually under the cross compliance inspection programme.

13. Contact

Martin Devine at the Department for Environment, Food and Rural Affairs, Tel: 0207 238 1849 or email: martin.devine@defra.gsi.gov.uk can answer any queries regarding the instrument.

Appendix 1 – Impact Assessment

Summary: Intervention & Options

Department /Agency:	Title:	
Defra	Impact Assessment of Changes to the cross compliance Good Agricultural and Environmental Condition standards in England.	
Stage: Final	**Version:** Final	**Date: 19-6-2009**
Related Publications:	All available at: http://www.defra.gov.uk/corporate/consult/gaec/	

Available to view or download at:

http://www.defra.gov.uk/corporate/consult/gaec/

Contact for enquiries: Sustainable Farm Management Team **Telephone:**

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

Recent review of CAP (Health Check) revised the EU legislation including cross compliance framework and removed set-aside thus requiring changes to domestic legislation. It also presents a limited opportunity to rationalise existing standards and introduce measures to recapture the environmental benefits of set-aside. Set-aside removal presents a major environmental risk, especially for farmland birds, a key Natural Environment PSA indicator.

What are the policy objectives and the intended effects?

The overarching policy objective of cross compliance is to ensure that farmers meet existing legal or other baseline standards in return for subsidy payments under pillar 1 of the CAP and as condition of entry to certain land based pillar 2 schemes. The proposed changes to cross compliance should secure or increase the level of benefit (contributing in particular to DSOs 2, 6 & 7) particularly through recapturing the benefits of set-aside, whilst minimising impact on farmers by simplifying some existing standards in line with stakeholder feedback and analysis of effectiveness.

What policy options have been considered? Please justify any preferred option.

To recapture the environmental benefits of set-aside: cross compliance complemented by voluntary Environmental Stewardship (ES)' top ups' (Option A with two implementation alternatives) alongside an industry led voluntary approach (Option B). A preferred approach to protect water quality is targeting buffer strips for water quality as part of either set-aside approach. Requirement on abstraction licensing and nitrates action plan no spread zones represents the minimum legal requirement. Other changes (e.g. rationalisation/consolidation) build on analysis of cross compliance and stakeholder feedback.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

General appraisal period is until the end of the 2007-2013 CAP period. Some assessment of uptake could take place after 1 year but environmental impacts will require longer term monitoring.

Ministerial Sign-off For final proposal/implementation Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

Hilary Benn

.....Date: June 2009

Summary: Analysis & Evidence

Policy Option:	Description: Recapturing the environmental benefits of set-aside through cross compliance with ELS options for 'non-production' measures
Set-aside Option A - Alternative 1	

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£ 3m-4.9m	2
Average Annual Cost (excluding one-off)	
£ 28m-39m	4

Description and scale of **key monetised costs** by 'main affected groups' Admin costs: To farmers £7.6m-13.9m (2010), £3.6m to £6.5m pa. thereafter. Implementation costs to RPA £1m (2009-10), running costs £1.1m-1.4m pa. from 2011. One-off cost to NE £1.1m for 2010/11 financial year. Compliance costs for farmers £32.6m-43.4m pa. (from 2011 to 2013 when the CAP will next be reviewed).

Total Cost (PV) **£ 110m-150m**

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

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£ -	
Average Annual Benefit (excluding one-off)	
£ 95m-440m	4

Description and scale of **key monetised benefits** by 'main affected groups' Benefits from environmental changes:

Farmland birds: £80m-350m pa; water quality: £20m-210m pa; greenhouse gases: £22m-£29m pa; ammonia: £0.6m-1.2m pa.

Total Benefit (PV) **£ 400m-1600m**

Other **key non-monetised benefits** by 'main affected groups' The benefits above do not cover increases to all farmland birds, only 7 species. There will also be other benefits to resource protection (soils), other wildlife and plants, and there may be benefits from landscape and environmental heritage also.

Key Assumptions/Sensitivities/Risks Assumptions: 4-5% of eligible land in EM. Estimates of farmers' income forgone based on average margins derived from Farm Business Survey data (2005/06 to estimated 2008/09). Mid range figure taken for land area otherwise left uncropped, assumed to have a zero compliance cost as it's already out of production. Uptake patterns and public valuations of benefits, derived using a benefits transfer approach, could differ from those used here.

Price Base Year 2009	Time Period Years 4	**Net Benefit Range** (NPV) **£ 250m-1490m**	**NET BENEFIT** (NPV Best estimate) **£ 870m**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			RPA/Defra	
What is the total annual cost of enforcement for these organisations?			£ 1.20m	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			Yes	
What is the value of the proposed offsetting measure per year?			£ N/A	
What is the value of changes in greenhouse gas emissions?			£26m	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small **1040-1830**	Medium	Large
Are any of these organisations exempt?	Yes	Yes	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ 14.8m-27m Decrease of £ 0 **Net Impact** **£** 14.8m-27m

Key: **Annual costs and benefits:** **(Net) Present**

Summary: Analysis & Evidence

Policy Option: Set-aside Option A - Alternative 2	Description: Recapturing the environmental benefits of set-aside through cross compliance with ELS options for 'non-production' measures AND 'production' measures

COSTS

ANNUAL COSTS		Description and scale of **key monetised costs** by 'main affected groups'
One-off (Transition)	**Yrs**	Admin costs: To farmers £7.6m-13.9m (2010), £3.6m to £6.5m pa. thereafter. Implementation costs to RPA £1m (2009-11), £1.1m-1.4m pa. from 2011. One off cost to NE £1.1m for 2010/11 financial year. Compliance costs for farmers £15.9-25.6m pa. (from 2011 to 2013 when the CAP will next be reviewed)
£ 3m-4.9m pa	2	
Average Annual Cost (excluding one-off)		
£ 15.5m-25.2m	4	**Total Cost** (PV) **£ 60m-100m**

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

BENEFITS

ANNUAL BENEFITS		Description and scale of **key monetised benefits** by 'main affected groups'
One-off	**Yrs**	Benefits from environmental changes:
£ -		Farmland birds: £60m-670m pa; water quality: £10m-180m pa; greenhouse gases: £11m-18m pa; ammonia: £0.3m-0.7m pa.
Average Annual Benefit (excluding one-off)		
£ 60m-655m	4	**Total Benefit** (PV) **£ 200m-2400m**

Other **key non-monetised benefits** by 'main affected groups' The benefits above do not cover increases to all farmland birds, only 7 species. There will also be other benefits to resource protection (soils), other wildlife and plants, and there may be benefits from landscape and environmental heritage also.

Key Assumptions/Sensitivities/Risks Assumptions: 5-6% of liable land in EM. Estimates of farmers' income forgone based on average margins derived from Farm Business Survey data (2005/06 to estimated 2008/09). Mid range figure taken for land area otherwise left uncropped, assumed to have a zero compliance cost. Uptake patterns and public valuations of benefits could differ from those used here.

Price Base Year 2009	Time Period Years 4	**Net Benefit Range** (NPV) **£ 100m-2340m**	**NET BENEFIT** (NPV Best estimate) **£ 1220**

What is the geographic coverage of the policy/option?				England
On what date will the policy be implemented?				2010
Which organisation(s) will enforce the policy?				RPA/Defra
What is the total annual cost of enforcement for these organisations?				£ 1.20m
Does enforcement comply with Hampton principles?				Yes
Will implementation go beyond minimum EU requirements?				Yes
What is the value of the proposed offsetting measure per year?				£ N/A
What is the value of changes in greenhouse gas emissions?				£ 15m
Will the proposal have a significant impact on competition?				No
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small **620-1170**	Medium	Large
Are any of these organisations exempt?	Yes	Yes	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ 14.8m-27m Decrease of £ 0 **Net Impact** **£** 14.8m-27m

Summary: Analysis & Evidence

Policy Option:	Description: Recapturing the environmental benefits of set-aside through a voluntary approach
Set-aside Option B	

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£ 2.5m-2.9m pa	2
Average Annual Cost (excluding one-off)	
£ 1.5m-1.7m pa	4

Description and scale of **key monetised costs** by 'main affected groups' To farmers: £600k to £1.2m initial time spent familiarising with the scheme, £300k annual thereafter for recording (voluntary). To Defra, industry and NGO bodies for county level campaigns: £4m (2010/11), £2.5m thereafter. To RPA: £0.1m-0.5m 2009/10, £90k-300k thereafter. To NE: £75k one-off 2010/11.

Total Cost (PV) **£ 10.6m – 12.1m**

Other **key non-monetised costs** by 'main affected groups' Assuming a fixed budget, the costs to government, will be met by redirecting funds from within existing budgets, causing no net increase in expenditure, but potential reduced spending on other areas, and thus losses in other areas.

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£ -	
Average Annual Benefit (excluding one-off)	
£ 0 – 195m	4

Description and scale of **key monetised benefits** by 'main affected groups' If 2.5% of arable area on each farm is put into management to protect the environment, annual benefits are: Farmland birds: £40m-170m pa; water quality: £11m-91m pa. However this is likely to be a large overestimate as it assumes a very low baseline, and the CFE does not aim to target every farm in this way.

Total Benefit (PV) **£ 0 - 700m**

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

Key Assumptions/Sensitivities/Risks Key risk is future costs to farmers and Government, plus lost benefits to public, if scheme does not deliver and regulatory fallback is implemented. Major assumptions about area uncropped in the baseline causing benefits to be overestimated. Risk of farmers stopping measures in high price years. Assumed that farmers will not take any action which leaves them worse off, hence zero production costs.

Price Base Year 2009	Time Period Years 5	**Net Benefit Range** (NPV) **£ -12.1m – 690m**	**NET BENEFIT** (NPV Best estimate) **£ 340m**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			none	
What is the total annual cost of enforcement for these organisations?			£ N/A	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ N/A	
What is the value of changes in greenhouse gas emissions?			£ 0	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ 1.6m – 2.2m Decrease of £ 0 **Net Impact** **£** 1.6m – 2.2m

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Other GAEC changes	Description: Simplification of and minor amendments to cross compliance requirements and guidance, the soil protection review (SPR) and mandatory no spread zones (NSZs).

COSTS

ANNUAL COSTS		Description and scale of **key monetised costs** by 'main affected groups' To farmers: £3.5m one-off for reading SPR guidance and creating risk maps, £160k pa for recordkeeping. To EA: £22k pa cost for inspecting abstraction licenses and NSZs. To RPA: £600k implementation (guidance, training inspectors) and £70k pa costs for SPR inspections. To Defra: £74k one-off for installing MAGIC maps, £14k pa thereafter for updating maps.
One-off (Transition)	**Yrs**	
£ 1.4m pa	3	
Average Annual Cost (excluding one-off)		
£ 205,000	4	**Total Cost** (PV) **£ 4.9m**

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

BENEFITS

ANNUAL BENEFITS		Description and scale of **key monetised benefits** by 'main affected groups' Administrative costs on government reduced by £1,000 per derogation for SPR. Likely to be an improvement in soil quality, even if the reduction in annual damage costs to soil quality is 5%, this would be £7.8m to £12.8m annually
One-off	**Yrs**	
£ -		
Average Annual Benefit (excluding one-off)		
£ 5.9m-9.6m	4	**Total Benefit** (PV) **£ 22m – 36m**

Other **key non-monetised benefits** by 'main affected groups' GAEC 12 - reduced admin burden for some farmers,clarity over requirement may increase compliance. Grouping GAECs and SPR - may increase stakeholder understanding and compliance, reduced recordkeeping. Improved soil structure, and thus productivity. NSZs may reduce pathogens in water bodies.

Key Assumptions/Sensitivities/Risks Assumptions: That farmers are already in compliance with existing law on abstraction licensing. Risks: That farmers are unreceptive to additional guidance and/or we are unable to find a clearer way to express cutting requirements for land not in production. Assumption of 5% reduction in annual damage costs to soil quality could be under or overestimate.

Price Base Year 2009	Time Period Years 4	**Net Benefit Range** (NPV) **£ 17m – 31m**	**NET BENEFIT** (NPV Best estimate) **£ 24m**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			01/01/2010	
Which organisation(s) will enforce the policy?			RPA and EA	
What is the total annual cost of enforcement for these organisations?			£ 92,000	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			Yes	
What is the value of the proposed offsetting measure per year?			£ nil	
What is the value of changes in greenhouse gas emissions?			£ negligible	
Will the proposal have a significant impact on competition?			Yes/No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ 3.96m Decrease of £ **Net Impact** **£ 3.96**

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

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0. EXECUTIVE SUMMARY

0.1. The recent review of CAP (Health Check) removed set-aside and introduced a number of changes, mostly minor, to the cross compliance framework, thus requiring changes to domestic legislation. Set-aside removal represents a major environmental risk, especially for farmland birds, a key Natural Environment PSA indicator.

0.2. To recapture the environmental benefits of set-aside, two possible options are considered: **Option A** would use a mandatory approach with cross compliance requirements complemented by voluntary Environmental Stewardship (ES) 'top ups'; **Option B** represents an industry led voluntary approach. By regulating for the maintenance of uncropped land, Option A can largely guarantee that the environmental conditions are met but imposes a risk that farmers might bear a substantial and, at this stage, uncertain cost. By relying on a purely voluntary approach, Option B, effectively removes the financial risk facing farmers but increases the risk that the environmental requirement will not be achieved.

0.3. Most of the **costs** of **Option A** will be borne by farmers. These costs will depend principally upon the size of the requirement to put land into environmental management and the loss of income arising from putting that land to a less productive use than would otherwise have been the case. This latter will depend in turn upon market conditions and the options that are available to farmers to meet the environmental conditions, including whether production is effectively precluded or cropping options are available. These costs will therefore vary greatly according to these factors but, including the admin costs to farmers, could be in the range £20 - £50m under average market conditions once the scheme is established. There would in addition be administration and inspections costs facing Natural England and the Rural Payments Agency, though these would small in relation to the costs facing farmers.

0.4. **Benefits** of Option A would take three major forms: the creation of nesting sites plus winter and summer feeding for a range of farmland bird species; habitat for a range of common plant species and for the invertebrates that feed on them; reduced loss of sediment and phosphate from cultivated land in some catchments where soils vulnerable to erosion occur on slopes. Quantifying and valuing such non-market benefits is extremely problematic as they will depend on the pattern of uptake amongst farmers of the available options (though the overall level will be determined), as well as relying on benefits transfer approaches. However, it is estimated that these could be in the range £80m to £870m annually, once the mitigation measures take effect. However, although estimated benefits are substantially greater than costs, there is also a greater margin of uncertainty attached to them.

0.5. **Option B**, *the Campaign for a Farmed Environment*, as proposed by industry stakeholder bodies involves a voluntary approach that will involve information, advice and local demonstration aimed at farmers and their advisers with the objective of promoting locally relevant actions benefiting farmland birds, resource protection and wider biodiversity. A voluntary approach might be assumed to be broadly cost neutral for farmers in terms of margin foregone, as they are unlikely to engage in activities on a voluntary basis that would impose more than marginal costs on their business. However, farmers may also face some costs in terms of the time that it takes them to familiarise themselves with the details of Option B, to consider what, if any, action they are going to take in response and to learn what they need to do in order to put any measures into place – though such costs will be incurred voluntarily. There will also be costs to industry, NGOs and government arising from a range of activities intended to promote and monitor actions on farm to address the range of environmental impacts associated with the loss of set-aside. In the absence of any indicative budget within the proposal, it is extremely problematic to provide any estimate of such costs. However, given the low cost of compliance to farmers, overall costs are likely to be considerably less than for Option A and seem unlikely to exceed £5m annually once the campaign is established.

0.6. Estimating **benefits** for Option B is also highly problematic with uncertainty attaching, in particular, to the pattern and level of farmer uptake which, of course, will be rather more uncertain than with the mandatory Option A, and the level of additionality which can be attributed to Option B. Hence, there is a very wide benefit range as the achievement of any level of benefits will be contingent upon the success

of the campaign in influencing the attitudes and behaviours of farmers. Annual benefits have been estimated in the range £0 to £130m if the Campaign were to reach an area uptake of 2.5%. An additional risk to achieving these benefits is the uncertainty attaching to the continuity of delivery of environmental benefits, should farmers reduce their contribution in response to perceived business priorities.

0.7. The remainder of the elements within the proposed changes to cross compliance requirements largely represent simplifications and minor amendments with limited cost implications. In a number of cases they are more likely to result in cost reductions for farmers. Where costs appear to be relatively high, such as the one-off cost of £1.8m associated with reading the new Soil Protection Review (SPR) guidance, this reflects a large number of farmers (essentially all SPS claimants) being affected but with a low cost per farmer. Benefits are also difficult to quantify for these measures but, in line with costs, are generally likely to be relatively small orders of magnitude. For example, the simpler SPR and improved guidance will provide greater clarity and the clearer requirements are expected to result in improved soil protection resulting in less erosion, compaction and soil carbon decline. Even if this results in only a 5% reduction in damage costs, this would deliver estimated annual benefits of £8 to £13m – substantially greater than annual costs estimated at less than £250,000.

1. POLICY CONTEXT

1.1. The European Commission regard cross compliance as an essential element of the Common Agricultural Policy (CAP) with the objectives of contributing to the development of sustainable agriculture and making CAP more compatible with the expectations of society at large. It provides a baseline level of environmental and other standards for farmers, in return for Single Payment Scheme (SPS) and land based rural development payments, which (depending on exchange rate) average around £2bn a year in England over the period 2007-2013. The majority of cross compliance standards simply require compliance with existing national law and in that sense cross compliance can be seen as a means to promote adherence with the law and avoid the perverse situation where a farmer breaking the law still receives a full subsidy payment. The cross compliance standards represent the minimum acceptable practice for farmers receiving subsidy under Pillar 1 of the CAP, and are the baseline beyond which agri-environment schemes under Pillar 2 reward farmers for positive management and/or enhancement of the environment.

1.2. Cross compliance only applies to those farmers who chose to claim subsidy under the SPS and/or enter a relevant RDPE (Rural Development Plan for England*)* scheme. There are currently around 107,000 SPS claimants in England which between them use 95% of agricultural land in England to support their subsidy claim. Member States are required to rigorously enforce the standards, with the majority inspected by the Rural Payments Agency (RPA), with others checked by the Environment Agency (EA), Animal Health and Veterinary Medicines Directorate (VMD). Breaches of cross compliance standards result in reductions to subsidy payment in proportion to the severity of the breach, usually in the range of 1-5%. 1% of farmers are subject to cross compliance inspection for any given standard in any year. The total amount of reduction applied (to the SPS) in 2007 was circa. £1m, or 0.07% of the £1.5bn annual SPS subsidy.

1.3. Cross compliance is an important instrument in ensuring value for public money by contributing to Defra's DSO - "A thriving farming and food sector with an improving net environmental impact - Making the farming industry more innovative, self-reliant, profitable and competitive and with better environmental management throughout the whole food chain".

1.4. At CAP Health Check Working Group the European Commission stated that measures should have a direct link to agricultural activity, relate directly to the farmer, should be enforceable and that costs should be commensurate with the benefits.

1.5. Cross compliance standards fall into 2 categories: Statutory Management Requirements (SMRs) which are set at EU level and are common across all member states, and Good Agricultural and Environmental Condition (GAEC) standards which are set by Member States on the basis of an EU framework. In the UK the implementation of agricultural policy including the definition of GAEC standards is devolved to "regions" i.e. England and the devolved administrations, in part reflecting the need to accommodate the diversity in landscape and farming practice between each region. The policy options contained in this Impact Assessment relate to the reframing of some of England's GAEC standards in light of revisions made at EU level in the CAP Health Check (a periodic formal review) and other associated changes to rationalise and simplify the existing standards.

1.6. The CAP Health Check has introduced new clauses that prevent Member States from removing standards but does not preclude changing the standard to make it more effective. We have sought where possible to empower farmers to identify and manage risks, especially in the area of soil protection.

1.7. The changes to cross compliance can be broken down into 6 main items:

- Introduction of possible measures to recapture the environmental benefits of set-aside.
- An obligation to introduce a new requirement for buffer strips for the protection of water resources.
- Consolidation of 4 existing standards on soils into 1.
- Abstraction Licence requirement.
- GAEC 12.
- Rationalisation and simplification – to ensure full compliance with EU legislation, bring existing standards up to date and respond to stakeholder feedback on the existing standards.

1.8. The summary sheets simplify this into possible policy outcomes:
- Summary sheet 1 - Option A1 for recapturing the environmental benefits of set-aside, including targeting advice on buffer strip locations
- Summary sheet 2 - Option A2 for recapturing the benefits of set-aside, including targeting advice on buffer strip locations
- Summary sheet 3 - Option B for recapturing the benefits of set-aside, including targeting advice on buffer strip locations
- Summary sheet 4 - All other changes, i.e. applying no spread zones to all farms in England, amendments to the soil protection review and other simplifications etc.

1.9. Summary sheets 1, 2 and 3 are mutually exclusive as only one option for recapturing the benefits of set-aside can be chosen and the preferred option for targeted advice on buffer strips will accompany either option chosen. The 4th sheet will be additional costs regardless of which option is chosen and contains relatively minor changes and lower costs (the no spread zone requirement and the abstraction licence requirement are compulsory so must be implemented). The evidence base is structured to cover each policy change rather than each cover sheet to avoid repetition. The appraisal period is 2009/10 to 2012/13, as the current CAP period ends in 2013.

2. RECAPTURING THE ENVIRONMENTAL BENEFITS OF SET-ASIDE

2.1 Background

2.1.1 In September 2007 the European Commission adopted a 0% set-aside rate to help mitigate current shortages in the EU cereals market. Following this agreement, the Secretary of State asked Sir Don Curry to help oversee the proposed enhanced programme of environmental monitoring in England in his role as Chairman of the Sustainable Farming and Food Strategy (SFFS) Delivery Group; and to bring together the leaders of Natural England (NE), Environment Agency (EA), National Farmers Union (NFU), Country Land and Business Association (CLA), and RSPB and others to form a High Level Set-Aside Group (HLSAG), which was established in October 2007.

2.1.2 As part of the Common Agricultural Policy review, known as the 'Health Check', the Commission agreed in November 2008 to abolish the set-aside mechanism with the abolition coming into force from January 2009. The UK supported the proposal to abolish set-aside but urged that adequate measures should be taken recapture the environmental benefits (a side effect of set-aside was to encourage a range of environmental and particularly biodiversity benefits). The UK government successfully negotiated for the legal basis to implement measures through cross compliance as part of the CAP Health Check, should it be decided to pursue this approach following public consultation.

2.1.3 As a consequence of the September 2007 decision Defra worked with the industry and stakeholders through the auspices of Sir Don Curry's (HLSAG), to provide advice and best practice. It also initiated a programme to monitor the responses of farmers and assess the environmental value of uncultivated land. Sir Don Curry's HLSAG produced an interim report in April 2008, followed by a final report in July 2008. The final report presented the findings of the monitoring work to date, set out options for recapturing the environmental benefits of set-aside and made a recommendation to the Secretary of State to pursue option XC1, now known as Option A (a combination of cross compliance and voluntary measures), which he accepted. Copies of the reports are available at: http://www.defra.gov.uk/farm/policy/sustain/deliverygroup/.

2.1.4 After agreeing to develop Option A, the Secretary of State commissioned Defra agencies, Natural England and RPA to work up implementation options by the end of 2008. The agencies identified two alternatives for implementing Option A, along with the costs, benefits and risks.

2.1.5 The industry reflected on the emerging results of the work carried out by NE and RPA to develop options to implement Option A during 2010. Some farming stakeholders expressed concerns over the range of costs that could fall on farmers and also the possible effects Option A might have on the continuing attraction of ELS. They therefore proposed an industry-led voluntary approach. Details of the proposal can be found on the NFU and CLA's websites at: http://www.nfuonline.com/x37687.xml and http://www.cla.org.uk/Policy_Work/Set-aside/. The proposal does however recognise the need for a mandatory back-up, similar to Option A, which would be triggered if agreed criteria had not been met. Such regulation would need to be developed and in place from the start to allow swift implementation if required.

2.1.6 Defra held a 12-week consultation entitled 'Environmental Standards for Farming - Consultation on proposed changes to standards in cross compliance Good Agricultural and Environmental Condition (GAEC) and related measures in England' from 4 March to 27 May 2009. This asked for views on whether to pursue a combination of cross compliance and incentive-based elements (Option A Alternatives 1 and 2) or a wholly voluntary approach (Option B, entitled 'Campaign for the Farmer Environment'). The consultation also included other proposed changes to cross compliance which are also covered in this Final IA. At this stage no final decisions have been taken on whether to pursue Option A (either Alternative 1 or 2) or B.

2.1.7 This Final IA considers the impacts of both Option A and B, and the two implementation alternatives for Option A (referred to as A1 and A2). The costs and benefits are summarised

in summary sheets 1 (Option A1 and targeting advice on buffer strip locations), 2 (Option A2, and targeting advice on buffer strip locations), and 3 (Option B, and targeting advice on buffer strip locations). These are mutually exclusive as only one option for recapturing the benefits of set-aside can be chosen and the preferred option for targeted advice on buffer strips will accompany either option chosen.

2.1.8 The general appraisal period for Option A would be from now until the end of the 2007-2013 CAP period (i.e. 4 years, 2009/10-2012/13). Some assessment (e.g. farmer uptake of management options) could take place after just one year. However, many of the environmental objectives, especially biodiversity, are enduring and so there will need to be short, medium and long-term (over 8 years) appraisal of the effects to take into account time lags and irreversibility. It is proposed that Option B would report regularly on progress via interim and end-of-year reports to Ministers. First interim report in December 2009 and another at the end of the first full year (expected July 2010); in future years interim reports are expected to be at half year intervals (i.e. in the spring). The first full report is scheduled for November 2010 reporting on the outcome of the first tranche of ES renewals and giving some scope to indicate the level of take-up of additional voluntary measures against the baseline.

