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Consultation on proposals for managing the coexistence of GM, conventional and organic crops

July 2006

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EXECUTIVE SUMMARY

1. Under European Union (EU) legislation, a GM crop can only be approved for commercial use if a specific risk assessment confirms that it is safe for human health and the environment. No commercial GM cultivation is expected in the UK for several years, but if authorised GM crops are grown here in due course this may result in non-GM crops having a small GM presence (e.g. through cross-pollination or the dispersal of GM seed). To facilitate choice between conventional, organic and GM crops, 'coexistence' measures will be needed to minimise unwanted mixing of GM and non-GM material. From a regulatory standpoint, the key benchmark for distinguishing GM and non-GM produce is the 0.9% threshold for adventitious GM presence adopted by the EU (products with a presence above this level must be labelled and sold as 'GM'). In this paper Defra is seeking comments on a proposed coexistence regime for England that would aim to minimise any unwanted GM presence in non-GM crops so that it is below 0.9%.
2. A full explanation of the technical background and rationale for Defra's proposals is given in the consultation paper. In summary, the main elements are:
 - the proposals relate to managing coexistence between farms and between ordinary crops (*not* certified seed production); and they focus on the specific coexistence measures needed for crops of maize, beet, potato and oilseed rape
 - farmers growing GM maize or oilseed rape crops would be required to:
 - observe a separation distance in relation to any crops of the same species grown by neighbouring producers, where these crops are intended for sale as non-GM or organic; and
 - notify their intention to sow a GM crop to neighbouring producers, if neighbouring land falls within the relevant separation distance
 - these key measures would be specified in a statutory instrument made under section 2(2) of the European Communities Act 1972
 - other desirable but less significant measures would be set out in a voluntary (non-statutory) code of practice. This code would be agreed between Defra and the industry, with Defra consulting all stakeholders on its proposed content.
 - these non-statutory measures would cover the control of 'volunteers' (including weed beet and potato groundkeepers), the control of beet 'bolters', and the cleaning of combine harvesters used on GM oilseed rape crops before they are used on non-GM farms

3. Defra proposes to monitor the effectiveness of the coexistence regime (both statutory and non-statutory elements) and review it in consultation with stakeholders after an introductory period of about 2-3 years. Compliance with the statutory measures would be checked and enforced via Defra on-farm inspections.
4. A draft 'Regulatory Impact Assessment' is included with the paper for stakeholder comment. This compares options for achieving the policy objective and analyses the potential costs and benefits, including the burden on farmers.
5. In addition to the proposed coexistence regime, the consultation paper also covers the following related issues:
 - whether a threshold for GM presence below 0.9% or stricter process-based standard should apply specifically for coexistence between GM and organic crops; in particular, it looks at the likely practical constraints of operating against a 0.1% (limit of detection) threshold, and the alternative of a threshold/standard somewhere between 0.1% and 0.9%.
 - possible options for redressing any financial losses that non-GM farmers might face, if their crops have a GM presence above the EU 0.9% threshold through no fault of their own; this discusses the possibility of leaving claims for redress to be resolved under existing law, having an industry-led (voluntary) redress mechanism, or establishing a statutory redress scheme.
 - the pros and cons of establishing a detailed public register giving the precise location of all commercial GM crops
 - possible guidance to farmers who may be interested in establishing a voluntary 'GM-free' zone
6. Where relevant, Defra has indicated its current thinking on the desirability or otherwise of the ideas being considered. But in each case, Defra wants to hear from stakeholders before reaching final decisions. Defra will consult stakeholders further when it produces draft regulations to give effect to its proposed statutory measures.
7. The deadline for responses to this consultation paper is 20 October 2006.

INTRODUCTION

8. This consultation paper seeks views on the following issues relating to the coexistence of GM and non-GM¹ crops:
 - Defra's plans for coexistence measures to apply in England
 - whether special arrangements should apply in the case of coexistence between GM and organic crops
 - options for providing redress for possible financial losses by non-GM farmers due to GM crop cultivation
 - the arguments for and against a public GM crop register
 - guidance on voluntary GM-free zones
9. Apart from the first item on this list where specific proposals are made, Defra is not taking a definite view at this stage on the issues raised or what specific action, if any, is required on them. All these issues are open for discussion, although Defra's current thinking is indicated where relevant. The paper should therefore be read as a mix of proposals and ideas for consideration.
10. This paper relates to England only. Coexistence is a devolved matter and the authorities in Wales, Scotland and Northern Ireland are responsible for developing the policy to apply in their areas. They will be issuing their own stakeholder consultation papers in due course.
11. A number of specific questions are raised in the paper. It would be helpful if you could address these in addition to making any other points. Where appropriate, please provide evidence to support your views. All the consultation responses will be considered and inform the further development of Defra's coexistence strategy. Defra will announce what further decisions it has reached following this consultation process, and the next steps it will take to ensure that effective coexistence measures are in place before any commercial GM cropping. No GM cultivation is expected before 2009 at the very earliest.