2.2 COSTS AND BENEFITS OF 'OPTIONS A AND B' INTENDED TO RECAPTURE THE ENVIRONMENTAL BENEFITS ARISING FROM SET-ASIDE

2.1.1 This analysis attempts to quantify, and monetise as far as possible, the costs and benefits of two alternative proposals (Options A and B) aimed at mitigating the adverse environmental effects, relating principally to biodiversity and natural resource protection, that would arise from a reduction in the area of uncropped land in England ensuing from the formal ending of set aside as part of the CAP Health Check. Under '***Option A'***, based on recommendation of Sir Don Curry's High Level Set-Aside Group, and developed by Defra, Natural England and RPA, farmers would be obliged to implement one or more out of eight 'Environmental Management' (EM) options on a proportion (probably between 4 and 6%) of their eligible arable land, as a cross-compliance measure. The first variant of Option A (known as Alternative 1) would offer farmers four largely non-cropping options; while the second variant (Alternative 2) would include these same four options plus four other options that allow cropping. Additionally, a number of ELS 'top-up' (EX) options, which could be placed on the EM options to enhance the environmental benefit, could be voluntarily adopted by those in the ELS, as part of their agreement.

2.1.2 The NFU and CLA have developed an alternative set of proposals for a voluntary approach, known as the Campaign for the Farmed Environment (CFE) or '***Option B***'. This would aim to increase the uptake of Environmental Stewardship and the options within it that would offset the loss of set-aside, and also to encourage voluntary implementation by farmers, in particular those not participating in ES, of a range of options that would help to recapture some of the benefits of set-aside.

2.1.3 Following on from the Consultation Stage Impact Assessment, a number of analyses were commissioned to strengthen the evidence and provide greater insights into the possible impacts of Options A and B. In particular, FERA (formerly CSL) was commissioned to undertake two pieces of work: the first assessed the likely responses of farmers to the introduction of Options A and B (including ES top-ups) in terms of the options that they would consider adopting, based principally on survey evidence; the second attempted to quantify the potential environmental impacts of Option B, using as far as possible, the same methodology as was previously used to estimate the environmental impacts of Option A. A further piece of analysis was commissioned from Professor Ian Hodge of the Department of Land Economy, Cambridge University who reviewed the Option B proposal, considering the assumptions underlying it, and identifying the costs, benefits and risks that were associated with it. These analyses have been used to inform this Impact Assessment and are cited throughout this document.

2.2 OPTION A 'LAND IN ENVIRONMENTAL MANAGEMENT' GAEC CONDITION

2.2.1 This option would be based on a new cross compliance condition requiring farmers to maintain a defined percentage of their cultivated land in 'environmental management'. Reflecting the conclusion that the environmental benefits associated with set aside, where the requirement

averaged 8%, could be met with a smaller percentage requirement where the management would be focused more directly on achieving environmental objectives, it has been assumed that this would fall in the range 4% - 6%, depending on the extent of the environmental management options that would be available to farmers. This also reflects current guidance on farmland birds from RSPB and Natural England which suggests that populations could be maintained if between 4 and 6% of cultivated land were deliberately managed to produce high quality seed resource, insect rich cover and nesting habitat. However, since Alternative 2 might require a slightly higher percentage of land in environmental management than Alternative 1 in order to deliver the same level of environmental benefit, the cost estimates below assume either a 4% or 5% requirement for Alternative 1 and either a 5% or 6% requirement for Alternative 2.

2.2.2 Depending on the variant of ***Option A*** adopted (i.e. Alternative 1 or 2), farmers might be able to meet the condition without taking cultivated land entirely out of productive use. ELS 'top-up' options would also be available to reward farmers who undertook more demanding environmental management on this land, though, in principle, these would only reward the additional management costs. However, since any such ELS payments will be based on average figures and farmers will be free to choose whether or not to adopt particular top-up options, farmers will tend to adopt an option only if it leaves them no worse-off than they were beforehand. In general, therefore, it is reasonable to assume that farmers will, on average, be slightly better off as a result of choosing a particular option, or combination of ELS top up options.

2.2.3 Under ***Option A*** the 'environmental management' requirement could be met in a number of possible ways either singly or in combination, with 2 possible variants (Alternatives 1 and 2) considered:

		Cross compliance options	ELS Top-up options
Alternative 1		EM1 Grass buffers alongside temporary and permanent watercourses	EX1 Wildflower seed mix EX2 Cutting & removal of vegetation
		EM2 Reverted arable areas or strips	EX1 Wildflower seed mix EX3 Grazing management
		EM3 Previously cultivated land rotationally taken out of production	EX4 Wild bird seed mixture EX5 Nectar mix EX6 Un-cropped cultivated margins EX7 Un-harvested cereal headlands EX8 Spring cultivated fallow
		EM4 Wild bird winter food area	n/a
	Alternative 2	EM6 Farmland bird plots in winter cereals	n/a
		EM9 Winter stubble (to end Feb)	EX9 Uncultivated summer fallow EX12 Low input regime for spring crop
		EM10 Winter stubble followed by specified crops	EX12 Low input regime for spring crop
		EM 11 Enhanced cereal/oilseed rape winter stubble	EX9 Uncultivated summer fallow EX11 Farmland bird plots EX12 Low input regime for spring crop

Note: A number of possible production options (EM5, 7, 8, EX10) have been considered and rejected as they would not deliver a reasonable level of environmental benefit and are also likely to be more difficult to inspect.

2.2.4 The more restrictive variant of the proposal (Alt 1) would require farmers to adopt options that involved a cessation of cropping on the Option A area.

2.2.5 Farmers would be able to adjust the areas managed in each of these ways as necessary to fit with their cropping patterns, subject to meeting the percentage target and the requirements of other GAEC standards at all times. To avoid adverse impacts on watercourses, farmers would not, however, be able to remove buffer strips alongside watercourses between 1st November and 1st February. Land in 'environmental management' would be additional to the existing cross-compliance protection zones required alongside hedges and watercourses and, unlike set-aside entitlements, it is envisaged that this requirement would **not** be tradable.

Costs to Farmers of Option A

2.2.6 In the absence of any mitigating measure, it is extremely unlikely that all arable land would be cultivated in any year. Even in 2008, when cereal prices were at historically high levels at the time of planting and there was no set-aside requirement, it is estimated that approaching 160,000 hectares of arable land in England was left uncropped voluntarily for agronomic or financial reasons. It is reasonable to assume that any such land voluntarily uncropped will meet the cross compliance conditions at no or negligible cost to the farmer so that the compliance costs associated with this land can be taken as being zero. The lower the returns to arable production, the higher will be the amount of land that we would expect to see left uncropped and, thus, the lower the aggregate compliance cost; on the other hand, as returns increase more marginal land will become viable and be brought back into production, implying that compliance costs will increase. Thus, there is likely to be a high correlation between market returns and compliance costs.

2.2.7 Three possibilities have therefore been considered for the amount of land that would be left voluntarily uncropped for agronomic or financial reasons in a 'do nothing' policy situation, in order to provide a range for the costs that would be incurred by farmers. These are shown in the table below: the '*low retention*' scenario where the amount of uncropped land is assumed to fall to 100,000 hectares – substantially lower than anything recorded in recent years, even with the historically high prices observed in 2007/08; a '*high retention*' scenario with 250,000 hectares assumed to be left uncropped, reflecting the possibility of prices, and price expectations, remaining relatively low over the medium term; and a mid-range figure of 175,000 hectares. This is similar to the area that was left uncropped as GAEC12 in 2006, even though there was then also over 300,000ha of uncropped formal set-aside (and is also close to the forecast for 2009, based on the November 2008 Farm Business Survey telephone survey of farmers' planting intentions for 2009 harvest). However, Professor Ian Hodge[1] notes in his recent analysis that, *'The fact that areas of uncropped land did not decline to the extent that might have been expected in response to recent commodity price hikes may simply reflect a lag in farmer responses to change rather than a long term commitment to the retention of uncropped land into farming systems.'* On the other hand, there is also some anecdotal evidence that the area of GAEC12 might be under-recorded to some extent, and it would be unrealistic to expect farmers to record every piece of uncropped land - for example, where the uncropped margin was slightly wider than the cross-compliance strip. **To the extent that such under-recording exists, the area of land otherwise uncropped will be larger and the estimated compliance costs lower than are estimated below.** However, while the extent of such under-recording is unknown, the evidence is anecdotal and it has to be remembered that considerable uncertainty attaches also to a number of other estimates, particularly those derived from relatively small surveys.

Table 1
Baseline Assumptions of Uncropped Area With No Mitigation ('000 ha)

Low Retention Scenario	Intermediate Scenario	High Retention Scenario
100	175	250

2.2.8 In order to comply with any new cross compliance conditions, many farmers will need to make changes to their practices and there will be compliance costs associated with these changes. These costs will arise largely from income foregone as a result of lower production levels, through taking land out of production or using less intensively, although there will also be administrative burdens incurred by farmers in implementing the new requirements. Initially these are likely to be of the order of £7½ - £14 million per annum with most of this falling on those arable farmers that will be impacted to the greatest extent. As noted in the consultation stage impact assessment, these costs are likely to decline somewhat after the first year as farmers become aware of whether or not they have to take any action and, if they do, acquire a greater degree of familiarity, with the scheme. Hence, it has been assumed that after the first year (2010) the costs associated with the time spent understanding the policy or measuring areas fall away for the remainder of the appraisal period (until end of 2007-2013 CAP period) to between £3½ and £6½ million per annum. There would, however, be considerable variation amongst farms in the costs associated with understanding and implementing the policy.

[1] Hodge, I. (2009). Review of the NFU/CLA proposal 'Option B – a Campaign for the Farmed Environment'. Final report to Defra June 2009.

2.2.9 The large majority of farm businesses are unlikely to be directly impacted by the requirement and the cost will amount to no more than that associated with reading the explanatory booklet to confirm that they are not affected: for, say, a livestock farm with no arable crops this might not take more than 10 minutes with an associated one-off cost of less than £3. At the other extreme where the farmer needs to spend several hours in understanding, planning and implementing the requirements the time needed could amount to 16 hours or more effort, though this will decline in subsequent years. It is also likely that a proportion of the total time requirement in many cases will be accounted for by professional support delivered by rural advisors and agents and this is assumed to account for around 12% of the total time involved. This has led to an increased estimate of farmers' administration costs since the initial impact assessment.

2.2.10 Changes that farmers need to make will vary greatly among farms and, in a number of cases, none may be necessary at all - for example, if a farmer is already planning to leave more land out of production than is needed to meet the percentage environmental management requirement. The impact at the farm level will also be affected by the way that any requirement for land in environmental management is derived. Under the present proposal farmers with fewer than 20 hectares of arable land, those in the Severely Disadvantaged Area (SDA) and organic producers will be exempt from any requirement. This is likely to have a rather greater impact on the numbers of producers affected than on the area of land in environmental management. Furthermore, any increase in the arable land area threshold at which the requirement applies will have a greater proportionate effect on the number of farms affected than on the total area.

2.2.11 Farmers vary greatly in their behaviour and, at any plausible EM percentage requirement, some will almost certainly exceed it by virtue of keeping some land out of production whilst others will have returned all of their arable land to cultivation, or at least an amount which will require them to put some additional land into EM. The 2009 Farm Practices Survey suggests that on 31% of holdings with arable land, no arable land would be left uncropped in future years and that a further 11% would leave less arable land uncropped than in the current cropping year. However, 54% of holdings intended to retain roughly the same amount of uncropped land in future years. In an attempt to reflect these differences amongst farmers in the areas of land that would be left uncropped in the absence of any mitigation measures, the 'additional area requirements' have been derived from a modelling approach and based on Single Payment Scheme (SPS) data. These are shown in Table 2 below for the Alternative 1 assumed requirements of 4% or 5% of land in environmental management. The areas are rather greater than the simple difference between the total area that would be required by the environmental management requirement and the area that would be left uncropped in the baseline situation: the analysis allows for the fact that the remaining uncropped land in future years is likely to have a very skewed distribution so that, at any percentage rate, some farms will already have enough land left uncropped to meet the environmental management requirement but many more will not and will therefore face a compliance cost. These areas also differ slightly from the figures included in the initial impact assessment which were based on Farm Business Survey data since SPS figures were not available at the time.

Table 2 Additional Land Requirements According to Assumed % Requirement For Environmental Land Management (Option A)

Arable Area 2008 ('000 ha)[(a)]	4054	
Area Implied By Environmental Management Requirement @ :	**4%**	**5%**
('000 ha)	162.2	203.5
Baseline Uncropped Area:		
Low Retention Scenario	100.0	100.0
Intermediate assumption	175.0	175.0
High Retention Scenario	250.0	250.0

*Estimated **Additional*** Area Implied By Environmental Management Requirement:		
Low Retention Scenario	106.1	138.6
Intermediate assumption	81.5	108.4
High Retention Scenario	55.5	76.1

Notes: (a) 2008 SPS data for cultivated land use that generates the requirement for Option A environmental management.

2.2.12 **Table 3** below provides an estimate of the orders of magnitude for compliance costs arising from the loss of production associated with Alternative 1 with farmers required to leave land out of production. To simplify the exposition, it is assumed here that all of the area comprises either EM2, reverted arable plots or strips alongside woodlands or hedges, or EM3, previously cultivated land rotationally taken out of production'. Estimated figures are based on rounded Gross Margins derived from Farm Business Survey results: the intermediate assumption is based on a four year average of 2005/06 to forecast 2008/09 and the high and low price scenarios respectively 2007/08 and 2005/06. The estimated reduction in gross margin assumes that there is no cropping compared with the alternative of a 4 year rotation with 3 winter cereal crops followed by winter oilseed rape, reduced by 25%, consistent with roughly a 15% reduction in average yield, to reflect the fact that the land is likely to be inferior quality or difficult to work. Farmers will have an incentive to opt for the least cost option, or options, for them and there is likely to be considerable variability amongst farms. Given that farmers are also likely to choose their poorest quality land for environmental management, actual production, and income, losses will tend to be well below levels that may sometimes be reported based on average figures.

Table 3 Option A – Alternative 1 - Annual Compliance Costs: Changes in Forecast Gross Margin

Percentage Environmental Management Requirement	**4%**	**5%**
Estimated Additional Area Implied By Environmental Management Requirement ('000 ha) (from Table above)		
Low Retention Scenario	106.1	138.6
Intermediate assumption	81.5	108.4
High Retention Scenario	55.5	76.1
Change in Aggregate Gross Margin (Compliance Cost) (£m)		
Low Retention Scenario (£600/ha)	63.7	83.2
Intermediate assumption (£400/ha)	32.6	43.4
High Retention Scenario (£220/ha)	12.2	16.7

Notes on analysis above

a. A number of farms are likely to leave some land out of cultivation voluntarily in any case for agronomic reasons (e.g. in awkward corners or areas that are difficult to work) and in some cases this area could exceed the maximum % required under any new cross compliance condition. However, since other farms will have to do something to at least meet this minimum %, the total area in environmental management will be greater than the difference between the minimum total area required and the land that would be left uncropped in a 'do nothing' scenario. Hence, compliance costs will arise even if it appears that the area that will otherwise be left uncropped *exceeds* this minimum requirement.

b. Gross margin is calculated as the gross output of an enterprise, minus the associated variable costs comprising seed, fertiliser, agrochemicals, grain drying and other crop costs. Figures are derived from the Farm Business Survey. Annex 2 provides information on the assumed gross margin losses associated with the options available to farmers under Option A.

2.2.13 **Table 3** indicates a huge range in the costs of compliance, reflecting the fact that when output prices are high, farmers will wish to bring more land back into production so that the area of additional land that they will need to put into Option A (above that they would leave uncropped anyway) will rise and the cost to them of doing in this in terms of the income foregone will also increase. Conversely, when prices are low the cost of putting any extra land into Option A will be

reduced and farmers are more likely to leave land out of production anyway. However, on the basis of the intermediate scenario, annual compliance costs arising from production losses are likely to be around £43m with a 5% requirement and £33m at 4%. With admin costs amounting initially to £7 - £14m, before falling to around half that amount as farmers become familiar with the scheme, total annual compliance costs are therefore likely to amount to £36 - £50m for Alternative 1 on these assumptions once the scheme is established. These figures are more likely to be overestimates than underestimates as many farmers will have less productive fields where the costs will be considerably less than the figures used here. This is likely to be especially the case at lower % Option A requirements since farmers are likely to have to use increasingly more productive land as the % requirement increases. As with the initial impact assessment, the intermediate assumption has been chosen as the most representative scenario: although prices and areas (and, hence, compliance costs) will fluctuate between years, neither the low nor the high retention scenario seems likely to persist over a sustained period of years so that the intermediate assumption is likely to be closer to an 'average' outcome.

2.2.14 **Alternative 2** represents a more extensive variant of Option A that will allow farmers a greater degree of discretion than Alternative 1 in the environmental management practice or practices that they apply. Given this, farmers' compliance costs cannot be higher with Alternative 2 than with Alternative 1 and must almost certainly be lower. As with Alternative 1, farmers will have an incentive to adopt the particular option or options that minimise their costs of compliance, including any non-financial costs associated with the ease of accommodating changes into their farming pattern. Factors such as weed and disease control and improved entry for subsequent crops may affect farmers' choices amongst the options available.

2.2.15 Costs are likely to vary greatly amongst farms according to their particular circumstances, Some evidence on how farmers might respond to Alternative 2 has been provided by results from a recent FERA survey of farmers and also by the autumn 2008 Farm Business Survey telephone survey of farmers' planting intentions which also sought information on how much land was already being managed in ways consistent with the proposed EM options. The preliminary FERA report suggests that the main Environmental Management (EM) measures likely to be taken up by farmers under Option A were EM1 (Buffers alongside watercourses), EM2 (Reverted arable plots or strips) and EM10 (Winter stubble followed by spring barley, beans, sugar beet or linseed). EM10 was the preferred stubble option because of the earlier date at which cultivation was permitted.

2.2.16 The FBS telephone survey results indicate that by far the most common option, in terms of the total area planned for 2008-09, was winter stubble followed by spring crops. There was considerable regional variation, with large proportions of farms in the North East, Yorkshire and West Midlands reporting such areas, but comparatively few in East Anglia and Kent. Grass buffer strips were reported by nearly half of all farmers with at least 20ha of arable land and game strips by nearly a quarter. Overall 71% of arable farmers indicated that they were planning to adopt one or more of these options in 2008-09.

2.2.17 Although farmland bird plots have the lowest compliance costs associated with them and thus may be expected to find some degree of popularity with farmers, respondents to the FERA survey tended to be polarised, either liking or strongly disliking them: while some were already implementing plots, others objected to them on grounds such as weeds in the patches, perceived access for predators, difficulty in remembering to create the plots and perceived lack of evidence for effectiveness. The plots could also be a problem in narrow fields because of the requirement to locate them at least 50m from the field boundary. However, the FERA results indicate that for those farmers who would consider bird plots as an option, there was a high probability of their adoption.

2.2.18 As with Alternative 1, changes to the normal cropping pattern would occur, albeit only on a small part of the total cultivated area, and there may be some practical issues to cope with, such as separating harvested crops in store (e.g. where spring wheat is grown in same rotation as winter wheat). However, even if the compliance cost figures and the available survey evidence suggest a considerable incentive to adopt the available spring cropping options, it has to be remembered that not all soils are suited to spring cropping and, even where it is possible, wet conditions at the wrong time could pose problems. Farmers may be reluctant to risk a spring crop in situations where getting it established at the right time is likely to be an issue, incurring costs which are certain where the return is particularly uncertain. However, although the spring cropping options potentially available within Alternative 2 might not represent a panacea for all

farmers, the cost figures in Table 3 for Alternative 1 above are almost certainly greater than any realistic outcome under Alternative 2 for a given percentage EM requirement.

2.2.19 Where farmers do opt under Alternative 2 for the widespread use of options that involve taking land completely out of production, it seems probable that their individual compliance costs will be considerably less than the estimated average, reflecting factors such as the quality of the particular land. Permanent grass buffers would be of interest to some farmers, particularly where there are low yielding field edges. Game strips (EM6 – wild bird winter food area) have the highest costs of compliance, reflecting the costs of planting and establishing game cover as well as the loss of production and, hence, are likely to be of interest only where a shoot is already established or where farmer has spotted a diversification opportunity.

2.2.20 Given all of the factors mentioned above, it is difficult to predict with any degree of accuracy, how farmers will choose between the options that might be available to them within Alternative 2. However, the apparent low level of compliance costs attaching to the options involving winter stubbles, such as winter stubble followed by spring barley or sugar beet, suggests that these are likely to be favoured by a significant number of farmers with suitable land and conditions. Since average compliance costs for these alternatives are only a fraction of those attaching to those involving the cessation the cropping, aggregate compliance costs are therefore likely to be rather lower than those shown in Table 3 above for Alternative 1. However, it should be noted that farmers who opt for the spring cropping options might put a larger area into EM than is strictly required as they will be constrained by field sizes: they are unlikely to put part of a field into spring cropping and the remainder into winter cropping in order to exactly meet the % requirement unless the residual area available for winter cropping is sufficiently large to make the operation worthwhile. Working in the other direction, however, there will be farmers who would have planted spring crops in any case whose compliance costs will therefore be reduced.

2.2.21 Tables 4 and 5 set out possible scenarios for Alternative 2 although there are several other plausible outcomes. In Table 4 below, 50% to 60% of land under environmental management is assumed to be accounted for by spring cropping options. Reflecting the apparent preferences of farmers for EM10 (Winter stubble followed by spring barley, beans, sugar beet or linseed), this option is assumed to predominate but given the relatively small differences in compliance costs among EM 9, 10 and 11, the estimated compliance cost is not particularly sensitive to changes in the mix between the three. With this level of spring cropping options, 40% to 50% of land in EM would be accounted for by other options. The available evidence appears to suggest that EM1 (Buffers alongside watercourses), EM2 (Reverted arable plots or strips) would be the preferred alternatives for many farmers but with some farmers also opting for farmland bird plots in winter cereals. Reflecting this, 15% or 20% has been assumed both for riparian buffers (EM1) and for land taken out of production (EM2) with 10% farmland bird plots (EM6). These percentages differ slightly from those used in the initial impact assessment: in particular game strips have been removed, reflecting the fact that these will have only a limited interest for farmers who do not already have a shoot and are most likely to be adopted if they represent a diversification opportunity and potential source of income.

Table 4

Option A Alternative 2 Assumed Areas By Type Of Management *('000ha)*

With 5% Requirement	*Low Retention Scenario*	*Intermediate Scenario*	*High Retention Scenario*
Estimated Additional Area Required in Environmental Management ('000 ha)	138.6	108.4	76.1
Winter Stubble Followed by Spring Barley or Sugar Beet (EM10) 50%- 60%	69.3-83.2	54.2-65.1	38.0-45.6
Permanent Grass Buffers (EM1) 15% - 20%	20.8-27.7	16.3-21.7	11.4-15.2
Reverted arable plots(EM2) 15% - 20%	20.8-27.7	16.3-21.7	11.4-15.2
Farmland Bird Plots (EM6) 10%	13.9	10.8	7.6
With 6% Requirement			
Estimated Additional Area Required in Environmental Management ('000 ha)	172.4	137.1	99.1
Winter Stubble Followed by Spring Barley or Sugar Beet (EM10) 50%- 60%	86.2-103.4	68.6-82.3	49.5-59.4
Permanent Grass Buffers (EM1) 15% - 20%	25.9-34.5	20.6-27.4	14.9-19.8
Reverted arable plots(EM2) 15% - 20%	25.9-34.5	20.6-27.4	14.9-19.8
Farmland Bird Plots (EM6) 10%	17.2	13.7	9.9

Table 5

Option A, Alternative 2 Annual Compliance Costs: Changes in Forecast Gross Margin (*£m)*

With 5% Requirement	*Low Retention Scenario*	*Intermediate Scenario*	*High Retention Scenario*
Winter Stubble Followed by Spring Barley or Sugar Beet (EM10) 50%- 60%	2.8-3.3	1.6-2.0	0.6-0.7
Permanent Grass Buffers (EM1) 15% - 20%	14.0-18.7	7.3-9.8	2.9-3.8
Reverted arable plots(EM2) 15% - 20%	12.5-16.6	6.5-8.7	2.5-3.3
Farmland Bird Plots (EM6) 10%	0.3	0.2	0.1
Total	**30.1-38.4**	**15.9-20.2**	**6.1-7.8**
With 6% Requirement			
Winter Stubble Followed by Spring Barley or Sugar Beet (EM10) 50%- 60%	3.4-4.1	2.1-2.5	0.7-0.9
Permanent Grass Buffers (EM1) 15% - 20%	17.5-23.3	9.3-12.3	3.7-5.0
Reverted arable plots(EM2) 15% - 20%	15.5-20.7	8.2-11.0	3.3-4.4
Farmland Bird Plots (EM6) 10%	0.3	0.2	0.1
Total	**37.4-47.7**	**20.2-25.6**	**8.0-10.2**

2.2.22 The figures in Table 5 suggest that on the intermediate assumption, annual compliance costs arising from production losses are likely to be of the order of £16 to £20m with a 5% requirement and of £20 to £26m with a 6% requirement. The lower end of the range is associated with a higher proportion of spring cropping options relative to those which leave land uncropped. When combined with admin costs borne by farmers, the compliance costs will be around £19 to £27m and £24 to £32m respectively, once the scheme is established, though farmers' admin costs are likely to be higher – by some £4 to £7m in the initial year. The figures

in Table 5 should be regarded as indicative rather than definitive but they serve to illustrate the great sensitivity of the estimates to changes in output (and input) prices and to the amount of land that would be left uncropped in the counterfactual situation. Given the high correlation between the two, movements tend to be reinforcing in terms of the impact on costs to producers. However, these compliance costs will also be positively correlated with farm incomes so that high compliance costs will be incurred in years when returns to arable crops, and hence incomes, are also buoyant whereas in years of low incomes, compliance costs will be correspondingly reduced. As with Alternative 1, and for the same reasons, the intermediate scenario has been chosen as representative of the most likely outcome in reality, although it should be noted that Alternative 2 might require a slightly higher percentage of land in environmental management than Alternative 1 in order to deliver the same level of environmental benefit.