How to respond to this consultation

12. The commencement date of this consultation is 19 July 2006 and the closing date is 20 October 2006. Written responses should be sent to:

Department for Environment, Food and Rural Affairs
GM Policy Team
Zone 4/E5
Ashdown House
123 Victoria Street
London SW1E 6DE

Or e-mailed to: GMcoexistence@defra.gsi.gov.uk

¹ 'Non-GM' refers collectively to both conventional and organic crops. Where appropriate, a specific distinction is made between 'conventional (non-GM)' and 'organic'.

13. When responding please state whether you do so as an individual or on behalf of an organisation. If the latter, please make it clear who the organisation represents and, where applicable, how the views of the membership were determined.

Confidentiality

14. In line with Defra's policy of openness, at the end of the consultation period copies of the responses will be made publicly available through the Defra Library (Ergon House, 17 Smith Square, London SW1P 3JR). The information they contain may also be published in a summary of responses and shared with other Government departments or the Devolved Administrations. If you do not consent to this, you must clearly request that your response is treated confidentially. Any confidentiality disclaimer generated by your IT system in e-mail responses will not be treated as such a request. You should also note that there may be circumstances in which Defra is required to give information to third parties on request, in order to comply with its obligations under the Freedom of Information Act 2000 and the Environmental Information Regulations.
15. The Defra Library will supply copies of consultation responses to personal callers or in response to telephone or e-mail requests (Tel: 020 7238 6575 or email to defra.library@defra.gsi.gov.uk). Wherever possible, personal callers should give at least 24 hours' notice of their requirements. An administrative charge will be made to cover photocopying and postage costs.

Data Protection Act 1998

16. The Secretary of State for Environment, Food and Rural Affairs is the data controller, as defined in Section 1 of the Data Protection Act 1998, in respect of any "personal data" that you provide in response to this consultation exercise. "Personal data" is information about an individual such as their name, contact details and opinions.

Consultees

17. Defra is specifically inviting the organisations listed in Annex A to respond to this consultation, but would like to hear from anyone who feels they have something to contribute. If you know of others who would be interested in receiving this consultation document please inform Defra.
18. This document is available on the Defra website at <http://www.defra.gov.uk/environment/gm/crops/index.htm>. Hard copies are also available on request from Defra.

Help with enquiries

19. If you would like help with queries or require further information about this consultation please contact:

Sharon Wort Tel: 020 7082 8083 (sharon.wort@defra.gsi.gov.uk)
Renaud Wilson Tel: 020 7082 8080 (renaud.wilson@defra.gsi.gov.uk)

Complaints procedure

20. If you want to make a complaint or query the consultation process (as opposed to comment on the issues which are the subject of the consultation), please write to:

Bree Verity
Defra Consultation Co-ordinator
Area 7D, Nobel House
17 Smith Square
London SW1P 3JR

or email: consultation.coordinator@defra.gsi.gov.uk

21. You may wish to note that the Government Code of Practice on Written Consultations specifies six key criteria for departments to follow, viz:

- consult widely throughout the process, allowing a minimum of 12 weeks for written consultation at least once during the development of the policy
- be clear about what your proposals are, who may be affected, what questions are being asked and the timescale for responses
- ensure that your consultation is clear, concise and widely accessible
- give feedback regarding the responses received and how the consultation process influenced the policy
- monitor your department's effectiveness at consultation, including through the use of a designated consultation co-ordinator
- ensure your consultation follows better regulation best practice, including carrying out a Regulatory Impact Assessment if appropriate

GENERAL BACKGROUND

What does 'coexistence' mean?