Administrative Costs of Option A

2.2.23 Costs of implementation, monitoring and enforcement will be borne by Defra / RPA in introducing and continuing to run the additional cross compliance measures associated with Option A on top of other cross compliance requirements. The exact scale of these costs will depend upon the details of the measures but will be relatively small compared with the cost of compliance to farmers. Based on the selected Option A implementation option following RPA's recommended booklet approach then RPA estimates indicate that implementation costs in the initial year will be in the range £880,000 to £1.05 million, while annual running costs thereafter are likely to fall in the range to £1.05 to £1.35 million. These figures include costs for business product and system design and development, resourcing, communications and business change activities requirements.

2.2.24 Additionally, Natural England (NE) is likely to incur one-off costs with the scale of these depending on the timing of implementation of this proposed requirements. It is estimated that a total of about 6,500 ES agreements with in-field arable options will be in existence in November 2010, and all of these are likely to need some amendment. There will also be around a further 5,350 classic scheme agreements in the same situation. Additional contact would be needed with all of these agreement holders and Natural England would also have to process the resulting amendments and/or renewals. It is estimated that this work would occupy about 24 staff years. With training, supervision and other overheads, plus the need to provide advice, the total cost of this additional work is estimated at £1,068,000 for the 2010/11 financial year. NE running costs are based on assumptions as documented in Annex 3.

Total Costs

2.2.25 On the basis of the above analysis, the average costs for the appraisal period (until end of 2007-2013 CAP period) have been estimated as follows in £ million:-

Table 6 Option A - Summary of Total Costs (£m)

	2009/2010	2010/11	2011/12	2012/13
Admin cost to farmers		7.6-13.9	3.6 -6.5	3.6-6.5
Costs to RPA[2]	0.9-1.2	1.1-1.4	1.1-1.4	1.1-1.4
Costs to Natural England		1.1		
Production cost to farmers Alt 1		32.6-43.4	32.6-43.4	32.6-43.4
Production cost to farmers Alt 2		15.9-25.6	15.9-25.6	15.9-25.6
Total Costs Alt 1	0.9-1.2	42.4-59.8	37.3-51.4	37.3-51.4

[2] Includes RPA costs for monitoring buffer strips, see section 11.

Total Costs Alt 2	0.9-1.2	25.7-42.0	20.6-33.6	20.6-33.6
Discounted Total Costs Alt 1	0.9-1.2	41.0-57.8	34.8-47.9	33.7-46.3
Alt 2	0.9-1.2	24.8-40.6	19.3-31.3	18.6-30.3
PV Total Costs Alt 1	110-153			
PV Total Costs Alt 2	64-103			

Note: Costs to RPA include the inspection costs associated with the monitoring buffer strips that also contribute to land in environmental management under Option A, see Section 3.

Risks of Option A

2.2.26 As Hodge notes in his analysis, although Option A can substantially guarantee that the environmental conditions are met by regulating for the maintenance of uncropped land, this approach imposes a risk that farmers bear a substantial and, at this stage, uncertain cost. As seen above, potential compliance costs will be highest in a high price / low retention scenario, though this would also create a situation where the voluntary approach of Option B is likely to come under the greatest pressure.

2.2.27 A further risk associated with Option A relates to the willingness of farmers to enter into or renew Environmental Stewardship agreements when they are also required to put a percentage of their arable land into environmental management under cross compliance. In their critique for HGCA of the consultation stage impact assessment produced, Andersons Consultants commented that, 'the introduction of compulsory set aside mitigation will seriously challenge the level of future ELS uptake and renewals and that, 'estimates from our consultants across the country indicate that half our clients are unlikely to renew in the event of Option A going ahead.' However, the recent report by Fera suggests that the level of renewals is likely to be considerably higher than that suggested by Andersons. Although several farmers who were included in the Fera survey commented that they would not want to take land out of production for both ES and cross compliance, nearly all of those already in ES intended to re-apply when their existing agreement expired, although for some the decision would depend on circumstances at the time of re-application. Fera also note in their report that farmers were more accepting of the Option A proposals once they had a better understanding of them, suggesting that the impact of Option A on ES might be less significant than their initial survey suggested.

BENEFITS OF OPTION A

2.2.28 Set-aside produced three major environmental benefits which the Environmental Management cross compliance condition would seek to capture:

- Nesting sites plus winter and summer feeding for a range of farmland bird species - current guidance on farmland birds from RSPB and Natural England suggests that populations could be maintained if between 4 and 6% of cultivated land were deliberately managed to produce high quality seed resource, insect rich cover and nesting habitat;
- Habitat for a range of common plant species and for the invertebrates that feed upon these plants;
- Reduced loss of sediment and phosphate from cultivated land in some catchments where soils vulnerable to erosion occur on slopes.

Additionally, a review by Institute of European Environmental Policy (IEEP) showed a range of other benefits including benefits for species such as vole and brown hare.

2.2.29 Valuation of the benefits from the two Option A alternatives for recapturing the environmental benefits of set-aside involved gathering evidence in three stages:

1. Identification of the benefits
2. Quantification of the benefits
3. Monetisation

The results of this process are described below.

Stage 1 - Identification of the benefits

2.2.30 The initial Natural England assessment of benefits expected from the proposed Environmental Management (EM) options was peer-reviewed by the Food and Environment Research Agency (Fera, formerly the Central Science Laboratory)3. A summary of the benefits of

[3] CSL. (2008). Estimating the quantitative environmental impacts of a package of potential options to recapture the benefits of set-aside, Phase 1: Review of Natural England benefits assessment. Final report to Defra, February 2009. http://defraweb.defra.gsi.gov.uk/corporate/consult/gaec/csl-phase1.pdf

the 8 proposed options and corresponding ELS top-up options is provided in the following paragraphs. The benefits can be broadly summarised as biodiversity of birds, plants, other animals, and resource protection. For this assessment, each option was compared with "former" set-aside on a hectare for hectare basis.

2.2.31 There is expected to be a lag time between implementing the EM options and seeing the environmental benefits. It may take some years for many of the benefits to develop to their maximum. The time frame for this impact assessment coincides with the end of the current RDPE (Rural Development Programme for England) period in 2013, by which point the full extent of benefits may not be seen. Likewise, the benefits will extend past the end of this appraisal period in 2013.

2.2.32 *EM 1– Grass buffers alongside temporary and permanent watercourses; and EM2 – Reverted arable plots or strips*

Options EM1 and EM2 have similar management requirements to non-rotational set-aside and are thus expected to give similar benefits as set-aside in terms of biodiversity of plants and farmland birds. EM1 would provide the same, if not greater, resource protection benefits because it does not allow the spreading of manure and organic wastes, which set-aside did. This will be beneficial to water quality. This benefit is less relevant to EM2 if it is not in the proximity of a watercourse.

2.2.33 The use of ELS top-up options would improve the biodiversity benefits of plants, as well as invertebrates and birds by enhancing the quality of foraging habitat. CSL/Fera suggest that more specific guidelines need to be given for EX2: regular cutting and removal of vegetation, in order to maximise benefits for bird nesting. EX2 may also be detrimental to invertebrates and small mammals. Conversely CSL/Fera point out that regular cutting will reduce nitrogen run-off, so long as soil compaction is avoided. ELS top-up EX3: limited grazing, looks likely to bring lower benefits than set-aside on EM2 land if stocking is intensive.

2.2.34 *EM3 – Previously cultivated land rotationally taken out of production*

Option EM3 is similar to land managed under rotational set-aside in the former scheme. Rotational set-aside provided year-long foraging and nesting habitat for farmland birds. EM3 will provide even greater benefits in the summer due to the delaying of herbicide application and thus removal of cover, which should aid foraging and nesting whilst still allowing farmers a rotational opportunity to manage problematic arable weed burdens. The delayed spraying date will also benefit some animals and plants above that gained from rotational set-aside. The resource protection benefits will be the same as for set-aside.

2.2.35 The ELS top-ups options available with EM3 should considerably increase the total biodiversity benefits from this annual uncropped area. They provide tailored nesting and winter food sites for key farmland bird species and mice. ELS options EX4, EX5 and EX6 (wild bird seed mixture, nectar mix and uncropped cultivated margins) create habitats which deliver for bumblebees and butterflies, and some options result in unsprayed plot areas for rare arable plants, allowing them to complete their life-cycles and replenish seed banks. The ELS top-ups will not benefit resource protection, and in fact EX6 and EX8 (rotational fallow) may cause increased nutrient losses, if wet weather follows cultivation.

2.2.36 *EM4 – Game strips (later changed to 'wild bird winter food area')*

Game cover grown on set-aside delivered valuable farmland bird and invertebrate habitats on a widespread scale, even though their primary function was to provide cover for game birds. The level of benefit depended to some extent on the species sown, with maize being the least beneficial. Under option EM4 farmers would have to exclude maize to qualify, which should mean that the overall value of game strips under Environmental Management retains and improves on the value of such strips under set-aside. In addition, the flexibility of inputs should result in better establishment, growth and seed production,

supporting farmland birds. In fact, BD1640 estimated that 0.13 ha of wild bird seed mixture was equivalent to 1ha of naturally regenerated set-aside, based on densities of seed-eating birds in the two habitats. The vegetation may be beneficial for animals but this will depend on the species sown. EM4 will be less beneficial for plant biodiversity than under former set-aside rules as herbicide use may suppress naturally regenerating flora. The resource protection benefits are the same as under set-aside. There are no ELS top-ups for EM4.

2.2.37 *EM6 – Farmland bird plots in winter cereals; and EM9-11 – variations of winter stubble*
The production options only included in Alternative 2 (EM6 and 9 to 11) do not attempt to directly match the conditions produced by set-aside, but provide instead some specific benefits for farmland birds, especially relating to winter feeding areas and nesting sites. These options improve the quality of the crop as bird habitat by manipulating crop agronomy and rotation. They will also benefit some BAP mammals. Land taken up under these options would produce fewer environmental benefits per hectare than EM1 to 4 or set-aside on a per hectare basis, and would particularly have few benefits for resource protection. However, the environmental benefits of this option can be considerably improved by using the top-up options to extend the period of environmental management, further improving habitat quality and availability. This is particularly true for EM9 to 11 (variations of winter stubble), which provide less per hectare benefit than set-aside alone but greater benefits when ELS top-up EX9 (enhanced winter stubble) is included.

2.2.38 To summarise, each environmental management option delivers slightly different benefits. They are not all equally beneficial to resource protection, all species of farmland birds, other animals or plants. The result of this is that a combination of the options is required in order to satisfy all the needs of the environment. Crucially, these options need to be managed correctly and placed in the most beneficial locations. This makes the role of guidance and advice critical for the success of any attempt to recapture the benefits of set-aside.

Stage 2 - Quantification of the Benefits

2.2.39 In order to assess the overall effectiveness of Option A, research from Fera (2009a) was commissioned to estimate the quantities of benefits that would be accrued, and the uncertainty surrounding those estimates.

2.2.40 This research focused on two key indicators of the environmental benefits: farmland birds and water quality. These aspects were chosen to broadly represent the overall groups of biodiversity and resource protection, though it is acknowledged that these results are not exhaustive of all the environmental benefits.

2.2.41 Six scenarios of what Option A might look like were devised, covering both Alternatives 1 and 2 (A1 and A2), different percentage requirements, different patterns of uptake and the use of ELS top-ups. Unfortunately these scenarios could not account for all possible combinations, and are described in full in Appendix 1 of Fera's report. The six scenarios are shown in Table 7 below. The scenarios were based on a model 200ha farm, which would have 1% uncropped anyway. This low area uncropped anyway was chosen to represent a model farm but is far lower than the area uncropped nationally in the counterfactual (175,000ha ≈ 4.2% nationally). This is likely therefore to have caused an overestimate in the benefits to farmland birds and water quality.

Table 7: The combinations of variables used in the six scenarios for the Fera workshops

Scenario	Alternative 1 or 2	% requirement	Uptake pattern	Use of top-ups?

1	1	4	-	No
2	1	5	-	No
3	1	5	-	Yes
4	2	5	A	No
5	2	5	B	No
6	2	6	A	Yes

2.2.42 It was necessary for Fera to make various assumptions about how and where farmers located their options in order to estimate the benefits. The research was carried out through expert elicitation, which involved translating a group of experts' beliefs about some uncertain quantities into a probability distribution. A greater explanation of the methodology can be found in Annex 5 and full results in the Final Report[4]. A summary of the results is given below.

Farmland birds

2.2.43 Experts made judgements about the impact of the scenarios on seven species of declining farmland bird. For each scenario, a distribution was modelled for the probability of delivering 'a national and sustained upward trend in the species populations over a medium time period (e.g. 5 years)'. Looking at the median probability of reversing the decline, as in Tables 3.1 to 3.7 of Fera (2009a), these results can be extracted:

- For six of the species, all of the scenarios were better than the base case of no option. For the seventh species (turtle dove) Option A1 scenarios were equally as good as the base case, and Option A2 was better.
- **The A2 scenario with top-ups was better than the previous set-aside regime for three species (skylark, yellowhammer and corn bunting), and for turtle doves any A2 scenario was better than set-aside.**
- For three species, none of the Option A scenarios gave a greater probability of reversal than set-aside had done (grey partridge, lapwing and kestrel).
- For three species, any A2 scenario was better than any A1 scenario (skylark, grey partridge and turtle dove). For the lapwing, A2 with top-ups was better than all the A1 scenarios.
- For three species, the top-up EX2 (regular cutting and removal) used on EM1 and EM2 land actually made A1 less beneficial than without the top-up (yellowhammer, corn bunting, kestrel).
- It was generally impossible to estimate any additional benefit from the increase in area required in environmental management (as covered between A1 4% and A1 5%, with no top-ups). This was likely due to the small scale at which the options were assessed – very small increases in area made little difference. The only species for which it was beneficial was the kestrel, where 70% of the EM land was in grass buffers.
- The pattern of uptake of EM options within both alternatives was important in determining the benefit to each species. In addition, the details of how the options were managed would have a great impact on their benefits.

2.2.44 Overall, the results show that a combination of all the options is needed, because each species responds to different aspects of the management options. On a national scale, the increase in area due to the percentage requirement may have a beneficial impact. The top-ups on the winter stubbles options (EM9-11) are particularly beneficial for many species.

Water quality

[4] Fera. (2009a). Estimating the quantitative environmental impacts of a package of potential options to recapture the benefits of set-aside. Phase 2: Quantifying benefits and uncertainty: report of expert elicitation workshops. http://defraweb.defra.gsi.gov.uk/corporate/consult/gaec/csl-phase2.pdf

2.2.45 Experts preferred to assess the impact of each individual option on water quality, and Fera then scaled up the results to match the scenarios. The impact on water quality was measured as the 'percentage change in nitrogen, phosphorus and sediment lost to watercourses'. The results as in Tables 3.8 to 3.12, and 3.15, can be summarised as follows:

- Both Alt 1 and Alt 2 are expected to lead to a reduction in all three pollutants lost to water courses, overall.
- Broadly speaking, scenarios under A1 caused a greater reduction in pollutant losses than A2, because of the larger amount of land out of production.
- Under A1, increasing the percentage requirement made a clear improvement in pollutant losses.
- The top-up option EX2 (cutting and removal) could increase uptake and removal of nutrients, however compaction from machinery could be detrimental.
- Under A2, a high uptake of EM6 (farmland bird plots), which implies a reduction in the non-production options, would decrease the overall efficacy of Option A2.
- Three of the four non-production options (EM1,2 and 4)were expected to decrease the amount of all three pollutants lost to watercourses.
- For the winter stubble options (EM9,10 and 11), phosphorus and sediment might slightly decrease, whilst nitrogen losses might increase slightly, though there was a great deal of uncertainty about these impacts.

The results for water quality are subject to considerable uncertainty, as the location, rainfall, slope, soil type and drainage characteristics will each affect the efficacy of a management option

Stage 3 – Monetisation of the benefits

2.2.46 In order to conduct a cost-benefit analysis it is necessary to attempt to place monetary values on the environmental changes resulting from a policy proposal. In this case, this requires using 'benefits transfer', taking estimates of the economic values of environmental goods or services derived from a primary study, and applying these to changes in the provision of the same good in a different but similar context. However, care must be taken when using these values as a large number of assumptions often need to be made when transferring the values. See Table 13 for assumptions and Annexes 6-8 for more detail on the methodology. A particularly important assumption used here was that the benefits begin in full immediately and constantly from when farmers begin Option A, i.e. full annual benefits for the year 2010/11 onwards.

2.2.47 It was possible to value four environmental benefits of Option A: changes in farmland bird populations and water quality and reductions in greenhouse gas and ammonia emissions. This means the valuation is by no means exhaustive; as previously discussed not all farmland bird species were considered, and other benefits such as those that might be derived from landscape changes, and the increase in other biodiversity (plants and animals) have not been valued. Future demographic increases have also not been considered, which would see an increase in population benefiting.

Farmland birds

2.2.48 A study by Foster and Mourato (2000)5 indicated that a household in England is willing to pay on average £13.50 per year in order to prevent the loss of one species of declining farmland bird (1998 prices). Adjusting this value for changes in national income and inflation, implies a willingness to pay between £500m and £800m annually to avoid the loss of one species in England.6 Further detail is given in Annex 6.

2.2.49 These values were then applied judgements for the probability of reversing the decline in each of the seven species considered by Fera. In order to see a best case and a worst case scenario, the higher value of £800m was applied to the median judgement (a higher probability of reversing decline) and the lower value of £500m was applied to the 25th percentile judgement (lower probability of reversing decline). The range of these total expected annual benefits for each option is shown in Table 8 below:

Table 8: Total value of benefit of changes in seven farmland bird species

Option	Estimated Annual Value of farmland bird benefit
A1 4%	£80m - £270m
A1 5%	£100m - £350m
A2 5%	£60m - £300m
A2 6%	£220m - £670m

2.2.50 The ranges are very wide due to the inclusion of various uptake patterns, use of top-ups, plus uncertainties in environmental outcomes and the economic value of each species. The large jump seen between A2 5% and A2 6% is largely due to the presence of ELS top-ups on the winter stubbles options, which were only included in the 6% scenario (see Table 7). This shows the striking benefit that the top-ups bring to farmland birds, which would most probably increase the value of A2 5% also, had it been included in the scenarios. It is important to note also that these values only account for seven out of twelve declining farmland bird species, but do not account for increases in the populations of other species. Notwithstanding the large range, great care must be exercised in assessing these values, as it is possible that respondents' willingness to pay in the primary valuation study was based on a more immediate desire to save the species from extinction. It is also possible that respondents overestimate their generosity in this sort of study, when considering a single environmental issue in isolation. In addition, the model farm overestimates the total additional area in environmental management when used to scale up to the national level. Hence, values from towards the lower end of these ranges are more likely to represent a more accurate representation of the public's valuation of farmland bird benefits.

[5] Foster, V & Mourato, S. (2000). Valuing the Multiple Impacts of Pesticide Use in the UK: A Contingent Ranking Approach. Journal of Agricultural Economics, Vol 51, No 1, pp1-21

[6] This uses the number of households in England in 2006, but does not adjust for any change in average household size.

Water quality

2.2.51 Two studies were used to estimate the value of reductions in nitrogen, phosphorus and sediment lost to watercourses from agriculture: Institute of Grassland and Environmental Research (IGER) (2006),7 and Environment Agency (EA) (2007)8. They both drew on a wide range of studies to come to their conclusions, but caution should be used in interpreting the figures because of the possibility of some double-counting of benefits to the public of improved water quality. Average values for reductions in pollutants were taken from these studies, and combined with baseline losses from the arable sector and the expert judgements for reductions from the Fera (2009) report to give overall values.

Table 9: Total value of benefit of pollutant reductions to watercourses from arable land

Option	Value of pollutant reductions per annum
A1 4%	£20m - £150m
A1 5%	£30m - £210m
A2 5%	£10m - £150m
A2 6%	£20m - £180m

2.2.52 A more detailed description of the methodology can be found in Annex 7. Again the wide range is due to the various uptake patterns, uncertainty in environmental outcome, and range of economic value. A linear relationship between cost per tonne of nitrate, phosphorus and sediment pollutants and level of reduction was assumed, and the baseline losses used were as at 20009. It should also be noted that the economic values used for nitrogen pollution were per tonne of nitrate only, where Fera estimated reductions in total nitrogen. Thus with respect to nitrogen the monetary values may underestimate all nitrogen benefits. On the other hand, the assumption of only 1% of land uncropped in the basecase model farm may have caused this to be an overestimate.

Greenhouse gas emissions

2.2.53 A study by the University of Hertfordshire (2007)10 estimated the greenhouse gas (GHG) savings of Environmental Stewardship options on a hectare per hectare basis, in comparison with a baseline of winter wheat. The EM options under Option A were matched with the most similar ELS option to give the GHG savings (see Annex 8), including those from production and use of inputs, N2O emissions from soil, fossil fuel consumption for machinery use, and carbon stored within the land. Using the shadow price of carbon for 2008/9 and the range of predicted uptake patterns, the annual savings from GHG reductions are shown in Table 10 below:

Table 10: Total value of benefit of greenhouse gas savings

Option	Value of greenhouse gas savings per annum
A1 4%	£22m
A1 5%	£29m
A2 5%	£11m - £14m
A2 6%	£14m - £18m

[7] IGER. (2006). Benefits and Pollution Swapping: Cross-cutting issues for Catchment Sensitive Farming Policy. Report to Defra. http://randd.defra.gov.uk/Document.aspx?Document=WT0706CSF_5718_FRP.doc

[8] Environment Agency. (2007). The Total External Environmental Costs and Benefits of Agriculture in the UK. http://www.environment-agency.gov.uk/static/documents/Research/costs_benefitapr07_1749472.pdf

[9] See page 3 of IGER (2006).

[10] University of Hertfordshire. (2007). Research into the current and potential climate change mitigation impacts of environmental stewardship. Report to Defra. http://randd.defra.gov.uk/Document.aspx?Document=BD2302_7559_FRP.pdf

Ammonia

2.2.54 There will be a reduction in ammonia emissions from land in EMs 1-3 due to the prohibition of fertiliser application. Using values of ammonia emissions per hectare of cereal land provided by North Wyke Research (pers. comms. with Laura Cardenas, 22/12/08), and economic values of ammonia emissions as given by the Interdepartmental Group on Costs & Benefits11, the annual savings from ammonia reductions are found to be:

Table 11: Total value of benefit of ammonia savings

Option	Value of greenhouse gas savings per annum
A1 4%	£0.6m - £0.9m
A1 5%	£0.8m - £1.2m
A2 5%	£0.3m - £0.5m
A2 6%	£0.4m - £0.7m

Total benefits and Present Values

2.2.55 It must be emphasised that a number of assumptions were made in coming to the figures above, which are listed in Table13 below. Wide ranges have been used to capture the uncertainty in terms of uptake and environmental outcomes, and economic value of the benefits. If we assume that the benefits occur immediately as the policy is brought in, giving full annual benefits from 2010/2011 onwards, then present values of the benefits can be calculated for the appraisal period which ends in 2012/13.12 These values are given in Table 12:

Table 12: Present values of benefits of various options for the appraisal period 2009-13[13]

Option	Present Value of all environmental benefits[14]
A1 4%	£400m - £1.3bn
A1 5%	£400m - £1.6bn
A2 5%	£200m – £1.3bn
A2 6%	£700m - £2.4bn

2.2.56 There is a striking increase in benefits when increasing A2 from 5% to 6%. This disproportionate increase is due to the benefit to farmland birds of the ELS top-up options, which were included in the A2 6% scenario but not the 5% scenarios. Thus, it is unlikely that increasing to 6% would give such substantial increases in public value. Rather, it will depend on the successful encouragement of top-up options.

2.2.57 These figures need to be interpreted with care as they depend on a large number of assumptions, in particular those made in relation to transferring the value of environmental benefits from one context to another, and in scaling up the results to the national level. However, it also needs to be remembered that these figures do not cover all aspects of the environmental benefits, as there will be others arising from population increases for other birds, insects, small mammals and plants, other resource protection benefits as well as landscape and other archaeological and environmental heritage benefits.

Assumptions and caveats

[11] http://www.defra.gov.uk/environment/airquality/panels/igcb/guidance/damagecosts.htm

[12] This assumption is critical because in reality there will be a lag time for environmental benefits, but it is not possible to accurately account for this lag time.

[13] Costs begin in 2009 but benefits do not begin until 2011.

[14] Using 3.5% discount rate as recommended in the Green Book.

Table 13: Assumptions and caveats in valuing the benefits of an option to recapture the benefits of set-aside

ID	Caveat Description
1.	Uptake pattern of EM options by farmers nationally may vary from that estimated and used in Fera (2009) scenarios and in calculating GHG and ammonia savings
2.	Location of EM options on farm, e.g. near to watercourses
3.	Correct management of EM land
4.	Uptake pattern on individual farms may change year on year, though were assumed to be fixed in the Fera (2009) research
5.	EM management requirements have changed since the Fera (2009) research was undertaken
6.	Presence of farmland bird species in the landscape already
7.	Type of soil, slope, drainage and rainfall
8.	Scaling up of water quality to model farm (see Fera (2009))
9.	Model farm of 200ha assumes 1% of land would be uncropped in the counterfactual.
10.	Assume the model farm used in Fera (2009) represents the whole of England
11.	Uncertainty in estimating the environmental outcomes – see Fera (2009) for full distributions. The median value and a 'worst case' (25^{th} or 75^{th} percentile) values have been used for a range
12.	Assume the benefits occur immediately, when in fact there will be time lags
13.	Possibility of outdated economic values from valuation studies, for both water quality and farmland birds – value of environmental benefits may have changed if their abundance has changed (quality and quantity). Preferences may change. Costs to water companies may change
14.	Economic values for farmland birds adjusted for increased average income and using an income elasticity of willingness to pay range of 0.5 to 1.2
15.	Assumed that the willingness to pay to prevent the loss of a species can be applied to the probability of reversing decline
16.	Number of households in England 2006 – may have changed
17.	Possibility of double counting in some of the water quality figures
18.	Value of water pollutants assumed to be linear
19.	Baseline pollutant run-off from arable sector as in 2000
20.	Economic value of nitrate applied to the change in nitrogen, so may be undervalued
21.	May have underestimated benefits if they are also valued by people outside of England as an option or non-use value
22.	Assumed that the economic values taken from studies are for households that represent the national average, thus all households are affected whatever their proximity to an arable farm or water course might be
23.	Greenhouse gas estimates involve matching EM options to ELS options, and a baseline of winter wheat
24.	Ammonia estimates only account for completely stopping fertiliser use, on a baseline of weighted average for cereals and oilseed rape

2.3 OPTION B - 'CAMPAIGN FOR THE FARMED ENVIRONMENT (CFE)'

Introduction

2.3.1 Option B involves a voluntary approach proposed by CLA and NFU on behalf of the farming industry, and backed by AIC, FWAG, LEAF. The NFU/CLA produced a first iteration that was published in the consultation, which was further revised in mid-April and then on the 19th May. Since analysis needed to be undertaken, and research commissioned, in time to produce this final Impact Assessment, some of this analysis is based on the mid-April version of the document, with further assessments made on the subsequent version.