22. In this paper 'coexistence' refers to the range of measures that farmers will need to take to minimise unwanted mixing of GM and non-GM crops. Such mixing can occur via normal processes such as cross-pollination between crops of the same species. If a GM crop cross-pollinates a non-GM variety the seed of the latter will have a 'GM presence' of GM DNA or protein (i.e. the novel genes in the GM plant will have been transferred into the non-GM plant).
23. More generally, coexistence is about maintaining choice for producers and consumers. The transfer of a GM presence into what is meant to be a non-GM crop could prevent it being sold into a non-GM production chain. The affected farmer might lose out financially as a result of this, and it would reduce the supply of non-GM products to consumers. The aim of coexistence measures is to minimise unwanted GM presence in non-GM crops so that these problems are avoided as far as possible.
24. If GM crops are grown in England they could either be processed with conventional (non-GM) crops in an undifferentiated production chain, or there may be distinct GM and non-GM chains. The extent to which GM and conventional (non-GM) crops are segregated will be determined by the prevailing market forces. Organic crops are required by legislation² to be processed separately from all other forms of non-organic production whether conventional or GM (to justify use of the organic label).

Legislative Context

25. The approval and use of GM products is already heavily regulated by European Union (EU) legislation³. Under a collective EU-wide consent procedure, no GM crop can be grown commercially unless it passes a detailed case-by-case assessment of possible risks to health and the environment. This considers the impact of the dispersal of pollen or seed from the GM crop, and of cross-pollination with non-GM crops or related wild plants. Only crops assessed as having no harmful impact will be approved for release, and therefore coexistence measures are not required for safety reasons.
26. There are also strict EU rules to allow people to make an informed choice between GM and non-GM products⁴. These are directly relevant to the coexistence issue. They require GM products or GM ingredients in composite products to be traced and labelled through the production

² Regulation (EEC) No. 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs.

³ The approval procedure for food and animal feed products is set out in Regulation (EC) No. 1829/2003 on genetically modified food and feed. The approval of other GM products is covered by Directive 2001/18/EC on the deliberate release into the environment of genetically modified organisms.

⁴ Regulation (EC) 1830/2003 covers the traceability and labelling of genetically modified organisms (GMOs) and the traceability of food and feed products produced from GMOs. Regulation (EC) 1829/2003 has specific rules on the labelling of GM food and feed.

chain, so that they can be clearly distinguished. The EU legislation on tracing and labelling defines a GM product/ingredient as one which:

- contains, consists of or is produced from genetically modified organisms (GMOs)
- *except where* the GM content is adventitious or technically unavoidable and no higher than a threshold of 0.9%

27. This means that any statutory coexistence measures must aim to minimise unwanted GM transfer into non-GM crops so that they do not exceed the EU 0.9% threshold. This threshold will apply as follows:

(i) under the rules on the tracing of GM products, if a crop produced by a non-GM grower has a GM presence above 0.9% he or she will have to inform the buyer in writing that the material has a GM content. And at each subsequent stage in the production chain operators will have to inform each recipient of the material that it is classed as 'GM'

(ii) under the parallel labelling rules, GM products, food ingredients or animal feeds as sold to the final consumer or user must be labelled as 'GM' if they have a GM presence above 0.9% (per ingredient).

28. As noted, the 0.9% threshold only applies in respect of a GM presence that is "adventitious or technically unavoidable". This means that farmers and other operators must take reasonable steps to avoid having a GM presence, if they want to avoid the need for their produce to be traced and labelled as 'GM'. Defra is aware that some stakeholders interpret the EU legislation as requiring coexistence measures to aim to prevent any detectable GM presence in non-GM crops. However, Defra is clear that the EU rules recognise in effect that it would be unrealistic for producers to strive to avoid GM presence completely. The 0.9% figure is a level that food and feed supply chains should in general be able to observe with measures that do not impose an excessive burden. Coexistence can only work on the basis of a pragmatic threshold.

29. It should be noted that in this paper the term 'non-GM' does not mean the same as 'GM-free'. 'Non-GM' means a crop or product that may have an adventitious GM presence below the EU 0.9% threshold, and which therefore can be sold without a GM label. 'GM-free' implies that a product does not have any GM presence.

Economic Context

30. Farmers in the UK will only cultivate GM crops if it offers them an economic benefit of some sort (e.g. a yield advantage or lower production cost), and if there is a market for the crops. The normal operation of the market will decide whether any approved GM crops are commercially successful. They could be grown here for either food or non-food uses.