2.3.2 The aim of the Option B proposal is 'to exceed the environmental benefits offered by set-aside through establishing a coordinated and engaging 'Campaign for the Farmed Environment'. Option B will involve information, advice and local demonstration aimed at farmers and their advisers with the objective of 'promoting locally relevant actions benefiting farmland birds, resource protection and wider biodiversity'.

2.3.3 Option B is intended to influence farmer behaviour and three mechanisms are proposed: Environmental Stewardship, additional non-Environmental Stewardship measures, and building on existing industry initiatives. The first element aims for increased and informed ELS participation, specifically seeking to achieve the existing Natural England commitments of 70% of UAA uptake with a 40% increase in area of in-field options by 2010/11 above the March 2008 baseline. This latter might imply some switching between ELS options within a given total area in order to focus on the three key themes for Option B of farmland birds, resource protection and biodiversity provision, identified as required to address the environmental losses associated with the withdrawal of set-aside. Achieving more than the existing NE commitment of 70% in ELS would also imply diverting agreed funds from other areas.

2.3.4 The second 'tool' to influence farmer behaviour seeks to promote voluntary non-ELS activity, with targets for the level of participation in voluntary management of 40% of arable farmers/ growers not in ELS to be undertaking some form of voluntary management in 2011 and 60% by 2012. 'Voluntary' in this component of Option B represents farmers responding in the absence of any financial incentive for doing so – or sanction for not doing so. In his review of Option B, Hodge comments that there is no explicit discussion as to why farmers who have chosen not to enter their farm into ELS should nevertheless choose to undertake voluntary environmental management beyond anything that they have done before, noting that this particular group of farmers might be expected to be most resistant to introducing such measures.

2.3.5 The third 'tool to influence behaviour' builds on existing industry initiatives to communicate the range of measures farmers and advisers can take to enhance their land management via the uptake of ELS and other measures promoted by the Campaign. Such initiatives can assist in realigning farmer attitudes towards environmental issues and may form part of a package of measures that are needed in order to promote substantial changes in behaviour. A list of the voluntary measures that farmers would be encouraged to chose from under Option B, and the equivalent Option A measures, is shown in Table 14 below. To note, one of the 22 proposed measures (17 – minimum alternate row drilling) was dropped in the May version of the proposal, in recognition of its limited environmental benefit, reducing the total to 21 measures.

2.3.6 Integral to Option B is the potential for the adoption of alternative approaches, with regulation as the most likely option, should the voluntary approach fail to deliver against its agreed objectives. Option A is considered in the document to be the most appropriate regulatory fallback. A trigger mechanism, based principally on land area in environmental management, is outlined in the document with rising land area triggers over the first three years as the campaign is established and the proposal that the trigger level would have to be breached for two successive years for a regulatory approach to be adopted. Although the implicit lags in resorting to a regulatory fallback present a risk of environmental losses relative to Option A, the existence of such a provision provides some measure of assurance in relation to the delivery of environmental benefits into the future, should the voluntary approach of Option B fall short of its intended targets.

Table 14: Voluntary Measures Available to Farmers Under Option B

Measure	*Description*	*Option A Equivalent*
1	Grass buffers alongside watercourses	EM1
2	Reverted arable plots	EM2
3	Previously cultivated land	EM3
4	Farmland bird plots	EM6
5	Uncropped cultivated margins	-
6	Soil erosion control headlands or field strips	-
7	Game strips	EM4
8	Conservation headlands	-
9	Sown wildflower headlands	-
10	Sown/managed pollen and nectar headlands	-
11	Wild bird seed patches/headland	-
12	Rotational fallow	EM3
13	Winter stubble (harvest to end of Feb)	EM9
14	Winter stubble	EM10
15	Low input cereal/oilseed rape followed by winter stubble	EM11
16	Reduced nitrogen winter or spring cereal crop	[EM7]
18	Reduced seed rate winter or spring cereal crop	[EM8]
19	Selective use of spring herbicides	-
20	Nutrient management plan	-
21	Perennial energy crop	-
22	Mixed land use	-

Note: EM5, 7, and 8 were considered under Option A and rejected as they would not deliver a reasonable level of environmental benefit and are also likely to be more difficult to inspect.

COSTS OF OPTION B

Costs to Farmers Of Option B

2.3.7 As noted by Professor Ian Hodge of University of Cambridge in his review of Option B15, any land use changes that are introduced are likely to be made in relation to personal farmer preferences and to involve relatively marginal changes to farming systems without some form of inducement, even once they have been better informed about environmental consequences. While some farmers who are already managing uncultivated land outside of ELS may be willing to make changes to the ways in which they manage it and others may be willing, or may be persuaded to make marginal management changes, Hodge considers that it is more likely that, once persuaded of the potential merits of the environmental measures, farmers would enter their

[15] Hodge, I. (2009). Review of the NFU/CLA proposal 'Option B – a Campaign for the Farmed Environment'. Final report to Defra June 2009.

farms into ELS rather than undertake voluntary measures outside of ELS. Hodge also acknowledges the possible argument that changes in farmer behaviour might be expected because of the possibility future regulation in the event of Option B failing but notes that this suffers from the free-rider problem: individual farmers are much less likely to see their own personal actions as making any significant difference to the overall pattern of land management and hence increasing probability of government introducing a regulation. Thus the general threat of future regulation may be insufficient to persuade them to alter their individual reaction to participation in Option B.

2.3.8 The assumption made in the Consultation Stage Impact Assessment would seem still to be valid that a voluntary approach could be assumed to be broadly cost neutral for farmers in terms of margin foregone, as they are unlikely to engage in activities on a voluntary basis that would impose more than marginal costs to their business. The assumed cost to farmers of implementing the various options available to them, in terms of the margin foregone, under Option B is shown at Annex 2. This indicates that average costs will be relatively high for a number of the options, in particular those that involve leaving land out of production, and it seems unlikely that farmers will take these up unless they are doing so already, implying little additionality.

2.3.9 Some of the options, such as the selective use of spring herbicides, do have low costs of implementation though this is only likely to be used where the weed burden not a problem, suggesting that the additionality might be low. Costs to farmers are therefore likely to arise principally from the amount of time that it takes them to familiarise themselves with the details of Option B to consider what, if any, action they are going to take in response and to learn what they need to do in order to put any measures into place. Some of this is likely to arise from routine reading of the farming press that would take place in any case but if we assume, since the scheme is voluntary, that all farmers not in ELS with some arable land (and not just those with more than 20 hectares as for Option A) will consider themselves to be within its scope and that on average a farmer spends one hour investigating the scheme and the actions they might take, there will be around 15,000 farmers each spending 1 hour, giving an aggregate one-off cost of £250,000 or around £16 each.

2.3.10 Although farmers may not generally feel that they need to seek recourse to professional agronomic advice on Option B, since there will be no possibility of any financial penalty for misinterpreting the requirements of the scheme, Option B is based on the premise that, in attempting to improve their environmental performance, farmers will be able to access an adequate supply of well-researched and helpful advice and information, supported by clear targets for action in each county. This includes a central information resource, advice and training for farmers and advisers and demonstrations and events to promote awareness and adoption of the new practices, including the setting up of regional demonstration / beacon farms providing examples of best practice. Such services are likely to be available free to farmers using them but there will be a time cost involved for participating farmers. It is difficult to estimate with any precision how many farmers will engage in these areas of activity and how long on average they will spend on them but it seems likely that such activity will be concentrated towards the beginning of the introduction of Option B and will tail off in subsequent years as farmers' familiarity and confidence increases. Assuming that these activities are concentrated amongst arable farmers that are not participating in ELS and that there is a 60% take-up amongst this group implies that some 9,000 farmers would incur one-off 'familiarisation' costs. Assuming further that these relate to an average of 4 - 8 hours per farmer, implies a total cost of familiarisation of £584,000 to £1.168 million. Farmers who participate in the voluntary scheme will also be encouraged (though not required) to maintain a record of their activities and it is plausible that they will continue also to review their participation and the actions that they take. Assuming a 60% take-up, as above, and that some 2 hours per year is spent on these activities, implies an ongoing annual cost of some £300,000 for voluntary participants. Thus, on the above assumptions, Option B is likely to generate initial costs to farmers in the range £834,000 to £1.42 million with ongoing annual costs of around £300,000.

2.3.11 A fundamental aspect of Option B is its linkage to improving ELS participation amongst arable farmers - specifically to achieve more than the existing Natural England commitments of 70% of UAA uptake with a 40% increase in area of in-field options by 2010/11 above a March 2008 baseline. However, it seems unlikely that farmers will incur any additional costs as a result: farmers are unlikely to participate if such participation would leave them worse off (though, if they are risk averse, they may attach a value to having a certain income stream of agri-environment

payments even if this is less than their expected but uncertain reduction in income as a result of participation).

2.3.12 If we assume risk neutrality on the part of farmers, they will be at least as well off under the scheme than they would have been otherwise and, given the variability of returns amongst farmers, many will be better off (ie the payment that they receive which is estimated on an average basis will exceed the income foregone / additional costs that apply to their particular circumstances). Hence, it is reasonable to assume that a voluntary approach based on an increased uptake of ELS arable options will involve farmers in no additional costs beyond the initial search costs of finding out about the options and whether the scheme is worth pursuing for them. For those farmers who ultimately participate in the scheme, it is reasonable to assume that any such search costs will ultimately be offset by the scheme compensation. For those who decide against participation, such costs will obviously not be offset but it is unlikely that the majority who decide against joining the scheme will devote more than a couple of hours in reaching their decision. Hence, assuming a 70% participation rate amongst arable farmers (ie the 44,000 or so, including those with less than 20ha of arable land), there will be some 13,000 non-participants who have invested some time in finding out about the scheme. Taking an average time invested of 2 hours yields an aggregate one-off cost to farmers of around £430,000 or some £32 per farm.

Administrative Costs of Option B

2.3.13 The Option B 'Campaign for the Farmed Environment' consists of a range of industry, NGO and government activities intended to promote and monitor actions on farm that will address the range of environmental impacts associated with the loss of set-aside. These will seek to influence the awareness, interest and actions of those most closely involved with managing arable land: farmers and growers and those who advise them. As such, according to the proposal, it requires a wide range of industry, government and conservation NGOs to contribute towards a concerted campaign of action, overseen by a National Steering Group, which would be designed to retain the environmental value of former set-aside areas. The National Steering Group would be supported by an Evidence and Monitoring sub-group that would, at the request of the Steering Group, undertake relevant research, analyse the evidence base and monitor progress against targets. There would also be a Delivery sub-group that could influence behaviours at a national and local level and it is proposed additionally, that county level Campaign liaison groups would be established, initially in the 15 counties with the highest proportions of set-aside land in 2005-07.

2.3.14 A definition stage of the campaign would involve the commissioning and collation of the evidence base (to identify the specific issues to be addressed); the identification of key 'partners' (best able to influence behaviours); review of tools (to use those best placed to achieve the desired outcome) and target setting (to ensure efficient deployment of limited resources); a subsequent delivery stage would involve the co-ordinated provision of advice, events and training to stimulate uptake of the desired behaviours/land use changes identified at the definition stage; the monitoring and reporting of these changed behaviours and subsequent review to enable management of any refinement or reinforcement, if shortcomings are identified in uptake.

2.3.15 Reflecting the above, there would be costs, possibly quite significant, involved in the administration of the campaign. The proposal notes that the campaign will be industry-led but suggests that there will be a need for public funding to support specific areas of activity such as the establishment of a demonstration farm network and the provision of farm walks. Costs are likely to arise in at least the following areas:

- Input into the work of the National Steering Group by industry, NGOs and government;
- Input into the work of the Evidence and Monitoring and Delivery sub-groups by industry, NGOs and government;
- Research, analysis of the evidence base and monitoring progress against targets undertaken or commissioned by the Evidence and Monitoring sub-group;
- Input into the work of the county level Campaign liaison groups (initially 15) by industry, NGOs and government;
- Promotion of ELS uptake across the country, not just in target counties;

- The co-ordinated provision of advice, events and training to farmers and their advisers that will stimulate uptake of the desired behaviours/land use changes.

2.3.16 Although the Campaign will be industry-led, the proposal states that public funding will be needed to support specific areas of activity, including the establishment of the demonstration farm network; provision of farm walks; the development of web-based resources; and defraying the costs of the County Liaison groups. It is proposed that, in return, the industry will carry considerable in-kind costs, such as the CFE secretariat, promotion, dissemination of advisory materials and measure development. However, in the absence of specific information on the precise nature and scale of the proposed activities, it is difficult to form any estimate of likely costs and the proposal notes that 'in the time available we have not been able to develop a budget to deliver the campaign' and that an 'immediate priority for the Campaign Steering Group will be to agree a budget and funded action plan for delivery of the Campaign on a sustainable basis'.

2.3.17 Any estimate of costs to Government, industry bodies and NGOs to cover areas such as monitoring and county level campaigns can therefore only be highly speculative. However, there is likely to be a level of expenditure required at a county level for each of the 15 counties identified in the document as leading the Campaign. For illustrative purposes, if this is assumed to average £250,000 per annum per county in the initial year before falling to £150,000 thereafter, it would amount to £3.75m over 15 counties in the first year and then decline to £2.25m. Costs are likely to be higher in the initial year reflecting costs such as those associated with developing training materials and imparting these to advisers and their farmer customers. Such activities would continue in subsequent years but, probably, at a lower level. Additionally there would be overhead costs associated with the National Steering Group plus research and analysis etc. If this is assumed to total a further £250,000 per annum, total annual costs of £4 million are implied in the initial year followed by £2.5m in subsequent years. These costs will be split between government, NGOs and industry bodies but any assumed allocation could only be wholly speculative at this stage. In practice, however, at least some of the costs to the Exchequer are likely to be met from within existing budgets with the possible implication that funds will be diverted from alternative activities related to providing farmers with information that would improve their environmental performance.

2.3.18 Under the proposal, there will also be costs of monitoring to the RPA. In the initial year these have been estimated in the range £102,000 to £335,000 and in subsequent years between £5,000 and £221,000, with the range, depending in part on whether the process is linked to land eligibility or cross compliance inspections or both. These costs have been estimated on the basis that, when visiting a farm RPA Inspectors will view information from participating farms' Voluntary EM Records completed by the farmer, where these are available. Inspectors will transpose the information to an Observation Report and, if applicable, they may also record that the farm is a non-participant or has a missing or incomplete record.

2.3.19 Additional costs incurred by Natural England associated with Option B would most likely revolve around servicing amendment requests to existing agreements (to help meet any targets set at County level) and provision of additional advice services to support the Campaign. NE are unable to provide a meaningful estimate in the absence of clearly defined or quantifiable advice contribution request from the NFU/CLA but to offer a comparison, if a separate advice programme was delivered which was similar in scope and scale to the NVZ campaign delivered through the England Catchment Sensitive Farming Delivery Initiative in 2008, this could cost around £800,000. Any such costs are, however, assumed to be included in the costs to government identified above. NE also estimate that some 2700 ELS agreements might be amended at a one-off cost of around £75,000.

Table 15: Option B - Summary of Total Costs (£m)

	2009/2010	2010/11	2011/12	2012/13
Admin cost to farmers		1.0-1.6	0.3	0.3

Admin / promotion costs to Defra / industry bodies / NGOs		4.0	2.5	2.5
Costs to RPA[16]	0.1-0.5	0.1-0.3	0.1-0.3	0.1-0.3
Costs to Natural England		0.1		
Production cost to farmers		0.0	0.0	0.0
Total Costs	0.1-0.5	5.2-6.0	3.0-3.2	3.0-3.2
Discounted Total Costs	0.1-0.5	5.0-5.8	2.8-3.0	2.7-2.9
PV Total Costs	10.6-12.1			

Note: Costs to RPA include the inspection costs associated with the monitoring buffer strips that also contribute to land in voluntary environmental management under Option B (see section 3).

BENEFITS OF OPTION B

2.3.20 Identifying and estimating the quantities of benefits that will arise from Option B is highly problematic, since these depend critically on the level, nature and geographical distribution of take-up, all of which are extremely difficult to estimate with any degree of accuracy. These uncertainties are in addition to the difficulties associated with estimating the link between management practices and environmental outcomes that tend to apply generally to such schemes. Given these factors, it is difficult to estimate with any degree of confidence the likely benefits of Option B relative to plausible counterfactual situations. Any estimates of the benefits are contingent upon the assumed level of uptake and its distribution relative to the situation that would prevail in the absence of mitigation.

Take-up

2.3.21 A fundamental determinant of the success of Option B will be the level of take-up achieved. This take-up may be of new ELS agreements, or of a substitution towards in-field arable options within ELS. In addition, the take-up could be of voluntary measures outside of an agri-environment scheme. These measures could be additional to the land farmers left uncropped (or managed for environmental protection) before, or it could be that land previously left uncropped as GAEC 12 is now managed more positively for the environment. Whatever the level of take-up, it will be difficult to attribute the changes in management directly to the Campaign, and thus to evaluate the additionality that the CFE has delivered.

2.3.22 For the purposes of appraising the impacts of Option B, various levels of uptake of voluntary measures have been used to illustrate the range of benefits that might be achieved. The levels of take-up are based on key figures and targets being used by the NFU/CLA, and Natural England. It should also be remembered that with a voluntary initiative, there is no guarantee of any take-up at all, and thus the benefits could well be zero. The levels of national take-up (total areas of land put into voluntary measures) are:

- 102,500ha – this is the area of land used in the original CFE (April 2009) that would act as a trigger. If the total area in voluntary measures were to fall below this level, then the CFE proposed that the regulatory fallback would be triggered.

[16] Includes RPA costs for monitoring buffer strips, see section 11.

- 142,500ha – this is the area of land to be in voluntary measures as a trigger level in the revised CFE (May 2009).
- 205,000ha – this was Natural England's original target of land which would need to be managed for environmental purposes, in order to recapture the benefits of set-aside. (The 102.5kha figure was calculated as 50% of NE's target.)
- 240,000ha – this is NE's revised target area to be in environmental management, in order to recapture the benefits of set-aside.
- 285,000ha – this is the area of land NFU consider to have been worthwhile set-aside for environmental purposes (i.e. the area of set-aside excluding non-food crops and temporary grassland). The NFU then used the 142.5kha figure as a trigger as it is assumed that the benefits can be recaptured on just 50% of the land area, if well targeted. However, the CFE does not include GAEC 12 land in calculating this 'target', yet it is then considered to contribute towards meeting the target of 142.5kha.

2.3.23 To put these figures into some perspective, for the assessment of Option A, it was assumed that in an intermediate crop price scenario, 175,000ha would be left uncropped in the absence of any option (the counterfactual). This means that the trigger level (102.5kha or the later value 142.5kha) is below what we expect to be uncropped anyway. If this uncropped land (GAEC 12 land) were to contribute towards meeting the CFE targets, then we would not expect the fallback to ever be triggered under average prices, and anywhere above the trigger but below 175kha cannot be shown to deliver any additionality from the Campaign. However, if crop prices were very high, we would expect approximately 100kha to be left uncropped voluntarily (although 159 kha remained uncropped during the price spike of 2007/08), leaving a small additional benefit (42.5kha) if the trigger is avoided. As mentioned, there may also be environmental benefits if farmers convert their GAEC 12 land into land managed more positively for environmental protection.

2.3.24 This assessment has tried to use the same methodology as that for Option A: Identification, quantification and monetisation of the benefits, at various levels of uptake. Due to the methodology used, and the need for consistency, the scenarios used for farmland birds and water quality (at 102.5kha and 205kha) do not use the same baseline as that used for greenhouse gases and ammonia – this is explained further below.

Identification of Benefits

2.3.25 The CFE document identifies three types of environmental benefit which the Campaign will target to recapture: farmland birds, resource protection, and wider biodiversity (including plants and wildlife). The Campaign will involve information, advice and local demonstration to promote locally relevant action on farms to benefit the environment and three tools are identified to influence behaviour: Environmental Stewardship, non-ES voluntary activities, existing Government and industry initiatives.

2.3.26 An independent assessment of the potential environmental benefits of Option B was commissioned from Fera, formerly CSL (2009b)17. This included an assessment of the 21 voluntary options (as in Annex 1A of the CFE) – there were originally 22 options in the April iteration of Option B, but the minimum drill width option was dropped following recognition of its limited environmental benefit – based on literature review and expert judgement. Similar to their earlier work on Option A, Fera compared the likely benefits of each action against a baseline of former set-aside on a hectare for hectare basis. However, as the implementation of these measures would have no compulsory aspects, Fera had to assume certain practices did in fact take place as recommended and that, for example that 'V1 Grass buffer strips' are managed as

[17] Fera. (2009b). Quantifying the environmental impacts of the Campaign for the Farmed Environment

set out in the CFE document. A short summary of the key benefits of the measures which were not covered by similar EM options in Option A is given below.[18]

V5 Uncropped cultivated margins

This measure will be most beneficial for rare arable plants, provided they are located where species are already present. Uncropped cultivated strips are likely to provide good foraging area for birds.

V6 Soil erosion control headlands or cross field strips

If positioned correctly, this measure will reduce run-off and diffuse pollution of watercourses. Depending on the management and location, there may also be biodiversity benefits.

V8 GWCT Conservation headlands

There is uncertainty about the prescription, making this measure difficult to assess. If managed similar to ELS option EF10 then the overall benefits could be greater than set-aside.

V10 Sown/managed pollen and nectar headlands

This measure is of greatest value for nectar-feeding insects. Impacts on resource protection are likely to be negative compared to set-aside, because of the accumulation of nitrogen in the soil under legumes and regular cultivations which release nitrogen into soluble forms.

V16 Reduced nitrogen winter or spring cereal crop

This measure will have limited value compared to set-aside, and the benefits seem unlikely to compensate for the considerable reduced gross margin that is likely to result.

V17Minimum alternate row width winter or spring cereal

This has been removed from Option B following recognition of its limited environmental benefit.

V18 reduced seed-rate winter or spring cereal crop

Fera report that there is little evidence of environmental benefit, so there seems to be little advantage in implementing a measure that will reduce yield, when there are more cost-effective measures available.

V19 Selective use of spring herbicides

This measure is likely to provide benefits to annual flora, arthropods and breeding birds that are greater than sprayed rotational set-aside, and for some species, probably greater than non-rotational set-aside. However, it is only likely to be adopted where weeds are not a problem.

V20 Use of a RB209 based nutrient management plan

These plans promote and reinforce good practice with respect to nutrient applications. As over 70% of farmers are following such practice anyway, and the plan does not necessarily have to be implemented, there will be little impact in terms of recapturing the environmental benefits of set-aside.

[18] Those not described here are similar to the EM and ELS top-up options covered in the benefits of Option A. They correspond as: V1=EM1, V2=EM2, V3=EM3, V4=EM6, V7=EM4, V9=EX1, V11=EX4, V12=EX8, V13=EM9, V14=EM10, V15=EM11,

V21 Perennial energy crop

Evidence on which to assess this measure is sparse. Fera comment that it is unlikely farmers will plant SRC in order to contribute to the CFE.

V22 Mixed land use

Mixed farming does have benefits for some bird species and other biodiversity, which will be greater if undersown leys are included in the rotation. However, Fera question whether farmers are likely to take up this option as a contribution to the CFE. It would also be difficult to ascertain metrics for this option.

2.3.27 An overall summary of the benefits, in comparison with set-aside, is given in Table 2.1 of the Fera report, reproduced below in Table 16 for ease of reference.

Table16

Summary of benefits for voluntary measures, compared to set-aside[1]

CFE Measure	Benefits compared with set-aside		
	Farmland birds	Wider biodiversity	Resource protection
Block plots & strips - unsown			
V1. Grass buffers along watercourses	~	~	~
V2. Reverted arable plots/strips/fields	~	~	~
V3. Cult. land out taken of production	>	>	~
V4. Farmland bird plots in winter cereals	<	<	<
V5. Uncropped cultivated margins	>?	>	<
V6. Soil erosion control headlands/strips	<	<	>
Block plots & strips – sown for food			
V7. Game strips (commercial mixtures)	</>	<	<
V8. GWCT conservation headlands[2]	>	>	>/<[3]
V9. Sown wildflower headlands	**>?**	**>**	**~/>**
V10 Pollen & nectar mixtures	~/>?	>	<
V11 Wild bird seed patches/headlands	>	>	>/<[3]
Stubbles & whole field options			
V12 Rotational fallow	>	>/<[4]	<
V13 Winter stubble left to end Feb	<	<	<
V14 Stubble + specified spring crop	<	<	<
V15 Low-input cereal/rape + stubble	>/<[5]	>/<[5]	<
Inputs & plans			
V16 Reduced nitrogen cereal crop	<	<	<
V18 Reduced seed rate cereal crop	<	<	<
V19 Selective use of spring herbicides	<	<	<
V20 RB209-based management plan	0	0	0
Alternative land use			
V21 Short rotation coppice	<	?	<
V22 Mixed land use	<	<	<

[1] > = greater than set-aside; < = less than set-aside; ~ = similar to set-aside; 0 = no benefit compared to arable crop; ? = some uncertainty/data lacking

[2] Considered as equivalent to EF10: "Unharvested cereal headlands within arable fields"

[3] Depending on whether comparison is with rotational (>)or non-rotational (<) set-aside

[4] Good for arable flora, better than rotational set-aside for all groups, but poorer than non-rotational set-aside except for arable flora (>)

[5] Greater than set-aside until ploughed

2.3.28 In relation to Environmental Stewardship (ES), Option B has the aim of facilitating increased and informed ELS participation amongst arable farmers, particularly achieving an increase in in-field options. Fera point out that it will be impossible to know what would have happened in the absence of Option B, so attributing benefits to the success of the Option will be difficult and could lead to some overstatement. FERA also notes that an increase in in-field options will result in a lower take-up of other measures, which may see a reduction in other benefits. This point is also made by Hodge in his critique of Option B, pointing out that any re-allocation of ELS options needs to recognise not only the environmental gains from the new options that are taken up but also the possible losses from the options that are not taken up that otherwise would be. Hodge notes, however, that the Campaign could make a valuable contribution to promoting higher levels of ELS take up through its impact on the attitudes and behaviours of arable farmers.

2.3.29 With respect to the non-ES voluntary activities promoted under Option B, Hodge notes that some farmers may be willing or may be persuaded to make marginal management changes, although he consider that there is a possibility that, once persuaded of the potential merits of environmental measures, farmers might enter their farms in the ELS rather than undertake voluntary measures outside of Environmental Stewardship. There may, however, be a body of farmers that is prepared to undertake environmental measures that do not impose significant costs on their business but who are unwilling to commit to a long term commitment to this as required by ES. However, it seems unlikely that there will be a significant number of farmers that would undertake voluntary measures that will result in significant additional costs and a large proportion of the land that will be managed under voluntary measures with Option B is likely to have been otherwise uncropped or require only minor changes in management.

2.3.30 It is possible, however, that such changes will yield environmental gains compared with a counterfactual of, for example, leaving land uncropped but without any positive environmental management. Under the Option A intermediate scenario, it is assumed that some 175 thousand hectares of land will be left uncropped in the absence of any mitigation measures and it is likely that, under Option B, this will provide a considerable proportion of the land going into non-ES voluntary measures. Benefits will be determined by the difference between those generated by the voluntary management regime adopted under Option B and those that would arise otherwise. Any further land that is managed under Option B would represent greater additionality.

Quantification and Monetisation of Benefits

Farmland birds and water quality

2.3.31 Fera (2009b) attempted to quantify the benefits of Option B using the same methodology as for Option A. Using preliminary results from the farmer testing surveys (Fera 2009c)19, they picked out the most popular voluntary measures and then developed three types of model farm scenarios:

- Farms preferring to implement non-crop measures
- Heavy land farms implementing crop and non-crop measures
- Light land farms implementing crop and non-crop measures

They allocated the additional uncropped land into areas of voluntary measures according to the weightings of popularity in the surveys. This accounts for the uptake patterns.

2.3.32 To consider the possible level of uptake overall, Fera used the two total areas used in the initial April version of the CFE that was available at the time of developing the scenarios: the NE target of 205,000ha needed to retain the value of set-aside (later NE revised this to 240,000ha), and a trigger level of 102,500ha uncropped land, below which the regulatory failsafe would apply. These figures respectively represent approximately 2.5% and 5% of the arable area. Fera then took the 'basecase' model farm as used in Option A, which assumed 1% of land uncropped already and developed scenarios (based on 1, 2 and 3 above) for environmental management / uncropped land covering 2.5% and 5%, implying an additional 1.5% and 4% respectively at the farm level. These figures were then grossed up.

2.3.33 The results show what the impact on farmland birds and water quality would be on a landscape as used in the models, where the level of land managed for environmental purposes

[19] Fera. (2009c). Farmer testing of the introduction of changes to cross-compliance (including ES top-ups). Draft report to Defra May 2009

rises to 2.5% and 5% of the farm area. This provides an indication of the benefits that might be expected at the target level (205,000ha) and trigger level (102,500ha) indicated in the April document. It should be noted, however, that the targets used in these estimates were altered in the later version the CFE (of 20th May) and these are considered later.

2.3.34 The results of these workshops need to be interpreted with some caution. At a national level, it was assumed for Option A that in an intermediate or 'average' scenario of crop prices, 175,000ha would be left uncropped anyway. However, in a high price situation this figure is likely to fall further with an assumed low of 100,000 ha. Thus while reaching the 205,000ha target would imply only an additional 30,000ha managed for environmental purposes in an 'average' year, this figure is likely to rise in a high price scenario if the voluntary agreement holds. A target of 2.5% (102,500ha) at the national level appears to represent no additional benefits in an average crop price scenario. However, if all farms aimed to have 2.5% of their land in voluntary measures, this would deliver an increase for those farms that would have left less uncropped otherwise. In addition, if the land which would have been left uncropped anyway is now managed in a more beneficial way than simply leaving it as GAEC 12 land, it could have additional benefits for the environment. However, although as noted in the costs section above, farmers are unlikely to undertake measures voluntarily that have a more than a marginal cost to their business, some of these may, however, yield significant environmental gains.

Farmland birds

2.3.35 Experts made judgements about the impact of the scenarios on seven declining species of farmland bird. For each scenario, a distribution was modelled for the probability of delivering 'a national and sustained upward trend in the species populations over a medium time period (e.g. 5 years)'. A short summary of the results is given below.

- Scenarios with 5% of land in voluntary management were better than set-aside for three species (yellowhammer, corn bunting and turtle dove) but for the other four species (skylark, grey partridge, lapwing and kestrel), none of the scenarios were better than set-aside.
- For all of the species, none of the 2.5% scenarios were better than set-aside.

The experts often felt that the areas used for voluntary measures in the scenarios were too small to have any significant impact. This is in part due to the model farm used, which was trying to represent a variety of popular options. However, if farmers only commit their marginal land to voluntary options, then it may represent very small areas, and be spread out in small sections to wherever is convenient to leave uncropped at little or no cost to the farm business.

2.3.36 However, if it is assumed these scenarios represent the national situation, then the value of the impacts on the national population can be assessed and valued as for Option A (see the methodology in Annex 6). This implies benefits of:

Table 17 – Annual benefits of farmland bird impacts under Option B

	2.5% area take-up	5% area take-up
Non-cropping options	£40m-£100m	£100m-£330m
Heavy land options	£20m-£80m	£50m-£180m
Light land options	£50m-£170m	£100m-£350m

2.3.37 As noted above, the additionality associated with Option B is somewhat problematic and the figures above are likely to be overestimated, since a proportion will be provided by land that would be uncropped in the counterfactual situation and hence would have arisen to some extent in any case. Furthermore, these scenarios double count some of the benefits that would come from the 175,000ha uncropped in the baseline. Thus rather than somewhere between £40m and £170m of benefits being delivered from farmland bird increases where 102,500ha is placed in voluntary measures and £50m to £350m where 205,000ha is in voluntary measures, the benefits at a national level would probably be rather lower. However, for illustrative purposes, even if additionality only amounts to 10% of these figures, this still implies annual benefits of £4m to £17m and £5m to £35m under the two scenarios.

Water quality

2.3.38 The experts assessed the impact of each individual option on water quality, and Fera then scaled up the results to match the scenarios. The impact on water quality was measured as the 'percentage change in nitrogen, phosphorus and sediment lost to watercourses'. A brief summary of results is given below:

- All scenarios of the CFE led to a reduction in all three pollutants lost to watercourses.
- The reductions in pollutants were estimated to be approximately twice the magnitude under the 5% scenarios than under the 2.5% scenarios.
- The measures with the greatest median reduction in pollutants were V1 buffer strips, V6 soil erosion strips, V19 selective spring herbicide use, and V22 mixed land use.
- Experts judged that some measures would see an increase in pollutants lost to watercourses. These included V12 rotational fallow and V18 reduced seed rate. The winter stubbles options (V13-15) would see an increase in nitrogen losses.
- Judgements about V3 rotational removal of cultivated land, V4 bird plots, V10 pollen and nectar headlands and V16 reduced nitrogen input, suggested these measures would see negligible or uncertain effects on pollutant losses.

Fera note in their discussion that location is of prime importance for measures to tackle diffuse pollution, and a measure in the wrong place may be completely ineffective or even detrimental. However, the expert workshop made the simplifying assumption that measures would be implemented correctly and in suitable locations, as this is part of the ethos of the CFE's advice and guidance. Fera emphasise that the extent to which this happens on the ground will be an important measure of success which monitoring should take this into account.

2.3.39 As before, it is assumed that Fera's results for a model farm (which themselves involve many uncertainties from scaling up from field level) can represent the national level. The absolute reductions in pollutants from arable land in England were then calculated and valued, using the same methodology as shown in Annex 7. The results of the annual expected benefits are as follows:

Table 18 – Annual benefits of water quality impacts under Option B

	2.5% area take-up	5% area take-up
Non-cropping options	£11m-£91m	£23m-£173m
Heavy land options	£12m-£91m	£24m-£183m
Light land options	£11m-£89m	£23m-£173m

2.3.40 As discussed above, care needs to be taken when interpreting these figures, particularly due to the assumptions made when creating the model farm scenarios for the workshops. The scenarios are likely to double-count some of the area that would be left uncropped in the counterfactual. If, as with farmland birds, there were only 10% additionality associated with Option B in relation to water quality measures, this implies annual benefits of £1m to £9m under the 2.5% scenario and £2m to £18m under the 5% scenario.

Greenhouse gas and ammonia benefits

2.3.41 Using the same methodology as that for Option A, it would be possible to estimate the greenhouse gas and ammonia savings from putting land into voluntary environmental management rather than cropping it following usual practices. Again, however, these benefits depend on what level of take-up is achieved nationally, which is uncertain. As discussed above, at a target of 102,500ha, this would in fact be less land out of production than in an intermediate scenario for Option A, suggesting no additionality (except any arising from managing the land in

a more environmentally beneficial way than would otherwise be the case). At 205,000ha, assuming the additional 30,000ha (over an average 175,000ha uncropped anyway) was split proportionately according to the popularity of increasing the existing area of management or choosing a new measure in the farmer survey work (Table 31 in Fera (2009c)), then the greenhouse gas and ammonia savings can be calculated. A breakdown of this split of voluntary measures is given in Annex 9.

2.3.42 In the CFE released in May, the 102,500ha is changed to be a longer term trigger level of 142,500ha. Again, this is below the 175,000ha that is assumed to be left uncropped in an 'average year' under Option A, making it difficult to assess any additional benefits of Option B beyond what might have happened in the absence of any mitigation measures.

2.3.43 For estimating the greenhouse gas and ammonia benefits of Option B, take up has been assumed at 5 different levels: 102,500ha and 205,000ha to match the farmland birds and water quality estimates, 142,500ha to show the CFE trigger level, 240,000ha as the current NE target level, and 285,000ha as the CFE's area of set-aside. As we do not know what the level of uptake will be, this range gives an indication of what benefits might be delivered depending on the success of the Campaign. The results of annual benefits are given in Table 19 below.

Table 19 – The average annual benefits from greenhouse gas and ammonia savings under Option B, depending on the level of voluntary measure uptake

Area of land uncropped/in voluntary measures (ha)	Annual benefits (£m)			
	Greenhouse gas savings	Ammonia (low)	Ammonia (high)	Total[20]
102500[21]	-	-	-	0
142500	-	-	-	0
205000	4.3	0.06	0.09	4
240000	9.4	0.13	0.18	10
285000	15.9	0.21	0.31	16

2.3.44 If the changes are assumed to occur as of (and including) 2010/11, then the present values for greenhouse gas and ammonia savings until the end of the appraisal period in 2012/2013 are found to be as below:

Table 20 – The present values of greenhouse gas and ammonia savings under Option B, depending on the level of voluntary measure uptake

Area of land uncropped/in voluntary measures (ha)	Present value benefits (£m)[4]			
	Greenhouse gas savings	Ammonia (low)	Ammonia (high)	Total[22]
102500	-	-	-	0
142500	-	-	-	0
205000	11.9	0.16	0.24	12
240000	25.8	0.35	0.52	26
285000	43.6	0.60	0.87	44

[20] Rounded to the nearest million, same result for low or high ammonia

[21] The results for 102,500ha and 205,000ha are not strictly comparable with the results for farmland birds and water quality at these areas, because different assumptions about the counterfactual have been assumed in the scaling exercise.

[22] Rounded to the nearest million, same result for low or high ammonia

2.3.45 It is difficult to come to any conclusions from these results. They give an indication of the value of benefits that might be delivered if these areas of land managed for environmental protection are achieved. However, it is clear there are still many uncertainties here:

1. The actual level of voluntary measure uptake is not known. This will depend on the success of the Campaign, crop prices, and other influencing factors.
2. The pattern of uptake by farmers, both amongst options and geographically, is unknown. The answers given in the Fera farmer testing were based on imperfect knowledge of the schemes, and stated intentions are not always implemented.
3. As there is no penalty for not following the guidelines, farmers may not always pursue best practice even if participating in Option B. Thus greenhouse gas and ammonia reductions may not be as estimated by best practice research. These uncertainties add to all the problems of variable environmental impacts depending on the local conditions, and the problems of valuing the environment.

Total benefits and present values

2.3.46 If the CFE is assumed to come into full annual effect from the 2010/11 cropping year, with full and immediate annual benefits from then, the present values for the benefits can be calculated (as for Option A) based on two different levels of voluntary measure uptake. This involves combining the farmland bird and water benefits, based on the Fera research, with the greenhouse gas and ammonia savings benefits. These benefits were calculated predicated on different assumptions regarding the area of land left uncropped in the counterfactual, and the level of uptake across the country.23 The values for farmland birds and water quality double-count the benefits from land that would be uncropped anyway, and assume that 2.5% and 5% targets are met on all farms rather than at a national level. As such, the benefits are not directly comparable so care should be taken in assessing them.

Table 21 - Present values of benefits of various options for the appraisal period 2009-13

	2.5% uptake (102.5kha)[24]	5% uptake (205kha)
Present value range	£100m-£700m	£200m-£1.6bn

2.3.47 As for Option A, the wide ranges partly reflect the uncertainty regarding pattern of farmer uptake, estimating environmental outcomes, and attaching monetary values to them. However, the most significant uncertainty is in having no way of knowing what the overall level of uptake by farmers will be. Fera make this point in their conclusion: '... *the CFE appears to be potentially capable of delivering management through ELS and voluntary measures that will recapture the benefits of set-aside. Whether this aim is actually achieved will depend on the success with which the organisations involved are able to recruit and enthuse farmers and growers on the ground, and achieve the spread of uptake of measures required to deliver the various environmental objectives.*' Whilst 2.5% of arable land was used as a worst case scenario, there may be as little as zero uptake, and thus zero benefits. For the purpose of the summary and evidence sheet, a range of 0 to 2.5% uptake was assumed, thus giving £0-£700m in benefits. Even at this low level of 2.5% uptake, the 700m is almost certainly a considerable over-estimate

[23] The Fera model farm assumed only 1% of land left uncropped in the counterfactual, in order to represent an average farm, were all farms to aim to put 2.5% or 5% of their land in environmental management. The GHGs and NH^3 figures assumed 175kha (approximately 4.3%) uncropped in the counterfactual, although this is at the national level.

[24] The disbenefits of increased ammonia and greenhouse gases (assuming a counterfactual of 175,000ha and a target of 102,500ha met) are not included here, as it is unlikely to be attributable to the CFE, but rather a reflection of other forces.

as 2.5% at a **national** level would in fact be less land in voluntary measures than we would expect in the counterfactual anyway.

2.3.48 The additional risk to achieving these benefits is that there is uncertainty as to the level of continuity of delivery of environmental benefits. With voluntary measures, there is no security that they will be maintained. Farmers may reduce their contribution to the Campaign in response to perceived business needs. The damage caused by only temporarily putting long-term uncropped land back in to production can take a long time to recover. Fera suggest that this increased risk 'needs to be balances by an effective monitoring scheme'. Thus further developing of the targets and monitoring would be necessary if Option B were to go ahead.

Risks

2.3.49 Given its very nature, there is bound to be uncertainty about the extent to which farmers will respond to any scheme where their participation is voluntary and hence there is a risk that such a voluntary scheme will fail to deliver the benefits that were originally intended and hoped for. This is likely to be particularly acute in a scenario where high arable returns prevail, such as in 2007, and farmers have a strong market incentive to bring previously marginal land into intensive cultivation. As Hodge notes in his analysis, '*The approach in Option B, by relying on a purely voluntary approach, effectively removes the financial to risk facing farmers; they can avoid any costs that they regard as excessive by choosing not to adopt the practices. But the primary risk inherent in this approach is that the environmental requirement will not be achieved.'*

3 WATER PROTECTION - BUFFER STRIPS

Background

3.1 The Water Framework Directive sets demanding targets that require Member States to achieve good ecological status in water bodies by 2015 and to avoid deterioration. At present only 21% of water bodies in England meet the required standard. Additionally and in support of this, the CAP Health Check recently agreed by the Council of Ministers, requires Members States to implement, by 2012, a new standard on buffer strips next to water courses in order to tackle the issue of water pollution.

3.1 As a minimum requirement no-spread zones for manure and fertiliser use, defined in national Nitrates Action Plans must be applied to all land for which the single farm payment is claimed by 1 January 2012. We propose to introduce the minimum requirement with some minor additions laid out in the consultation stage IA as a new GAEC standard within cross-compliance. Details of this requirement and its impact can be found in section 6 of this document.

3.2 The Water Framework Directive also requires Member States to ensure that the condition of water courses does not deteriorate and evidence suggests that some aspects will be put at risk due to the abolition of compulsory set-aside. A review by Newell-Price et al. (2008) concluded that the loss of set-aside was likely to lead to an increase in the risk of particulate phosphorous (P) and sediment on sloping land, particularly sandy and silty soils. This study concluded that retaining field margins and corners would have significant benefits in reducing particulate P and sediment losses in vulnerable catchments.

3.3 Buffer strips aimed at reducing pollution of watercourses resulting from sediment and sediment-bound run-off usually take the form of vegetated strips along water courses.

3.4 In recognition of the water protection impacts associated with the loss of set-aside and to prevent deterioration of watercourses that may result from set-aside loss, we propose to introduce an advisory approach to target the location of 6m wide buffer strips and other land maintained in ways that can protect watercourses to locations where they will be most effective. At consultation stage we considered 2 other options for implementing this requirement;

1. Mandatory 6m wide uncultivated buffer strips next to watercourses on all cultivated arable land in addition to the baseline requirement (the blanket approach).
2. The use of a mandatory approach to target the location of 6m wide uncultivated buffer strips to locations where they will be most effective in addition to the baseline requirement.

We do not intend to proceed with either of these options for implementation in 2010, however it is possible that these measures could be introduced at a later stage if the advisory approach to mitigating the impact of the loss of set-aside on water quality was unsuccessful or if further measures were required to meet the requirements of the Water Framework Directive. If introduced the blanket approach is likely to require some land in addition to that required to recapture the environmental benefits of set-aside. A summary and analysis of the impact of these options can be found in Annex 10 of this document.

Cost and benefits of an advisory targeted approach to siting wider uncultivated buffer strips (included under Options A and B)

Description

3.5 This preferred option would take an advisory approach to targeting buffer strips of 6m alongside watercourses in areas where buffer strips would be most effective in preventing pollution of watercourses. The evidence indicates that buffer strips will be most effective on land that is not under-drained with light soils and a 2-7 degree slope and land on medium and calcareous soils with a 3-7 degree slope. Guidance, on targeted use of 6 metre buffer strips consistent with that proposed in Annex B1 of the Consultation Stage IA, would be supplied through a revised edition

of the Cross Compliance Guidance for Soil Management and a revised Soil Protection Review (SPR). Farmers following the guidance would consider the soil type, slope and location of the water courses in all fields before deciding where to locate buffer strips or other options to protect water quality. It is anticipated that slope maps would also be made available to farmers online. Details of the costs of the revised guidance and SPR are included in Section 4 of this document.

3.6 If this option is implemented it is proposed that the success of the approach will be monitored by the RPA through the soil protection review, by monitoring uptake of ELS options and through a project to examine individual ELS agreements and land managem.ent in selected catchments where baseline uptake and landscape information has been collected. This project would probably be undertaken in 2012 when the majority of ELS scheme agreements have been renewed. If it appears likely that there will be deterioration in water quality due to insufficient uptake of buffers in appropriate locations and other appropriate land management options to protect water quality, and if other initiatives are failing to deliver the outcomes required under the water framework directive, a mandatory approach to implementing vegetated buffer strips would be re-considered.

Baseline

3.7 All farmers claiming the single farm payment must comply with the existing GAEC 14 requirement to leave an uncultivated strip a minimum of 1 metre wide alongside water courses. In addition many farmers have chosen to take up wider uncultivated buffer strips under Environmental Stewardship and some farmers also keep land out of production for other reasons; it is estimated that 158 000 ha of agricultural land was uncropped in 2008 (FBS telephone survey, November 2008, some of this land is likely to be in locations that reduce run-off into watercourses. A considerable number of Agri-Environment agreements include buffer strip options. In January 2009 there were 137,058km (49,820km in ELS) which equates to 85,164 hectares (40,088ha in ELS) of margin options including buffer strips along watercourses, field edges and field corners within these schemes (agreements include 2m, 4m and 6m wide options). At the same time 18,842 agreements (10,604 ELS) included at least one margin option.

3.8 A detailed study of individual agreements and the associated land types would be required to make an accurate assessment of the value of existing buffer strips in ELS for water quality and this has not been possible in the time available. A study of Environmental Stewardship by Boatman et al. (2007)[25] indicated that approximately 37% of ELS buffer strips were situated next to watercourses, although it did not indicate whether these were positioned in the most effective locations. If we assume that a similar proportion are located next to watercourses in all existing agreements there would be approximately 31,500 hectares of buffer strips (0.37 * 85,164ha).

Benefits

3.9 The main benefit associated with vegetated buffer strips is that they reduce pollution, primarily sediment and sediment-bound pollutants including phosphorous and pesticides entering water courses from surface flow (run-off). Buffer strips receive no nutrients or other agri-chemical inputs so they also reduce nitrate and phosphate leaching and direct pollution from spray drift. A full range of benefits associated with buffer strips in the ADAS report in Annex B1 of the Consultation Stage IA and these are summarised in Table 22.

3.10 The report indicates that buffer strips of the width considered in this impact assessment are most effective at reducing pollution of watercourses on fields with medium and light soils on land where surface flow is an important route of pollution.

3.11 The level of surface flow and associated pollutants is affected by a number of factors including slope, soil type, field drainage and soil compaction. Run-off and soil erosion is not common on slopes shallower than 3 degrees unless the soil is light or the land is heavily compacted (Controlling Soil Erosion, Defra 2005).

[25] Boatman, N., Jones, N., Garthwaite, D., Bishop, J., Pietravalle, S., Harrington, P. & Parry, H. (2007). *Evaluation of the Operation of Environmental Stewardship*. Final report to Defra, project No. MA01028.

3.12 The data are highly variable and it is difficult to compare one study with another due to the different experimental methods used and the different soil/slope and weather conditions at each site.

Table 22: Summary of previous studies showing range of % Reduction in pollutants entering watercourses via surface flow from agriculture found for vegetated buffer strips of various widths[26]

Pollutant	1m wide	3m	6m
N	(50% at 5m)		
P	30-85%	30-85%	80%
Pesticides	50-85%	45-86%	44-86%
FIOs (indicators of contamination by microbial pathogens)	None (no spread zone for manure will have positive impact)	None (no spread zone for manure will have positive impact)	None (no spread zone for manure will have positive impact)
Sediment	30-90%	55-90%	58-95%

3.13 Buffers are most effective at reducing sediment loss and associated pollutants into watercourses on light and medium soils. The authors also indicate that buffer strips will not be effective at mitigating water pollution on land with working field drains and indicates that much (55%) arable and grassland (predominantly on heavy soils) is under-drained, particularly in the East of the country. The authors also recommend that buffer strips should not be used on slopes greater than 7 degrees. This is because buffer strips can act as a source of pollutants into watercourses if they breach or flood, breaching is more likely in areas with a high velocity of surface flow. In these cases it is more appropriate to use other measures, for example by growing the right crops (or none at all) and managing the soil correctly.

3.14 The greatest benefits for water quality would be expected where buffer strips are located in suitable locations as recommended under this option. The scale of the benefits associated with this approach will depend on the extent to which advice is followed in suitable locations.

3.15 Analysis carried out by the Environment Agency indicates that approximately 25% of arable land falls into the categories where buffer strips would be most effective using 2001 cropping data and combining this with data on soil type and slope. Approximately 94,700 hectares of 6m wide buffer strips would be required to buffer **all** watercourses on arable land (see Annex 10 for details) so if 25% of watercourses are located on this type of land approximately 23,700 hectares of 6m buffer strips would be required under this targeted approach. Based on figures shown in the baseline section it is likely that the area of buffer strips next to watercourses in existing agreements already exceeds this figure, however we don't know what proportion of these buffer strips are located in positions where they provide optimal water protection benefits.

3.16 Option A and Option B for recapturing the benefits of set-aside both include the buffer strips in the menu of measures. The benefits of employing buffer strips have been quantified as part of these packages of measures in Section 3. It is expected that successful targeting will increase the benefits from buffer strips, whether under Option A or Option B. These benefits are most probably captured in the Fera workshops for water quality, in which the experts assumed the measures were correctly located.

Administrative costs to government

3.17 The main costs to government of implementing this measure would be associated with monitoring its success in selected catchments and providing guidance to farmers. As these costs would occur under Option A or B, they are included in the summary costs (Tables 6 and 15), and are included in the summary and evidence sheets for A1, A2 and B.

3.18 Monitoring would involve resource requirements from Natural England to look in depth at agri-environment agreements in selected catchments (requiring approximately 5 weeks work from a full time specialist), some time from Defra statisticians to monitor uptake of management

[26] Summary table from ADAS review published as Annex B1 in consultation stage impact assessment

options and approximately £60k for an independent study to look at implementation of measures related to water protection in selected catchments 2012.

3.19 The RPA would monitor the uptake of land to protect water quality on farms during cross compliance inspections and it is proposed that the RPA would provide the results in the form of a report to Defra on a quarterly basis. RPA inspectors would also provide guidance to farmers on the suitability of this voluntary measure to their land and highlight the availability of funding for the measure through Environmental Stewardship and free advice through the local catchment sensitive farming officer where this service is available. The cost of training inspectors to provide guidance and setting up systems to carry out the monitoring has been estimated at £29k -£184k depending on whether training on the requirement can be incorporated into existing one-day annual refresher training in the first year. Annual operational costs of £82k to cover dossier preparation and submission of reports are expected thereafter. Full details of these costs have been provided by the RPA and are in the separate document of RPA Impact Analyses. Local EA officers would deliver training about CSF at each local refresher training session, it has been anticipated that this should take approximately 1 hour and could be accommodated without additional resources.

3.20 Costs to farmers of carrying out a risk assessment and costs to government of providing guidance can be found in Section 3.

4 AMENDMENTS TO THE SOIL PROTECTION REVIEW (SPR)

Problem and Proposed Measures

4.1 Current Cross-compliance measures relating to soil protection are:

- **GAEC I**, the Soil Protection Review, which requires farmers to identify soil types and problems on their land, and select and put in place appropriate ways of addressing them.
- **GAEC 2**, Post-harvest management of land, which requires farmers to take one of a number of management options to ensure that land which has been harvested mechanically is left in a state in which run off and soil erosion is unlikely. There is no provision which requires a farmer to choose another option of the selected option fails.
- **GAEC 3**, Prevents mechanical operations on, and access to, waterlogged soil unless exemptions apply or a derogation is granted by the Secretary of State.
- **GAEC 4**, Crop Residues (Burning) Regulations 1993, form part of cross-compliance and are reinforced as cross-compliance provides a further means of enforcement (although the requirements are unchanged).

4.1 The aim of this proposal is to simplify and improve the efficacy of cross compliance measures relating to soil protection. The number and complexity of the Good Agricultural and Environmental Condition (GAEC) standards adds to the administrative burden on farmers in terms of the time needed to read about, understand and apply all the standards. There is also some overlap in the mandatory standards (GAEC 2-4) and the choice-based standard of GAEC 1 which can lead to ambiguity and confusion. These points were noted in the evidence from the evaluation of cross compliance in England carried out by an ADAS led team in 2008-9. The four GAEC standards applicable to soil are interconnected and can reasonably be incorporated into one which will help address all the relevant issues. Farmers would then only have to think about and implement their Soil Protection Review (SPR) when it comes to soil management.

4.2 Farmers' stakeholder groups have also expressed concern that the standard on waterlogged soil is unduly restrictive and adds unnecessary burdens on both government and farmers. It is proposed to simplify this by cutting out the need for derogations, allowing farmers to use their own judgement in terms of deciding when to go onto this soil.

4.3 In addition, there has been some concern that the SPR guidance has not made it clear enough that farmers need to implement suitable measures that are likely to be successful in resolving soil issues. Further work over recent years on soil organic matter also enables us to improve the soils guidance. Therefore, we propose to take the opportunity to improve the layout of the guidance for clarity and expand the section on soil organic matter. This should assist farmers and make the SPR more effective.

4.4 Initial consultation on these proposals had a mainly positive response from stakeholders although the format of the SPR is being amended for further clarity, to reflect suggestions made during the consultation process.

4.5 The proposed changes to the Soil Protection Review (SPR) will:-

(1) Consolidate the four Good Agricultural and Environmental Condition (GAEC) Standards covering soils into just one, in the form of the SPR (GAEC1). This will be done by:-

(a) Incorporating GAEC 2 into GAEC 1 (SPR) by including an extra section on post harvest management in the SPR and emphasising the requirement on farmers to select one of five mandatory options for post-harvest management;
(b) Incorporating GAEC 3 into GAEC 1 (SPR), simplifying GAEC 3, so that farmers are no longer prohibited from using machinery on waterlogged soil except in certain conditions. Instead they will be required to record access to waterlogged soil on their SPR and record and take appropriate steps to repair any damage within a reasonable time period.
(c) Incorporating GAEC 4 into the GAEC 1 (SPR) by stating within the SPR that compliance with the Crop Residue Burning Regulations, GAEC 4, is part of cross-compliance, as well as a regulatory requirement.

The standards will essentially be the same except that the waterlogged soil standard will be simplified and made more flexible. They will also be more closely integrated on existing SPR requirements for dealing with soil degradation threats.

(2) Clarify that farmers need not only to identify risks and problems and record what measures they plan to take to alleviate them, but must identify and carry out these measures. This will be reviewed and improved annually.
(3) Improve soils guidance to give farmers additional advice on how to maintain organic matter levels.

4.6 SPR guidance for land not in agricultural production (GAEC12), land in environmental management and buffer strips will be amended to reflect other proposed changes to the cross compliance framework as a result of the CAP Health Check. These are covered in other sections of this IA. All these proposed changes would take effect from 1 January 2010.

4.7 The benefits associated with cross compliance soil protection measures are reduced erosion, compaction and soil organic matter decline, the key degradation threats to soil.

4.8 Erosion

Soil erosion causes soil runoff to enter ditches and water courses, deposition in ditches and water courses and on roads. Additionally, it can cause the formation of gullies and rills. The Environment Agency estimates that erosion moves 2.2m tonnes of arable topsoil each year in England and Wales. The total costs of erosion from agriculture have been estimated by The Environment Agency at around £45m per year in 2005, before cross compliance measures will have had any impact[27]. This includes costs to farmers and land managers of applying additional soil conditioners and nutrients to avoid loss of productivity which are estimated as being in the region of £9 million annually[28]. However, this is likely to be an underestimate as it does not fully reflect the impact on productivity of current levels of erosion. No information is currently available on loss values following the introduction of cross compliance but the figure is likely still to be substantial.

[27] Soil erosion costs primarily include water treatment, damage to property and dredging stream channels (EA 2007).
[28] EA (2007): The total external environmental costs and benefits of agriculture in the UK.

4.9 Compaction

The costs of compaction are linked to increased risks of erosion, flooding and lower productivity as a result of plant rooting activity being affected. There is an increased risk of flooding, at least locally, in comparison with situations where soils are more permeable and have greater infiltration rates. We do not have precise figures for these costs but the flood related costs of poor agricultural soil management and breakdown of soil structure have been estimated by the Environment Agency (2007) to be in the wide range £29 -128 million per year.

4.10 Soil Organic Matter Decline

Recent studies[29] have shown that even a small change in total organic carbon content can impact soil physical properties and functions. As well as contributing to CO_2 emissions, soil organic matter decline will also lead to a lower water holding capacity and poorer soil structure. This can also impact on flood risk as well as the productivity of agricultural land. Poor soil structure can also lead to increased soil erosion. It has been estimated that carbon loss from soil cultivation is in the region of £82m[30].

4.11 The costs and benefits of the current regime are described in Annex 11.

Additional Costs of Proposed Measures

On the Farmer

4.12 These changes to the SPR will generally result in only small administrative costs for farmers. This is estimated at one hour to familiarise themselves with the changed requirements, giving a one-off cost of £1.79 million in total (110,000 farmers x 1hour x £16.23= £1,785,300). There will also be minor costs in the case of waterlogged soil, when record keeping should be no more than half an hour per farmer for each waterlogging incident (£8.11 x min of 20,000 x 1 incident per year = £162,200) (A generous estimate allowing for time to be spent inspecting damage to soils, which it is possible the farmer could do in ordinary course of activities)

Costs to farmers of implementing advisory buffer strip option

4.13 It is anticipated that guidance for locating buffer strips will be made available as a voluntary section within the Soil Protection Review and associated guidance. Farmers who choose to complete this section of the SPR will incur costs associated with reading guidance and carrying out a brief assessment of soil type and slope for their land. All farmers would receive modified Cross Compliance Guidance for Soil Management and the Soil Protection Review with minor revisions signposting the use of buffer strips. Arable farmers would be expected to read and understand the guidance and complete the buffer strips section of the SPR which is likely to incur a time cost of approximately 30 minutes and farmers who know their land are likely to be able to assess the soil type and maximum slope in around 2 minutes per field. The estimated costs are shown in Table 23, the mean number of fields on English farms is 17.93 (Defra statistics) and this figure has been used for the calculation in the Table B4 below, although 50% of farmers have 11 fields or less.

Table 23: Administrative Costs Associated with Voluntary Targeting Approach of targeted buffer strips

[29] Watts et al. (2006): The role of clay, organic carbon and long-term management on mouldboard plough draught measured on the Broadbalk wheat experiment at Rothamsted. Soil Use and Management **22**, 334-341.

[29] Blair et al. (2006): Long-term management impacts on soil C, N and physical fertility. Part 1: Broadbalk experiment. Soil and Tillage Research **91**, 30-38.

[30] EA (2007): The total external environmental costs and benefits of agriculture in the UK.

	Number of Arable farms	Average cost/farm [a] £'s	Total cost to farmers (000's)	Annual cost Y/N
Reading Guidance	27,000 42,000	3.5	284.8 443.1	N
Risk Assessment	27,000 42,000	12.6	340.5 429.6	N
TOTAL	27,000 42,000	16.1	**625.3- 972.7**	N

[a] Figures assume 30% overhead time and a standard rate of £16.23 per hour

4.14 To assist farmers in the assessment of slope it is anticipated that farmers would be able to slope maps through the MAGIC website. The EA's Geomatics team would provide the maps to Defra at a cost of around £67k excluding VAT which covers data processing and a licence agreement for the derived product. The annual cost to Defra for updating the maps would be around £14k excluding VAT. It is estimated that a one-off cost of £7k would be required to install maps on MAGIC

On the Government

4.15 Implementation of the amended SPR will cost the Rural Payments Agency approximately £550,000 to implement and an annual increase of approximately £70,000 to inspect. Administrative costs on government will be reduced as there will be no need to make emergency legislation, (in the region of £1.000 per derogation) to suspend measures. Minor saving on administration of individual derogation applications.

4.16 There will be some impact on the Rural Payment Agency Inspectors as although these changes are primarily intended to consolidate and clarify existing requirements, the new methodology behind the SPR will require all inspectors to receive training to understand. In addition, the information required in the SPR for inspectors to check and the mandatory measures for each parcel from 2010 mean there will be a small increase in inspection time (approximately one hour).

Benefits of amended regime

4.17 The amended regime should assist farmers by providing a simple system for recording access to waterlogged soil. This will remind them of the requirement to take appropriate action to repair any damage caused by such access. There will be reduced costs to farmers arising from easier access to waterlogged soil and subsequent reduction in delays to harvesting.

4.18 The extra record keeping on waterlogged soil should be compensated by the knowledge that farmers will not have to wait for a Defra derogation before they can harvest crops from (or carry out other operations) on waterlogged soil. Some farmers, will be saved from the administration time involved in applying for individual exemptions for waterlogged soil. However, as noted above this is likely to amount to less than £100 per year on average and can be effectively ignored.

4.19 The amended SPR will simplify the record keeping process by including all soil protection requirements into a single document. This will make planning for soil protection simpler and should allow farmers to focus more on soils management.

4.20 The simpler SPR and the improved guidance will provide greater clarity. The easier to understand requirements are expected to result in improved soil protection, resulting in less erosion, compaction and soil carbon decline. As noted above, annual damage costs associated with these impacts have been valued as follows:

Erosion	£45m
Compaction	£29m - £128m
Soil carbon decline	£82m
TOTAL	£156m – £255m[31]

4.21 Even if this were only to make a 5% reduction in annual damage costs this would be about £7.8m- £12.8m per annum. Assuming these benefits start into 2010/11 and run to 2012/2013, when the next review of the CAP is due, their net present value in 2009 terms will lie in the range £22m to £36m, as shown below in table 24.

Table 24

		2009/10	2010/11	2011/12	2012/13	Net Present Value 2009 (£m).
Discount Factor →		1.00	0.97	0.93	0.90	
Estimated Annual Damage Reduction at 2009 prices (£m) ↓		Discounted annual damage reduction (£m)				
Minimum	7.8	-	7.5	7.3	7	21.9
Maximum	12.8	-	12.4	12.0	11.5	35.9

[31] EA (2007): The total external environmental costs and benefits of agriculture in the UK.

5 OTHER CHANGES - SIMPLIFICATION AND RATIONALISATION

5.1 Introduction

5.1.1 The CAP Health Check requires changes to our cross compliance regime and this provides an additional opportunity to look for ways to improve the existing standards and guidance and react to emerging analysis of cross compliance in England by ADAS. This item is composed of a number of small changes to cross compliance that seek to rationalise and simplify the guidance and requirements for cross compliance and ensure implementation in England is in line with the CAP Health Check.

5.1.2 There are 3 aspects of simplification and rationalisation:

i. Changes to the standard on land not in production (GAEC 12) to account for the removal of set-aside in the CAP Health Check.
ii. The introduction of a requirement to comply with existing law on abstraction licenses.
iii. Possible introduction of additional guidance to improve understanding of cross compliance as a whole.

5.2 LAND NOT IN PRODUCTION

The need for government intervention

5.2.1 Government intervention is necessary to bring the existing standard in line with the removal of set-aside requirements and to simplify the requirements placed on farmers.

Policy objectives and intended effects

5.2.2 To ensure that any limitations on the use of such land does not preclude non-profit community activities (fetes, fairs etc) formerly undertaken on set-aside land.

Policy options considered and preferred option

5.2.3 The proposal sets out the changes necessary to account for the cessation of the set-aside scheme and in additon we will consult on 2 elements of the standard - 1) the way in which we enact the requirement to prevent encroachment (curretnly seen as complex and confusing) and 2) the range of non-agricultrual activites that should be allowed (to ensure that we only apply restrictions where appropriate).

Timetable for assessment and review

5.2.4 Review will take place in 2011. Cross compliance and stakeholder feedback data is collected annually, this will allow for review one year after implementation. Proposals will also be assessed by stakeholders during consultation.

Background

5.2.5 Agricultural land not in agricultural production is governed by the cross compliance standard GAEC 12. The purpose of the standard (in line with the aim of the underlying EU GAEC framework) is to ensure that uncultivated agricultural land remains in good agricultural condition by preventing the encroachment of scrub and by limiting the extent to which such land can be used for non-agricultural activities.

5.2.6 During stakeholder meetings on possible changes to the cross compliance standards NFU representatives asked for GAEC12 be used to carry over concessions on storage and non-

agricultural use previously granted for land in set-aside and the revision of this standard is designed to respond to that request. Providing additional flexibility for non-agricultural use on land out of production will balance out the tighter controls that we intend for environmental management land being used to recapture the environmental benefits of set-aside. We will consult on this approach and the range of non-agricultural activities that should be permitted under the revised standard (note: only not-for-profit activities are considered e.g. village fetes etc).

5.2.7 In developing policy options for this standard we have sought to reduce the number of restrictions placed on farmers and place more emphasis on active risk management and mitigation by farmers in the course of their activities. We propose to remove restrictions on access by vehicles and requirements to maintain green cover which are designed to prevent soil damage and erosion and instead allow farmers to undertake such activities on the basis that they will identify and manage any risk through the Soil Protection Review.

5.2.8 Lastly, the CAP Health Check removed set-aside whilst at the same time we are seeking to introduce requirements to keep some land in environmental management. We will revise the standard to reflect this. Retaining references to set-aside would provide a potential source of confusion for farmers getting to grips with a changed regime and clear references to any new policy measure that also involves land not in production will be necessary to ensure clarity for farmers going forward.

5.2.9 The economic impact of these changes will be negligible. The cost of inspection to RPA will remain the same as the same elements (prevention of encroachment and damage from non-agricultural use) are inspected. If, by changing the rules on non-agricultural use in line with existing SPS requirements, we provide greater clarity to farmers on what they use land out of production for then we would expect to see a reduced admin cost to farmers associated with e.g. non-agricultural use of the land, in particular where they would no longer need to seek clarification from RPA to hold events, and an increase in benefits to those involved in community events on the land.

5.2.10 Any change in this standard will require RPA to produce revised guidance and send this to farmers at a cost of £3,500.

5.3 **ABSTRACTION LICENSING**

The need for government intervention

5.3.1 Without government intervention, farmers who do not comply with domestic regulations on abstracting water for irrigation would still receive full subsidy payment under the Single Payment Scheme.

Policy objectives and intended effects

5.3.2 The objective is to ensure the managed use of water resources, to enable usage levels to be sustainable and to ensure that abstraction of water for irrigation does not have unintended adverse environmental impacts (through depletion of water resources). The effect of introducing this measure will be to enable the Environment Agency, in conjunction with the Rural Payments Agency, to reduce EU subsidy payments to farmers who do not comply with the domestic requirements for abstraction for irrigation under the Water Act 2003; under a system know as cross compliance.

Policy options considered and preferred option

5.3.3 The policy option outlined here is a direct response to a change in the EU legislation that governs the sustainability standards that member states must place on their farmers in return for those farmers receiving EU subsidy under the Single Payment Scheme (cross compliance). From 2010 all member states must ensure that their cross compliance regime includes checks to ensure compliance with domestic abstraction licensing legislation.

5.3.4 The policy option proposed here is considered to be the simplest and least costly way to comply with the new EU requirement.

Timetable for assessment and review

5.3.5 Each year - data on cross compliance inspections, including for abstraction licenses, will be compiled and combined with Environment Agency data on applications for abstraction licenses and cases of non-compliance. This will allow any effect of the introduction of a cross compliance requirement on the underlying rate of compliance

Background

5.3.6 As a result of a revision of the CAP Health Check member states are required to introduce a Cross Compliance standard to ensure that farmers who abstract water for irrigation do so in accordance with national abstraction licensing regimes. The compulsory standard contained in the new Annex III of Directive 16306/08 will be ‘Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures.’

5.3.7 For England, this means that those farmers who are required to hold an abstraction license under the terms of the abstraction regime run by the Environment Agency will now need to do so in order to avoid reductions to their SPS payment, including where the abstraction and irrigation is conducted on an area that is not itself part of the SPS claim, but is part of the holding of an SPS claimant. In addition the relevant agencies must ensure compliance with the regime by all farmers, meaning that the relevant agencies will need to ensure that farmers who are abstracting without a licence are doing so in accordance with the rules. At present, rates of compliance with the abstraction licensing regime are high.

Implementation considerations

5.3.8 The requirement to include abstraction under cross compliance will take effect from 01/01/10.

5.3.9 New rules, widening the scope of irrigation activities that will require a licence, will be introduced in England in October 2009.

5.3.10 The new rules on abstraction licensing will mean that any irrigation activity that abstracts over 20m3 per day will require a licence. Currently only spray irrigation over a threshold of 20m3 per day requires a licence. There are an estimated 900 operators who previously did not need a licence but will do under the new rules (mostly trickle irrigators).

5.3.11 Subject to a consultation in early 2009, it is proposed that a transition period will operate between the current and new schemes. Operators will have 12 months from the entry into force of the new requirements in which to apply for a licence, and the Environment Agency will have 5 years in which to process these applications. The Environment Agency expects to prioritise applications from high risk (low water level / high abstraction rate) areas. Once granted, typically, licences will be valid for 12 years.

5.3.12 Farmers who require an abstraction licence for irrigation will not be in breach of the requirements, or cross compliance, if they apply for a licence within the application period laid down (expected to be 12 months). If they make an application, they will not be in breach of any requirements pending determination of their application (which may take up to 5 years).Because the requirement on Member States is to assess compliance with authorisation procedures it will be necessary to take adequate steps to ensure that, as part of the inspection process we are able, not only to check that licence holders are complying with the terms of their license, but also to check that those abstracting without a licence do not need one (i.e. that they are abstracting less that 20m3 per day or not conducting activities that need a licence).

5.3.13 The Environment Agency would be the Competent Control Authority for the new abstraction standard under Cross Compliance and therefore integrate the additional checks necessary into their existing programme of inspections.

Costs

5.3.14 In terms of Cross Compliance the additional costs to the farmer are negligible, because only costs over and above compliance with domestic legislation are assessed

5.3.15 There will be additional cost from the need to carry out additional checks as part of Cross Compliance inspection on 1% of the claimant population (RPA use a figure of 1100 as 1% of a population of around 106k – 107k farmers because it provides a margin for error so that we meet the EU's 1% inspection requirement even if some of those inspected turn out to be ineligible for any reason). The Environment Agency have suggested that it will be possible to inspect for this as part of the existing inspection programme with the only additional cost being the recording of findings – estimated at around 20 minutes extra on a visit to incorporate abstraction licensing checks for the purpose of cross compliance. The additional cost to EA of inspecting this measure is estimated at £10,659 per annum [hourly cost of EA inspector = £29.07 / 3 = cost of 20 additional minutes = £9.69 x 1,100 inspections required for 1% sample = total annual cost of £10,659].

5.3.16 There will also be a need to look, within the sample selected for Cross Compliance inspection, for farmers abstracting over the 20m3 per day threshold and without a licence and it is anticipated that such checks can be incorporated in the usual EA inspections already undertaken so incur no additional cost.

5.3.17 RPA estimate that their backroom admin costs will remain negligible - the only significant cost will be £5k to include additional data fields in Rita (the RPA's database system) to accommodate the new standard.

5.3.18 Costs may accrue to farmers who are non-compliant. It is necessary to develop specific standards for abstraction under Cross Compliance and map breaches of these on the penalty matrix in order to define the rates of penalty to be applied.

Benefits

5.3.19 Current rates of compliance with the abstraction licensing regime are high. Therefore there is limited scope for additional requirements to greatly increase levels of compliance. The introduction of a cross compliance requirement may be helpful in publicising to farmers the general need to consider if they need an abstraction licence for irrigation, in particular because the requirements for abstraction licensing are likely to broaden and more farmers will be required to hold a licence in the future. Guidance on cross compliance (which should be read by all farmers claiming SPS subsidy) will include relevant information on abstraction licences. So the

introduction of the requirement under cross compliance may support uptake of the licensing regime.

5.3.20 A clear benefit from the introduction of this measure is the mitigation of disallowance risk if we not to comply with the EU legislation that obliges us to introduce this standard. Current disallowance penalties for failing to implement other aspects of cross compliance in line with the EU legislation in 2006-7 are estimated to be in the range of £30-90m (awaiting a final verdict from the EC).

5.4 **ADDITIONAL GUIDANCE**

The need for government intervention

5.4.1 A farmer survey and review of cross compliance have revealed that while most farmers understand ther technical requirements of the standards, many do not feel they understand why the standards are in place and how they contribute to sustainable farming.

5.4.2 As part of their evaluation of cross compliance, ADAS has developed a classification system for cross compliance standards that groups the 35 existing GAEC and SMR (Statutory Management Requirement) standards into 7 groups (Habitats & Wildlife, Landscape Features, Soil & Water Protection, Animal Identification, Animal Welfare, Prevention & Control of Animal Diseases and Control of Chemicals, Food and Feedstuffs). This system was used to aid discussions of cross compliance standards with farmers by simplifying the large number of individual standards into coherent themes. Emerging results from the ADAS study suggest that, whilst understanding of the technical requirements of cross compliance is improving there is still potential for significant improvement in farmers' understanding of the reasoning behind the standards and their contribution to wider goals on environmental protection and sustainability.

Policy objectives and intended effects

5.4.3 The intention is to produce a small quantity of extra guidance that assists farmers in understanding the reasoning for having standards and relates the standards to wider issues such as resource protection and animal health.

Policy options considered and preferred option

5.4.4 We will consult on potential additional guidance material and, if the response is positve, make this avaialble to farmers and other relevant groups. This guidance will not be necessary for compliance (existing technical guidance allows farmers to be compliant) and use of it would be voulantary.

Timetable for assessment and review

5.4.5 After 1 year farm survey results and stakeholder feedback would enable us to gauge if additional guidance has been helpful.

6 OTHER CHANGES - THE MINIMUM REQUIREMENT; NITRATES ACTION PLAN NO-SPREAD ZONES ON ALL LAND IN ENGLAND IN ADDITION TO EXISTING UNCULTIVATED BUFFER STRIPS IN CROSS COMPLIANCE (GAEC 14)

Description

6.1 Spreading of inorganic fertiliser within 2m of a watercourse and manure within 10 metres of a watercourse will be prohibited on all farms claiming the Single Payment; EU Regulations require this must be the minimum legal requirement in 2012. All farmers spreading manure will be required to produce a map (the manure risk map) showing all the watercourses and no spread zones will also be required to demonstrate compliance. Farmers would also be prohibited from spreading manure within 50metres of a borehole, spring or well and these must also be marked on the manure risk map.

Baseline

6.2 Farmers with land in designated Nitrate Vulnerable Zones (70% of land) are already required to meet this obligation. The additional requirement would apply only to farmers on the 30% of land outside these areas (31.5% of SPS holdings; Defra statistics).

6.3 Spreading manure within 10 metres of a watercourse has been discouraged under the Code of Good Agricultural Practice (CoGAP) for water since 1991. According to the Farm Practices survey in 2001 around 22.5% of farmers who spread manures did so within 10 metres of water courses. At this time just under 8% of land area in England was within designated NVZs. Some farmers outside NVZs are also likely have existing manure risk maps as part of a former ELS option; the manure management plan and plans for some Farm Assurance Schemes. According to the Farm Practices Survey in 2007 around 74.1% of farmers outside NVZs in that year still spread manure. No data exists on how many farmers spread manure within 50m of boreholes, springs or wells.

Benefits

6.4 The main benefit from applying the NAP no-spread zone is likely to be a reduction in pollution by microbial pathogens in areas where manure was spread within 10m of a water course or 50m of a borehole, spring or well outside existing NVZs. The change to farming practices resulting from this mandatory requirement is likely to be very small and the resulting benefits small. Using the information available we estimate that 5% of farmers in England (17% of those who are not currently in NVZs) will have to change their practices to meet the requirement not to spread manure within 10m of a watercourse (Assuming 31.5% holdings outside NVZs (Defra statistics), 74.1% of which spread manure and that 22.5% of those who currently spread manure within 10m of a watercourse).

6.5 The requirement not to spread fertiliser within 2m of surface waters is unlikely to confer new benefits because farmers are required under cross compliance to leave land within 2 metres of the centre of the water course and 1m from the top of a bank of a water course uncultivated.

6.6 The requirement to complete a manure risk map has the benefit of raising awareness of water issues on farms provided it is not outsourced to a consultant.

Costs

6.7 For the large majority of farmers the costs of complying with the no spread zones should be negligible as they are likely already to be compliant through adherence to CoGAP or to be able to meet the requirements by making relatively minor adjustments to farming practices at little cost, in particular with respect to the use of manure and inorganic fertiliser on different parts of the farm. Since inorganic fertiliser can be used to within 2 metres of a watercourse the impacts on yields, and hence output, should be negligible. The fact that the requirements already apply to some 70% of the agricultural area in England and no representations have been received from industry stakeholders that meeting the prescription is costly or otherwise burdensome to farmers, is also suggestive that the cost impacts on farmers of expanding the no spread zones outside the NVZs will generally be small [especially given the existing 1m no-spread requirement under cross compliance]. There could, however, be some limited effect for a few intensively stocked livestock farms where the new requirements mean that the physical area of

the farm is too small to use the manure that is produced on it. Farm Business Survey data indicates that around 2% of farms could be affected by the expansion of no spread zones to the whole of the country. For these farms additional land will need to be found on which to spread manure which will incur a cost that will depend on how far it has to be hauled. There may also be some offsetting savings for the receiving farm or farms in terms of reduced purchases of fertiliser.

6.8 Farmers outside designated NVZs who spread manure (74.1% of the 37 658 holdings outside NVZs at 1 Jan 2009) would also be required to use complete a manure risk map. It is anticipated that this would take most farmers around 5 minutes per field assuming they need to visit each field to determine where the features to be recorded on the map are located. The mean and median values for the one-off cost associated with this requirement are shown in the Table 25. This calculation assumes that none of the farmers newly affected by the requirement already have a manure risk map.

Table 25: Costs to Farmers of Indicating No Spread Zones on Risk Maps

	No. farms	**Cost/ hour (£)**	**No. hours/ map completion**	**Ave cost/farm (£)**	**Total cost (£)**	**Annual cost**
Mean (17.93 field parcels)	27,904	16.23	1.5	31.5	879,700	N
Median (11 field parcels)	27,904	16.23	1	19.3	538,700	N

Administrative costs to government

6.9 The Environment Agency inspects existing NVZs would inspect the new GAEC standard. Costs to the inspection body are a small extension to the existing inspection programme and have been estimated to be £7k-£15k including inspection of this requirement outside of NVZs, compliance reporting and processing. The variation in costs depends on the level of field inspection that is required as a result of responses supplied during the inspection. In addition to the inspection cost there will be some administrative costs to the RPA associated with updating guidance and RPA policies, collecting information from the EA for the new GAEC, including inputting to and amending the database and project support costs. This has been estimated as a £40k cost including 20% contingency, full details can be found in the document of the RPA's Impact Analyses.

7 REFERENCES

CSL. (2008). Estimating the quantitative environmental impacts of a package of potential options to recapture the benefits of set-aside, Phase 1: Review of Natural England benefits assessment. Final report to Defra, February 2009

Defra Academic Panel. (October 2007). Note and Panel meeting minutes.

Eftec. (2009). Development of Guidelines for Use of Benefits Transfer in Policy and Project Appraisal. Draft guidelines submitted to Defra May 2009

Environment Agency. (2007). The Total External Environmental Costs and Benefits of Agriculture in the UK.

Fera. (2009a). Estimating the quantitative environmental impacts of a package of potential options to recapture the benefits of set-aside. Phase 2: Quantifying benefits and uncertainty: report of expert elicitation workshops.

Fera. (2009b). Quantifying the environmental impacts of the Campaign for the Farmed Environment. Draft report to Defra June 2009

Fera. (2009c). Farmer testing of the introduction of changes to cross-compliance (including ES top-ups). Draft report to Defra May 2009

Foster, V & Mourato, S. (2000). Valuing the Multiple Impacts of Pesticide Use in the UK: A Contingent Ranking Approach. Journal of Agricultural Economics, 51 (1), pp1-21

University of Hertfordshire. (2007). Research into the current and potential climate change mitigation impacts of environmental stewardship. Report to Defra.

Hodge, I. (2009). Review of the NFU/CLA proposal 'Option B – a Campaign for the Farmed Environment'. Final report to Defra June 2009.

IGCB (Accessed 28/05/2009). Air Quality Damage Costs. http://www.defra.gov.uk/environment/airquality/panels/igcb/guidance/damagecosts.htm

IGER. (2006). Benefits and Pollution Swapping: Cross-cutting issues for Catchment Sensitive Farming Policy. Report to Defra.

Jacobsen, JB & Hanley, N. (2009). Are there income effects of global willingness to pay for biodiversity conservation? Environmental and Resource Economics, 43 (2), pp 137-160.

8 ANNEXES

1. Specific Impact tests
2 Estimated Costs Arising from Production Losses of Options for Set Aside Mitigation
3 NE Implementation costs of Option A
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Annex 1

Specific Impact Tests

1 *Competition Assessment*

1.1 The Option A proposal to recapture the environmental benefits of set-aside would apply only to farms with over 20ha of arable land and exclude farms with under a specified number of hectares of arable land, those in the Specially Disadvantaged Areas (SDA), and organic producers. However the proposals apply equally to all farms involved; and therefore will not impact upon competition. Option B would focus on arable farms of all sizes, with a focus on key arable counties, but would not preclude mixed farms, livestock or dairy farms and farms in other counties from taking part in the campaign. As Option B involves no obligation on farmers it is unlikely that farmers would incur any negative effects voluntarily and so there would be no impact upon competition.

1.2 The proposals will not create barriers to setting up new businesses.

2 *Small Firms Impact Test*

2.1 For the purpose of Impact Assessments small firms are classified as those with fewer than 20 employees. Therefore the overwhelming majority of farm business can be classified as small firms; however the proposals apply equally to all and will not disadvantage smaller farms in relation to large ones. The smallest farmers would be excluded from the Option A set-aside requirements as those with under 20 hectares of arable land, those in the SDA and organic producers will be exempt. For those farm businesses that are impacted by Option A, compliance costs will be positively correlated with farm incomes so that high costs will be incurred in years when returns to arable crops, and hence incomes, are also buoyant whereas in years of low incomes, compliance costs will be correspondingly reduced. Given that farmers are also likely to choose their poorest quality land for environmental management, actual production, and income, losses will tend to be below average levels. As Option B involves no obligation on farms it is unlikely that a small firm would voluntarily undergo any negative impacts.

2.2 Further work is underway to assess the impacts on farm businesses.

3 *Legal Aid*

If farmers do not comply with the requirements of the proposed changes to cross compliance their cross compliance payments would be reduced. There would be no penalties involved with the Option B set-aside voluntary approach. The proposals do not create new criminal sanctions or civil penalties therefore there will be no impact on Legal Aid.

4 *Sustainable Development*

The proposals conform to the five principles of sustainable development to which the Government is committed (living within environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly). For example, measures to recapture the environmental benefits of set-aside directly contribute to helping us live within our environmental limits, in particular the Natural Environment PSA. They would be less restrictive than the previous requirements under set-aside, therefore allowing land users greater flexibility to manage their land in accordance with market and societal requirements. There has also been substantial research by both

independent organisations, Defra and agency officials into the proposals, demonstrating the use of sound science.

5 *Carbon Assessment*

5.1 Any change in land use has an impact on the emission of greenhouse gases, and the proposals are likely to result in land use changes. Both Option A and B involve changes in land management which will reduce greenhouse gas emissions. The land management measures with the greatest beneficial impact are those which do not allow any cropping or fertiliser application

5.2 Estimates of the benefits from greenhouse gas savings are included in the evidence section on benefits in this Impact Assessment. Research into the current and potential climate change mitigation impacts of environmental stewardship, by the University of Hertfordshire[32], was used to find the savings from the various environmental management measures, and scaled up to the national level according to estimates of the number of hectares that would be placed in each option. The value of the greenhouse gas savings expected per year under Option A are expected to be £22m-£29m under Alternative 1, and £11m to £18m under Alternative 2. The savings under Option B will depend on the level of uptake or changes to management under the Campaign.

6 *Other Environment*

6.1 The impact on environmental issues (for example, biodiversity, landscape features, and resource protection) is addressed fully in the main text of this Impact Assessment and further in the FERA (formerly CSL) reports: for Option A - CSL (2009) - Phase 1 Report: Estimating the Quantitative Environmental Impacts of a package of potential options to recapture the benefits of set-aside; and FERA (2009) - Phase 2 Report: Estimating the Quantitative Environmental Impacts of a package of potential options to recapture the benefits of set-aside - Quantifying benefits and uncertainty. For Option B – FERA (2009) Quantifying the environmental impacts of the Campaign for the Farmed Environment. The measures to recapture the benefits of set-aside would go some way, depending on farmer uptake of management measures in either Option A or B, to reducing the environmental impacts of removing set-aside as mentioned in the Impact Assessment for the CAP Health Check.

7 *Health Impact Assessment*

We undertook the first screening stage of Department of Health's Health Impact Assessment for the consultation stage Impact Assessment and concluded that there will be no significant impact on health and wellbeing, therefore no further screening is needed.

8 *Race/Disability/Gender Equality*

We undertook the first screening stage of Defra's Equality Impact Assessment for the consultation stage Impact Assessment and concluded that there will be no significant impact on any of the particular groups and apply equally to all involved, therefore no further screening is needed.

9 *Human Rights*

The proposals are consistent with the Human Rights Act 1998.

10 *Rural Proofing*

10.1 The overwhelming majority of those involved in the farming business are based in rural areas and there is no difference in the impact between urban and rural areas, as the proposals apply equally to all involved.

10.2 The impact is further assessed using the rural proofing checklist below:

1 Will the policy affect the availability of public and private services?
Might it encourage closure or centralisation and will this have a disproportionate effect in rural areas where services are already limited?

No.

2 Is the policy to be delivered through existing service outlets, such as schools, banks and GP surgeries?
How will you ensure rural residents can access services in areas where outlets are few and far between?

No.

3 Will the cost of delivery be higher in rural areas where clients are more widely dispersed or economies of scale are harder to achieve?
Will longer travel times or distances to clients add to the cost of service provision?
Will services need to be run out of smaller outlets, so losing economies of scale?

No, the proposals predominately affect rural areas, and there will be no difference in impact between urban and rural areas.

4 Will the policy affect travel needs or the ease and cost of travel?
Will the impact be different in sparsely populated or remote rural areas, where typically journey times are longer, public transport is poor, and travel options are limited or expensive, especially for low income groups?

No.

5 Does the policy rely on communicating information to clients?
How will clients access information in rural areas, where there are fewer (formal) places to obtain advice and information?

The proposals rely on communicating information to clients however this will be through well established existing means, including the paying agencies and other enforcement bodies, farming organisations and consultants. We are aware of the need to inform farmers of the proposals as soon as possible for them to plan for forthcoming years.

6 Is the policy to be delivered by the private sector or through a public-private partnership?
Will the smaller and scattered population in rural areas provide a sufficient market to attract the private sector? Will there be similar opportunities for choice and competition? Does the private sector in rural areas have the capacity to deliver?

Delivery of most of the policy (including Option A set-aside) will be via public sector paying agencies and other enforcement bodies, i.e. Natural England (NE) and the Rural Payments Agency (RPA). If Option B, the voluntary approach, this will be led by industry but would be delivered via well established existing means (eg. farm advisory bodies and the RPA), which are already well equipped and accustomed to delivering in rural areas.

7 Does the policy rely on infrastructure (e.g. broadband ICT, main roads, utilities) for delivery?
How will the policy work in rural areas, where the existing infrastructure is typically weaker (e.g. roads, electricity grid), some infrastructure doesn't exist (e.g. cable TV, mains gas) and upgrading of infrastructure may be difficult or expensive?

No. An element of the Option B industry-led voluntary approach to set-aside would involve a web-based information hub but it is assumed that steps would be taken by the industry to disseminate this advice to those without broadband ICT access.

8 Will the policy impact on rural businesses, including the self-employed? Will it have a different effect on smaller businesses (which employ a greater proportion of the workforce in rural areas) or those sectors which are typically more significant in rural areas - farming and construction? Will the higher proportion of self-employed people in rural areas be affected by the policy (including women running part-time businesses)?

The overwhelming majority of those affected by the policy changes will be small rural businesses. The effects are documented in detail in the main evidence base section of this Impact Assessment and Small Firms Impact Assessment.

9 Will the policy have a particular impact on land-based industries and, therefore, on rural economies and environments?
How will the policy affect the agricultural sector and the mining, extraction and water industries, which have a particular importance in many rural areas? Will there be a knock-on effect on the environment (given that 70% of the land is farmed)? Conversely, if the policy affects the environment, what are the implications for businesses based on natural resources such as tourism, leisure, renewable energy and food production?

The overwhelming majority of those affected by the policy changes will be rural businesses. The proposals are designed to have a beneficial impact on the natural environment and long-term sustainability of the farming sector and a minimal impact on food production.

10 Will the policy affect those on low wages or in part-time or seasonal employment?
For those who work in rural areas, wages tend to be lower on average and a higher proportion of the workforce is engaged in part-time or seasonal employment. Will your proposal affect wage levels or people's access to quality employment? Will it affect the type of businesses that tend to pay low wages or offer seasonal/part-time work (e.g. agriculture, tourism)?

The overwhelming majority of those affected by the proposals will be rural farm businesses and there could be an impact on the incomes of arable farms. However providing farms comply they would receive their cross compliance payments. Further details are considered in the main evidence base of this Impact Assessment.

11 Is the policy to be targeted at the disadvantaged?
How will it target disadvantage in rural areas, which is not usually concentrated in neighbourhoods? Do the indicators to be used for identifying need measure deprivation issues that are particular rural features (e.g. access to services, access to job opportunities, low earnings and housing affordability)?

No.

12 Will the policy rely on local institutions for delivery?

Will the policy be as effective in rural areas, where private, public and voluntary sector organisations tend to be smaller and have less capacity to build partnerships? If funds or services are to be allocated via a bidding process, will small organisations be able to compete fairly?

No

13 Does the policy depend on new buildings or development sites? Where will these be located in rural areas, given that there are few Brownfield sites and fewer locations where housing or other development will be acceptable?

No.

Annex 2
Estimated Costs Arising from Production Losses of Options for Set Aside Mitigation

OPTION A

		Cross compliance options	Cost per Hectare (£)		
			'Low Price' Scenario (2005 margin)	'Average' Scenario (Av 2005/06 to 2008/09(fc) margin)	'High Price' Scenario (2007 margin)
Alternative 1		EM1 Grass buffers alongside temporary and permanent watercourses	250	450	675
		EM2 Reverted arable areas or strips	220	400	600
		EM3 Previously cultivated land rotationally taken out of production	220	400	600
		EM4 Wild bird winter food area	345	525	720
	Alternative 2	EM6 Farmland bird plots in winter cereals	12	15	20
		EM9 Winter stubble (to end Feb)	15	30	40
		EM10 Winter stubble followed by specified crops	15	30	40
		EM 11 Enhanced cereal/oilseed rape winter stubble	20	40	50

Note: Figures are based on Farm Business Survey results for the period 2005/06 to 2008/09 (fc).

OPTION B

	Measure	***Option A Equivalent***	Cost per Hectare (£)		
			'Low Price' Scenario (2005 margin)	'Average' Scenario (Av 2005/06 to 2008/09(fc) margin)	'High Price' Scenario (2007 margin)
1	Grass buffers alongside watercourses	EM1	250	450	675
2	Reverted arable plots	EM2	220	400	600
3	Previously cultivated land	EM3	220	400	600
4	Farmland bird plots	EM6	12	15	20
5	Uncropped cultivated margins	-	260	465	690
6	Soil erosion control headlands or field strips	-	220	400	600
7	Game strips	EM4	345	525	720
8	Conservation headlands	-	310	510	735
9	Sown wildflower headlands	-	400	550	820
10	Sown/managed pollen and nectar headlands	-	410	560	835
11	Wild bird seed patches/headland	-	375	525	800
12	Rotational fallow	EM3	260	465	690
13	Winter stubble (harvest to end of Feb)	EM9	15	30	40
14	Winter stubble	EM10	15	30	40
15	Low input cereal/oilseed rape followed by winter stubble	EM11	20	40	50
16	Reduced nitrogen winter or spring cereal crop	-	30	55	75
18	Reduced seed rate winter or spring cereal crop	-	5	10	15
19	Selective use of spring herbicides	-	0	0	0
20	Nutrient management plan	-	0	0	0
21	Perennial energy crop	-	-	-	-
22	Mixed land use	-	-	-	-

Note: Figures are based on Farm Business Survey results for the period 2005/06 to 2008/09 (fc).

Annex 3

NE Implementation costs of Option A

Introduction

1.1. It is recognised that the implementation of the new cross compliance rules requiring SPS claimants to ensure that a proportion of their land is under environmental management will impact of ES/classic agreement holders. The new cross compliance rules come into force on 1 Jan 2010 but agreement holders have until end November 2010 to ensure that changes on the ground have been made. This is to allow farmers reasonable time to adjust their cropping plans and the expectation is that after harvest in 2010 farmers will have had time to consider and implement what they need to do.

1.2. This implementation timing means that, of the 18,500 Environmental Stewardship agreements potentially affected by Option A, around 40% of these will come up for renewal by the end of November. Therefore, as NE would be renewing these agreements in any event it, cannot be claimed that extra resource is required to implement this rule for those agreements other than additional communication and advice to ensure everyone of them is aware of the potential implications for their agreement.

1.3. The total number of affected ES agreements after 30 November 2010 is 11,390 (of which 926 are ELS/HLS). Of these, around 6,500 contain in-field options on arable land. The number of affected classic (Countryside Stewardship Scheme and Environmentally Sensitive Areas) agreements is 5,332.

1.4. The estimate below is based on a high impact scenario and uses the most up to date processing times, which take into account the efficiencies Incentive Scheme Services (ISS) have already made in processing agreements.

Assumptions

For ES agreements:

- Standard time for amendments 1.3 hours
- Standard time for a renewal 5.5 hours
- Population affected post Nov 2010 = 6500
    - 100% will amend or renew
    - Up to mid 2011 agreement holders will renew early rather than amend, pop 3000
    - The remainder will amend rather than renew, pop 3500.
- Population not affected post Nov 2010 = 4900
    - 20% will amend (take up ELS top-ups), pop 980

For classic agreements:

- Standard time for amendments 2.1 hours
- Population affected post Nov 2010 = 5,300
    - 100% will amend, pop 5300

For both:

- Hours in a standard day 7.4
- 200 days per FTE
- Team Member cost = £25k
- Group Co-ordinator cost = £32k
- Team Leader cost = £40k
- Accommodation overhead £3000 per FTE

Duration

1.5. The above resource calculation assumes the work will be carried out over a full calendar year. This is not going to be the case. The cut off date of 30 November 2010 is going to bring forward

work much of this work into a very small window where the workload is already greatly increased and therefore the staff numbers needed will be greater than estimated above. To take account of this a factor of an additional fifth (x1.2) has been applied.

Training

1.6. Based on current training for use of computer system, scheme knowledge and induction into NE = 4 days per FTE.

Advice and Communications

1.7. Local Team Member advice to HLS agreement holders
c.500 affected HLS agreements with arable options x 0.5 day

1.8. Expanded ELS communications, advice and promotion programme
This will ensure all ELS agreement holders and affected classic scheme agreement holders are informed of the implications of Option A for their agreement and invited to additional local events to help them reach decisions on whether to amend or renew their agreements. Follow up advice contacts are also assumed for an additional 1500 advice contacts specifically for Option A.

2010 implementation

ES Affected	Process	Numbers	FTE	Overhead	Cost
	Renew	3000	11.15		
	Amend	3500	3.07		
Total		6500	14.22	1 GC + accom	£430500
ES not affected					
	Amend	980	0.86	3000	£24500
Classics					
CSS	Amend	4600	6.53	27590	£190840
ESA	Amend	750	1.06	11180	£37680
SUB TOTAL		12830	22.67		£683520
Duration factor (x0.2)					£136704
Training					£11335
Local Team input (HLS)		500	1.3		£36,400
Expanded ELS advice programme	55 local events Mailshot to all	1500			£300,000
TOTAL					£1,167,959

Annex 4
NE Implementation costs of Option B

1.1 The Campaign for the Farmed Environment would encourage participation in Environmental Stewardship (and other voluntary measures) to re-capture the benefits of set-aside. This industry-led initiative proposes significant resource input from those organisations, including Natural England, with close contact with the farming sector to deliver environmental management.

1.2 It would support an agri-environment uptake target of 70% of the Utilisable Agricultural Area (UAA) and 90% rate of renewal for expiring ES agreements, the first of which is within Natural England's existing Corporate Plan target. If land managers respond to the CFE by either entering ES as a new participant, or by renewing their existing agreement when it expires, both of these elements would be accommodated within Natural England's existing business plans.

1.3 Additional costs incurred by Natural England associated with Option B would most likely revolve around servicing amendment requests to existing agreements (to help meet any targets set at County level) and provision of additional advice services to support the Campaign.

1.4 Natural England has not yet received a clearly defined or quantifiable advice contribution request from the NFU/CLA. Therefore it is not possible at present to provide detailed estimates for this element. To offer a comparison, if a separate advice programme was delivered which was similar in scope and scale to the NVZ campaign delivered through the England Catchment Sensitive Farming Delivery Initiative in 2008, this could cost around £800,000. This campaign delivered over 10,000 advice contacts through 80 half day workshops.

1.5 If the uptake of particular options within ES (i.e. the in-field arable options which benefit farmland birds, other wildlife and resource protection) is promoted at a local level, existing agreement holders may wish to increase their contribution to the CFE's outcomes by changing the balance of options within their agreement. It is assumed that agreements expiring in 2010 or 2011 would make these changes on renewal, at no additional processing cost for Natural England. But land managers whose agreements expire in 2012 or later may wish to request an amendment to their agreement to implement the changes sooner. In providing the following cost estimate Natural England has assumed an high impact scenario and used the broad assumptions that the CFE would target a similar population to Option A (i.e. holdings with over 20ha liable land) and farmers would be guided towards having a minimum proportion of their cultivated land in suitable options.

1.6 Assumptions:

- Only ES agreements due to expire in 2012 or later may respond to the Campaign by requesting an amendment in 2010, pop 4500.
- Only agreements with less than the target % of land in arable options will request any changes, pop 2700 (at 3% target)

Scheme	Process	Numbers	FTE	Overhead	Cost
ES	**Amend**	**2700**	**2.37**	**15110**	**£74360**

Implementation of regulatory backstop in 2013

1.7 The following are initial estimates based on the best data and assumptions currently available. Implementation in 2013 will incur additional cost but Natural England would need to revisit this area by the end of 2011 to check assumptions. In 2013 we are heading to a new Rural Development Programme, as yet undefined, and this is likely to influence behaviour of customers i.e. whether they amend or renew, which makes a big difference in the resource required.

1.8 Assumptions

- A regulatory backstop of Option A will be invoked if Option B fails; earliest implementation date is January 2013 following 2 clear cropping years.

- Population affected estimated at 20000 (most agreements renewed 2010-2012) – 20,000 will amend
- Up to mid 2014 agreement holders will renew early rather than amend pop 2000

Training

1.9 Based on current training for use of computer system, scheme knowledge and induction into NE = 4 days per FTE.

Advice and Communications

1.10 Local Team Member advice to HLS agreement holders
c.1500 affected HLS agreements with arable options x 0.5 day

1.11 Expanded ELS communications, advice and promotion programme
This will ensure all ELS agreement holders and affected classic scheme agreement holders are informed of the implications of Option A for their agreement and invited to additional local events to help them reach decisions on whether to amend or renew their agreements. Follow up advice contacts are also assumed for an additional 1500 advice contacts specifically for Option A.

Scenario	Process	Numbers	FTE	Overhead	Cost
	Renew	**2000**	**7.4**		
	Amend	**20000**	**17.57**		
SubTotal		**22000**	**24.97**	**2 GC + accom**	**£763250**
Training					**£24,485**
Local Team input (HLS)		**1500**	**3.75**		**£105,000**
Expanded ELS advice programme	**55 local events** **Mailshot to all**	**1500**			**£300,000**
TOTAL					**£1,192,735**

Annex 5
Explanation of quantification of benefits methodology

Quantification of farmland bird and water quality benefits by Fera (2009)

1. Phase 2 of the Fera work was carried out by expert elicitation. Elicitation involves translating someone's beliefs about some uncertain quantities into a probability distribution. For this work, two workshops were held, one with seven experts on farmland birds and the other with six experts on water quality. The experts were asked to make judgements for the relevant metrics in order to estimate the quantities and uncertainty of outcomes for various scenarios.

2. Six scenarios of Option A were devised. These were chosen to cover the variables: A1 or A2, percentage requirement (4%, 5% or 6%), the uptake pattern of EM options and the use of top-ups. It was not possible to consider every possible combination of these factors so the six chosen scenarios aim to represent the likely realities of implementation. It also had to be assumed that EM options remained in the same locations year-on-year, which might not happen in reality. These scenarios were based on a model farm of 200ha, which already had 1% uncropped and 1700 ELS points from arable infield options. This base case farm was chosen to be representative of the national arable landscape, though it is acknowledged that this is a simplification. Simplification was required in order for the experts to be able to envisage the changes to environmental goods. Full details of the base case model farm and the scenarios applied to it can be found in Appendix 1 of Fera (2009).

3. The experts' results gave probability distributions for the environmental changes. In comparing each of the scenarios, the median probability was used. For monetising the changes, a range was used to account for the uncertainty. For farmland birds, the 25th percentile and median probability of reversing decline were used as these represent a worst case, and most likely scenario. For water quality, the median and 75th percentile probability percentage reduction in pollutants were used, again as a most likely and worst case scenario.

Annex 6
Monetisation of farmland bird benefits

1. From Foster and Mourato (2000) the willingness to pay per household per year to avoid the loss of one declining species of farmland bird can be found. The research was carried out in 1996 but the results were given in 1998 prices, so were adjusted for inflation using the GDP deflator (giving WTP_{96}). This gives £17.54 per household, per species, in 2009 prices. This was then adjusted for economic growth between 1996 and 2009, using the formula[33]:

$WTP_{09} = WTP_{96}$ x (average income 2009 / average income 1996)^e
where
WTP_{09} is the willingness to pay in 2009
WTP_{96} is the willingness to pay in 1996 in 2009 prices (the study was carried out in 1996)
e = income elasticity of willingness to pay.
The value of e was not known, so a sensitivity analysis was carried out by using 0.5 and 1.2, as suggested by various literature.[34]

2. This willingness to pay was taken from a sample to represent the national average, so it was multiplied by the number of households in England (21,515,000 as at 2006) to give the national willingness to pay. This gives approximately £500m per species at an income elasticity of 0.5, and £800m with an income elasticity of 1.2. Multiplying this national value by the probability of reversing decline for each species then gave the expected benefit of farmland bird increases. Table 6.1 below gives the shift in median judgement for the probability of reversal of decline of each species, in comparison with the baseline. Table 6.2 shows the expected benefit of these shifts using an income elasticity of willingness to pay of 1.2. This gives a best case benefit. Separately a worst case benefit was found by using the 25th percentile shift in judgement and a lower income elasticity of 0.5.

3. Caution needs to be taken when using values from benefits transfer for policy decisions. The context of the study good (farmland birds in 1996) is slightly different to the context today. In 1996 there were nine species in decline, although they were not the same as the 12 species in decline today. In addition, it is not clear exactly what respondents' willingness to pay included, for example a valuation of the underlying environmental benefits that farmland birds represent.

4. Foster and Mourato used two models to find the willingness to pay, the 'Ranks Data' (RD) model and the 'Most Preferred Alternative' (MPA) model. Using a linear index, the MPA model found a constant WTP, which was very close to the slightly increasing marginal WTP using a piecewise linear index. The RD model

[33] Eftec. (2009). Development of Guidelines for Use of Benefits Transfer in Policy and Project Appraisal. Draft guidelines submitted to Defra May 2009.
[34] Defra Academic Panel October 2007, and Jacobsen, JB & Hanley, N. (2009). Are there income effects of global willingness to pay for biodiversity conservation? Environmental and Resource Economics, 43 (2), pp 137-160.

produced a higher constant WTP using the linear index, and a sharply declining marginal WTP using the piecewise linear index. An increasing or decreasing marginal WTP could not be used in this Impact Assessment as a judgement would have to be made as to what order to consider the seven species, meaning a linear index result must be used. The MPA result was chosen as it shows more consistency, was a more conservative estimate, and was felt most valid by the authors (page 7).

Table 6.1 – The shift from the basecase in the median judgements for probability (0-1) of reversing decline of seven farmland bird species

Scenario		Species						
		Skylark	Yellowhammer	Grey partridge	Corn bunting	Lapwing	Turtle dove	Kestrel
Scenario 1	Alt 1 4%	0.02	0.05	0.03	0.04	0.01	0	0.2
Scenario 2	Alt 1 5%	0.02	0.05	0.03	0.04	0.01	0	0.3
scenario 3	Alt 1 5% + top-ups	0.02	0.03	0.03	0.03	0.01	0	0.25
Scenario 4	Alt 2 5% A	0.09	0.05	0.04	0.04	0.01	0.01	0.15
Scenario 5	Alt 2 5% B	0.09	0.03	0.03	0.03	0.01	0.01	0.05
Scenario 6	Alt 2 6% + top-ups	0.19	0.18	0.09	0.14	0.05	0.01	0.2

Table 6.2 – Annual expected benefit (£) of the impact on seven farmland bird species, using an income elasticity of willingness to pay of 1.2

Scenario		Skylark	Yellowhammer	Grey partridge	Corn bunting	Lapwing	Turtle dove	Kestrel	Total
Scenario 1	Alt 1 4%	15,622,684	39,056,710	23,434,026	31,245,368	7,811,342	-	156,226,840	£ 273,396,970
Scenario 2	Alt 1 5%	15,622,684	39,056,710	23,434,026	31,245,368	7,811,342	-	234,340,260	£ 351,510,390
scenario 3	Alt 1 5% + top-ups	15,622,684	23,434,026	23,434,026	23,434,026	7,811,342	-	195,283,550	£ 289,019,654
Scenario 4	Alt 2 5% A	70,302,078	39,056,710	31,245,368	31,245,368	7,811,342	7,811,342	117,170,130	£ 304,642,338
Scenario 5	Alt 2 5% B	70,302,078	23,434,026	23,434,026	23,434,026	7,811,342	7,811,342	39,056,710	£ 195,283,550
Scenario 6	Alt 2 6% + top-ups	148,415,498	140,604,156	70,302,078	109,358,788	39,056,710	7,811,342	156,226,840	£ 671,775,412

Annex 7
Monetisation of water quality benefits

1. Values for the pollutants were taken from two studies, 'Benefits and Pollution Swapping: Cross-cutting issues for catchment sensitive farming policy' (IGER 2006) and 'The Total External Environmental Costs and Benefits of Agriculture in the UK' (EA 2007). These were then converted into 2009 prices using the GDP deflator.

2. In general, the reports were compared and very often used the same figures to estimate the cost of water pollution from agriculture on the English public. (EA 2007's figures were for England and Wales only). Where they used different figures, a range has been used to cover both papers' conclusions. The allocation of these costs between each pollutant (N, P, sediment and FIOs) was assumed to follow the breakdown used in IGER (2006). These values are below in Table 7.1.

3. There is considerable uncertainty surrounding some of these figures. The EA and IGER reports use a wide range of literature, and for this reason there is sometimes ambiguity as to what aspects (costs/benefits) the primary studies included. It is unclear where there may be double counting which would cause an overestimate to be given. For example, a willingness to pay study focussing on improving water quality may appear to cover the recreational value, but implicitly people may respond considering the benefits to ecosystems and biodiversity, fishing and reduced eutrophication also.

4. The average cost per tonne of each pollutant was found by dividing the total cost by the total baseline losses35. This means there is an assumption of a linear relationship between reducing pollutant losses and the reduced costs to society. This average cost was then applied to the reduction of pollutants as found from the Fera (2009) study. This is demonstrated in Table 7.2.

5. To account for the uncertainty, the range of total water quality benefits used a worst case and best case scenario. The worst case consisted of the lower bound pollutant value and the 75th percentile reduction judgement. The best case consisted of the upper bound pollutant value and the median reduction judgement.

[35] See page 3 of IGER (2006)

Reason for cost	Contribution from agriculture of water quality costs (£m)		Break down of cause %				Value of each cause (£m) Lower bound				Value of each cause (£m) Upper bound			
	Lower bound	Upper bound	N	P	FIO	sed	N	P	FIO	sed	N	P	FIO	sed
Water treatment costs	15	163	100	0	0	0	15	-	-	-	163	-	-	-
Amenity river quality	11	40	10	40	10	40	1	4	1	4	4	16	4	16
Fishing	15	40	10	10	0	80	2	2	-	12	4	4	-	32
Freshwater eutrophication ie in lakes	22	348	10	70	0	20	2	15	-	4	35	243	-	70
Bathing water quality	25	46	0	0	100	0	-	-	25	-	-	-	46	-
Ecosystems, habitats and biodiversity – rivers	202	546	20	40	0	40	40	81	-	81	109	218	-	218
Ecosystems, habitats and biodiversity – wetlands	14	45	20	40	0	40	3	6	-	6	9	18	-	18
Total value	**306**	**1228**					**64**	**108**	**27**	**108**	**324**	**500**	**50**	**354**
Total losses from agriculture (kt)							250	10.64		1490	250	10.64		1490
Average cost (£m) per kt from agriculture							**0.25**	**10.15**		**0.07**	**1.30**	**46.95**		**0.24**

Table 7.1 – Total costs to water quality from agriculture, allocation of causes amongst pollutants nitrate, phosphorus, faecal indicator organisms and sediment; and lower and upper bound values of total pollutant from agriculture in England.

Table 7.2 – Percentage reductions, absolute reductions, and expected benefits of those reductions for pollutants nitrogen, phosphorus and sediment, using the judgement for median reductions

Scenario		Median % reduction from baseline			Absolute reduction from baseline (kt)			Lower bound expected benefit (£m)			Upper bound expected benefit (£m)		
		Nitrogen	Phosphorus	Sediment	N	P	Sed	N	P	Sed	N	P	Sed
1	Alt 1 4%	-17	-23	-26	-27	-1	-232	-7	-13	-17	-35	-61	-55
2	Alt 1 5%	-24	-31	-36	-38	-2	-321	-10	-18	-23	-49	-82	-76
3	Alt 1 5% + top-ups	-22	-31	-35	-35	-2	-312	-9	-18	-23	-45	-82	-74
4	Alt 2 5% A	-14	-22	-28	-22	-1	-249	-6	-13	-18	-29	-58	-59
5	Alt 2 5% B	-8	-11	-14	-13	-1	-125	-3	-6	-9	-16	-29	-30
6	Alt 2 6% + top-ups	-18	-27	-35	-28	-2	-312	-7	-15	-23	-37	-72	-74

Annex 8
Valuation of greenhouse gas and ammonia benefits

1. This Impact Assessment is only concerned with the value of benefits from the additional land in EM options. The total additional areas expected to go into each option were calculated using the total additional area, and the expected uptake pattern. This is shown in Table 8.1.

2. A study by the University of Hertfordshire gave greenhouse gas savings in tonnes of carbon dioxide equivalent per hectare per year, for Environmental Stewardship options, against a baseline of winter wheat. The EM options in Option A were matched with the most similar ELS option. The saving per hectare was then multiplied by the total number of hectares to give total annual savings (see Table 8.2).

3. The annual savings of CO_2-e were then multiplied by the shadow price of carbon (SPC) for the relevant year (years 2011, 2012 and 2013) to find the annual monetary benefit. For example, if Alt 1 at 4% gives 756,646 tonnes of CO_2-e savings in 2011, and the SPC for 2011 is £28.15 per tonne, then the benefit in 2011 will be:

   Benefit = 756,646t x £28.15 = £28,333,841
   These figures were then rounded to avoid spurious accuracy.

4. For ammonia, researchers at North Wyke provided figures for the ammonia emissions per hectare of cereal land and oilseed rape land. These emissions only account for those from fertiliser application:
   Cereal land = 4.56 kg NH_3 /ha
   Oilseed land = 6.70 kg NH_3 /ha

5. Assuming the rotation used throughout the Impact assessment of 3 years winter cereal to one year oilseed, the average emissions due to fertiliser on cropped land are 5.1 kg/ha.

6. This saving of 5.1 kg/ha was then applied to the hectares of EM options which do not allow fertiliser application (EM1, EM2, and EM3). By multiplying these together and summing the products, the result is an annual reduction in ammonia. This annual reduction is then multiplied by the cost of ammonia (according to the Interdepartmental Group on Costs and Benefits) to give annual monetary savings. This is shown below in Table 8.3.

Table 8.3 – The derivation of benefits from reductions in ammonia release from land in EMs 1 to 3.

		Alt 1 4%	Alt 1 5%	Alt 2 5%		Alt 2 6%	
Total area of EMs 1-3 (ha)		73,350	97,560	35,520	43,360	41,130	54,840
Total reduction in NH3 (tonnes)[i]		374	498	166	221	210	280
Value of decrease (£)[ii]	Low	628,463	835,894	278,631	371,508	352,402	469,869
	High	915,760	1,218,017	406,006	541,341	513,500	684,666

i Found by multiplying the total area (ha) by 5.1 kg/ha
ii Low value for NH_3 = £1680 per tonne, High value for NH_3 = £2448 per tonne.

Table 8.1 – Total hectares placed into Environmental Management options under Option A, at different requirement percentages

				ha at 4%	ha at 5%			ha at 6%	
	Alt 1	Alt 2 A	Alt 2 B	Alt 1	Alt 1	Alt 2 A	Alt 2 B	Alt 2 A	Alt 2 B
EM1	20%	15%	20%	16300	21680	16260	21680	20565	27420
EM2	50%	15%	20%	40750	54200	16260	21680	20565	27420
EM3	20%	0%	0%	16300	21680	0	0	0	0
EM4	10%	0%	0%	8150	10840	0	0	0	0
EM6		10%	10%			10840	10840	13710	13710
EM9-11		60%	50%			65040	54200	82260	68550
Total	**100%**	**100%**	**100%**	**81500**	**108400**	**108400**	**108400**	**137100**	**137100**

Table 8.2 – Greenhouse gas savings under Option A, at different percentage requirements

EM option	ES equivalent	GHG savings (t CO2e /ha /year)	GHG savings (t CO2e /yr)					
			Alt 1 4%	Alt 1 5%	Alt 2 5%		Alt 2 6%	
EM1	EE3	17.54	285,902	380,267	285,200	380,267	360,710	480,947
EM2	ED2	4.14	168,705	224,388	67,316	89,755	85,139	113,519
EM3	EE3	17.54	285,902	380,267	-	-	-	-
EM4	EF2	1.98	16,137	21,463	-	-	-	-
EM6	EF8	0.01			108	108	137	137
EM9-11	EF6	0.55			35,772	29,810	45,243	37,703
Total			**756,646**	**1,006,386**	**388,397**	**499,941**	**491,229**	**632,305**

Annex 9
Calculation of greenhouse gas and ammonia benefits under Option B

1. The level of uptake of voluntary measures is unknown. Thus, benefits were calculated for five different area levels:
   102,500ha
   142,500ha
   205,000ha
   240,000ha
   285,000ha

It was then assumed, as for Option A, that 175,000ha would be left uncropped anyway in the absence of Option B. As this IA is concerned with only the additional impacts of the options, the additional land area over and above 175,000ha was assumed to be the result of Option B, to which the voluntary measures would be applied. For 102.5kha and 142.5kha, this would mean a decrease in uncropped land area. This would likely be due to high crop prices and a failure of the CFE to stimulate maintained environmental management, but not a result of the Campaign itself. Thus for these areas it is assumed that there are zero benefits.

2. The additional area of uncropped[36] land was thus assumed to be split into the 20 voluntary measures (V20 was excluded as this may be used everywhere) according to the relative popularity of the measures, as given by the farmer testing (Table 31 of Fera 2009c). The total percentage of farmers who said they would increase or take up a voluntary measure was then converted into a percentage according to the ratio of all the measures. This is shown in Table 9.1 below.

Table 9.1 – Derivation of the percentage of land devoted to voluntary measures

	% that are already doing and would increase	% that are not already doing but would consider taking up	Total % that will increase or take up	Uptake as % of area
V1	24	32	56	8%
V2	29	36	65	9%
V3	5	34	39	6%
V4	10	42	52	7%
V5	5	31	36	5%
V6	7	8	15	2%
V7	34	15	49	7%
V8	8	10	18	3%
V9	7	32	39	6%
V10	5	31	36	5%
V11	10	37	47	7%
V12	8	19	27	4%
V13	7	32	39	6%
V14	15	29	44	6%
V15	3	8	11	2%
V16	2	16	18	3%
V17	0	8	8	1%
V18	8	25	33	5%

[36] Though this is assumed to include the cropping measures such as winter stubbles and reduced seed rate

V19	14	14	28	4%
V20			0	0%
V21	3	7	10	1%
V22	29	5	34	5%
All measures	233	471	704	100%

3. As with Option A, the voluntary measures were linked to the most similar ELS options, to use the greenhouse gas savings as given in the University of Hertfordshire report. These are matched below:

V option	ES equivalent	V option	ES equivalent	V option	ES equivalent
1	EE3	8	EF9	15	EF6
2	ED2	9	EE3	16	n/a
3	EE3	10	EF4	18	EG1
4	EF8	11	EF2	19	EF9
5	EF11	12	EF11	20	EM2
6	EE3	13	EF6	21	n/a
7	EF2	14	EF6	22	EG2

4. The CO2 equivalent savings per hectare of each voluntary measure against a baseline of winter wheat were then multiplied by the number of hectares of each option to give the total annual savings. The shadow price of carbon for the relevant year was then applied to give a monetary value of the savings.

5. The ammonia savings due to reduction in fertiliser use were calculated using the same method as for Option A, applying to voluntary measures 1 to 3.

Annex 10
Buffer Strip Options Evaluated in Consultation Stage IA

6m wide uncultivated buffer strips on cultivated arable land

Description

1. This option would require farmers with arable land to leave an uncultivated strip 6 metres wide alongside the top of the bank of water courses or to leave the area 7 metres from the centre of the watercourse uncultivated if this distance is greater. This requirement could be partially additional to any requirement for land in Environmental Management and farmers would not be eligible to receive agri-environment payments for buffer strips on this land.

2. The merits and costs of using 6 metre mandatory buffer strips have been investigated. This width was selected for investigation because it represents a typical machinery width. Strips of 3 metres were also considered at the policy formulation stage, however these were rejected on the basis of the evidence that the optimum width for reducing particulate phosphorous transfer is 5-12 metres (Syversen, 1995) and the recommendations of the authors of the report by ADAS in Annex B1 of the consultation stage IA.

Baseline

See section 3.

Benefits

3. The range of benefits expected from vegetated buffer strips next to watercourses has been summarised in the review at Annex B1 of the Consultation stage IA and in Table B2. The greatest benefits are expected on land with light soils between 2 and 7 degrees and land with medium and chalky soils between 3 and 7 degrees provided the land is not under-drained.

4. Data from analysis carried out by the Environment Agency indicates that under this approach roughly 75% of buffer strips would be on arable land which falls outside soil and slope categories where buffer strips next to watercourses could be used most effectively to prevent water pollution. Approximately 55% of arable and grassland is under-drained, this is predominantly on heavy soils.

5. A quantified assessment of the benefits of this option was estimated in the consultation stage impact assessment although this did not consider the benefits provided by buffer strips in agri-environment schemes which are likely to be substantial if they are correctly located in the landscape.

Costs

6. This option would incur an additional £35.49m from lost income resulting from an uncultivated 6m buffer strip (see Table 1). The data used in this table has been derived from the CEH land cover survey 2000 which is based on watercourses visible on 1:50,000 Ordnance Survey maps. This was subsequently scaled up to reflect the actual area of watercourses mapped on the detailed river network. This requirement would relate only to arable land. Costs of this option have been calculated using the average costs supplied for the riparian buffer strips option for Option A land (£450/ ha) see Annex 2.

Table 1: Costs to farmers of implementing blanket 6m buffer strip requirement

Buffer Width	Buffer Area Requirement (ha)	Additional Area requirement (ha)	Average Cost per Hectare (£)[a]	Total cost (£)
1	15823.53	n/a	450	n/a
6	94692.16	78868.63	450	£35.49m

[a]Figure based on average costs of riparian buffer strips

7. Under this option administrative costs and costs due to loss of income could be incurred by farmers who have existing agri-environment options on this land. 18,842 agreements (10,604 ELS) include at least one margin option and since agri-environment payments are calculated on the average costs of income foregone some farmers would incur additional costs. Farmers with agri-environment options on the land affected by this mandatory requirement would need to re-negotiate those agreements, find alternative options to retain their agreement and would no longer be paid for the loss of income from these strips under their agreements.

8. Costs would vary greatly between farming businesses; those with few watercourses would experience few costs. Further analysis would be required to determine the range of costs on a per business basis.

9. A blanket mandatory requirement through an amended cross compliance standard would incur set-up costs for the RPA in terms of new paperwork and IT, however the RPA has estimated that these changes could be incorporated with no additional cost. There would be costs to Natural England associated with re-negotiating existing agri-environment agreements with options on land affected by this requirement.

A mandatory approach to siting 6m wide uncultivated buffer strips in targeted locations on arable land

Description

10. This option would require SPS claimants to site 6 metre buffer strips along all watercourses next to arable land where buffer strips are likely to effectively mitigate water pollution resulting from run-off according to an assessment of soil type and slope near watercourses. Farmers with affected land would not be eligible to receive agri-environment payments for buffer strips on this land.

Baseline

11. The baseline for this option is as described in Section 3.

Benefits

12. The benefits of this approach would be the same as those described if all farmers were to adopt buffer strips targeted to the most suitable locations under the preferred approach (see Section 3).

Costs

13. The costs associated with this mandatory measure would be additional to those outlined in the analysis of options to recapture the environmental benefits of set-aside. If targeting of buffer strips was made a compulsory requirement costs relating to loss of income associated with positioning 6m buffer strips near water courses on undrained land with medium and calcareous soils with a slope of 3 to 7 degrees and land with a slope of 2-7 degrees on light soils in gradient is estimated to be £8.87m (see Table 2).

Table 2: Compliance costs and areas envisaged for compulsory targeting approach

Estimated area of 6m buffer (ha) 3-7 degrees (heavy, light, medium and calcareous soil)[a]	Area of 1m buffer (ha) 3-7 degrees (heavy, light, medium and calcareous soil)	Additional Area Required (ha)	Cost per Hectare (£)[b]	Additional Cost (£)
23,700	3,960	19,700	450	8,865,000

[a] The report at Annex B1 of the consultation stage IA shows that approximately 45% of arable and temporary grassland is not under-drained, however it is not possible to establish the drainage status of proportion of land on which the buffer strips requirement would apply. For the purposes of this analysis it has been assumed that none of this land is under-drained.

[b] Figure based on average costs of riparian buffer strips (EM1)

14. A compulsory targeting approach would take longer for farmers to assess (our initial estimate is that this would be a one-off task taking roughly 35 minutes per field. The estimated costs associated with this task are outlined in Table 3. Farmers would need to carry out a field visit to assess the field slope to be sure that they were not in breach of the requirement and to mark the slope and soil type on a map. It is likely that farmers will be able to access slope maps online so this task may be less time consuming than indicated.

Table 3: Costs associated with a compulsory targeting approach through a revised Soil Protection Review

	Number of Arable farms	Average cost/farm £'s	total cost to farmers (000's)	Annual cost Y/N
Designate individual field risk	116,000	96.7	11,218	N

Assess options to address risk	116,000	19.3	2,239	N
Complete farm risk map (60% BAU)	116,000	9.7	1,120	N
Total		**125.7**	**14,577**	**N**

15. Farmers who have agri-environment agreements (roughly 60% of SPS claimants) will already have a map specifying many of the features required and this has been taken into account when calculating the cost of a compulsory approach to targeting.

16. Under this option administrative costs and loss of income could be incurred by farmers who have existing agri-environment options on land affected by the new requirement. Aggregate loss of income would be small relative to those incurred under a blanket requirement for mandatory 6m buffer strips nest to watercourses (around 25% based on the area of land in buffer strips under the 2 approaches). There may also be some costs associated with loss of income from agri-environment schemes since payments for measures are calculated on the average costs of income foregone and replacement options may be more expensive for some farmers. Costs would vary greatly between farming businesses; those with few watercourses or flat land would experience few costs.

17. A compulsory targeting approach through a revised Soil Protection Review would also present substantial costs to the Rural Payments Agency. Under this option the SPR would be similar to the "Consultation SPR" referred to in the RPAs impact. Full costs for implementing this option have not been established but the RPA has indicated that each farming inspection would take around 155% longer resulting in an additional annual cost of £703k for inspection. The RPA has estimated that farmers would be likely to have a breach rate of between 10-25% if this requirement was to be employed as laid out above compared to a figure of less than 5% for the existing GAEC 1 standard. Other costs to the RPA include substantial training on inspecting the requirement, equipment to measure slope, project management, IT and reporting system changes which have been estimated at £456k. Natural England would also incur some costs in renegotiating agri-environment agreements.

Annex 11
Amendments to the Soil Protection Review, costs and benefits of current regime.

Costs of Current Measures

On the Farmer
Time taken reading the SPR and Guidance
One-off cost of £3.6 million (based on 110,000 farmers in receipt of Single Farm Payment taking average of 2 hours to read and understand guidance @£16.23 per hour= £3.6 million.) plus an additional 1 hour each year to complete the SPR which amounts to £1.8m.

Taking soil protection measures on land, emerging results from an evaluation of cross compliance measures being conducted by ADAS indicate an average of £2,843 for those farmers who incurred costs in making changes to meet cross compliance conditions relating to soil protection. However, this figure is affected by a relatively small number of farmers reporting extreme values. The median figure is much lower at less than £500 and this has been used as a better indicator of typical cost levels. Of the sample of 300 farmers questioned by ADAS in 2008 only 32% made changes as the result of the SPR and for 35% of these there were no cost changes: thus the £500 figure relates only to around the 21% of all farmers, giving an average cost per farm of around £100 or some £11½m across all farms.

Additionally, around 22% of those farms making changes reported a drop in revenue with a median value of around £750. This is roughly equivalent to £55 per farm across all farms or £6m in aggregate. Savings averaging around £55 were reported by around a quarter of farms that made changes but this is equivalent only to around £5 across all farms or £½m in total. Thus the total cost of complying with the current standards – admittedly based on preliminary results from a relatively small sample – is likely to be of the order of £17m a year. However, it should be noted that the majority of farmers reported that compliance either required them to make no changes or that any changes had little or no effect on their costs. .

Dealing with waterlogged soil – There is a potential cost to farmers from having to apply for exemptions, for example, to use vehicles to harvest land and to wait for a decision on permission. However, this application cost is a trivial amount as there have only been 10 applications for individual derogations, only one of which was granted, since cross compliance was introduced in 2005. Estimating the cost at 2 hours of the farmers' time per application the figure would be insignificant at less than £400 in aggregate – below £100 per year on average. However, there will be additional costs arising from losses caused by delayed harvests. There were few individual applications as the general derogations apply to all.

On the Government
RPA inspections: RPA visits 1% of farms and checks the SPR and makes a visual inspection of land. The effort required to complete cross compliance inspections will increase.

The current average total inspection time for cross compliance is 23.82 hrs in total and an average of 8.08 hours is spent on the holding. These figures are taken from 2008 statistics.

Because RPA Inspectors check all of the SMRs and GAECs as they inspect the farm, records are not kept on how much time is spent on individual SMRs or GAECs. Therefore separate figures are not available for the actual time spent inspecting GAECs 1 to 4 which are the most relevant to this analysis. However, RPA Inspectorate estimate that reviewing and inspecting the revised SPR could increase the overall inspection time by approximately 60 minutes. This will lead to approximately £70,000 increase in inspection costs per annum.

Administrative costs per derogation for GAEC 3, Waterlogged Soil is estimated at approximately £1,000.

Benefits of Existing Regimes

The current regime is delivering accepted but as yet unquantified benefits on reduction of erosion, compaction and carbon depletion, by providing a planning tool and structured advice. This formalises awareness of the need for soil protection, the need to plan to address it, and for appropriate action to be taken.