31. The market conditions that pertain to GM cultivation in the UK will dictate the extent to which coexistence measures need to operate, and this could

depend on the type of GM crop involved. The following scenarios are possible in relation to coexistence between GM and conventional (non-GM) production:

- the GM crop trades at a premium price relative to the equivalent conventional crop as it has a novel quality trait. Farmers growing the GM crop may therefore need to minimise 'contamination' from non-GM crop impurities because it reduces the desired quality.
- the non-GM conventional crop trades at a premium price relative to the GM crop, which has a production trait like herbicide-tolerance.
- there is no price differential between GM and non-GM crops and the economic position of non-GM producers is not adversely affected if their crops have a GM presence above the EU 0.9% threshold.

32. The relationship between GM and organic crops is likely to be different. Organic crops normally attract a price premium over conventional produce, and they might be expected to trade at a premium above GM regardless of the type of GM crop involved. At the same time, however, it may be that the GM crop species introduced in the UK are not widely grown in organic form, which would mean that coexistence between GM and organic is not a significant issue. There is, for example, relatively little UK organic production of maize, oilseed rape or beet.

Policy Context

33. The EU has decided that coexistence arrangements should be determined at national level, adopting a legislative provision which provides that: "*Member States may take appropriate measures to avoid the unintended presence of GMOs in other products*"⁵. To assist Member States the European Commission has issued coexistence guidelines⁶.

34. The Government has also received a report⁷ on coexistence issues from the independent Agriculture and Environment Biotechnology Commission (AEBC), a former advisory body. In developing policy on coexistence Defra has taken account of both the European Commission guidelines and the AEBC recommendations.

35. The Government's general policy on GM crops was outlined in a Parliamentary statement on 9 March 2004⁸. In relation to coexistence, the statement confirmed the Government's view that:

- farmers growing GM crops should implement measures to enable non-GM producers to operate within the 0.9% EU threshold, and that this might be achieved via a code of practice with statutory backing;

⁵ Article 26a of Directive 2001/18/EC.

⁶ Commission Recommendation 2003/556/EC on guidelines for the development of national strategies and best practices to ensure the coexistence of genetically modified crops with conventional and organic farming (available at http://ec.europa.eu/agriculture/publi/reports/coexistence2/guide_en.pdf).

⁷ *GM Crops? Coexistence and Liability* (www.aebc.gov.uk/aebc/reports/coexistence_liability.shtml).

⁸ Available at www.defra.gov.uk/corporate/ministers/statements/mb040309.htm.

and that Defra would undertake the following:

- explore with stakeholders whether a threshold lower than 0.9% should apply for coexistence between GM and organic crops
- consult on options for compensating non-GM farmers who suffer financial losses due to excessive GM presence
- provide guidance to farmers on voluntary 'GM-free' zones

General Principles

36. The European Commission guidelines set out a number of principles to be observed when developing coexistence policy. Defra agrees with these principles, and would highlight in particular that measures should or must:

(i) *balance the interests of all farmers.* Farmers have a legitimate interest in growing their preferred crops (conventional, organic or GM), and a coexistence regime must be fair and reasonable to all parties. Coexistence should be seen as a co-operative rather than adversarial process, and it is a general principle of EU law that any action taken by Member States at national level must be non-discriminatory in its effects.

(ii) *be determined crop-by-crop.* Different crops may need different coexistence measures to take account of their specific characteristics.

(iii) *be practical and effective.* Regard must be had to what is achievable in practice, both in terms of what farmers might reasonably undertake and having rules that it is possible to enforce. There should also be confidence that measures will actually achieve the stated objective.

(iv) *be proportionate.* Measures should not exceed what is necessary to achieve the aim, which itself must be consistent with EU law. The 0.9% threshold is central in this respect. Measures must not be too prescriptive and should allow farmers to pursue the most cost-effective solution that meets the objective, thereby avoiding a disproportionate burden.

(v) *build on existing experience as far as possible.* Coexistence is not a new idea in agriculture. There are precedents for measures to minimise cross-contamination between different types of crop, and it makes sense to consider what can be learnt from these. Examples are the segregation of industrial and food-grade oilseed rape and also different types of maize (e.g. 'waxy' and 'non-waxy'). In liaison with Defra, the farming and industry group SCIMAC⁹ has developed guidelines¹⁰ for managing GM crops that include coexistence provisions. These were applied during the Government-sponsored Farm Scale Evaluation (FSE) GM trials.

⁹ Supply Chain Initiative on Modified Agricultural Crops. This comprises the National Farmers Union, British Society of Plant Breeders, Crop Protection Association, Agricultural Industries Confederation and the British Sugar Beet Seed Producers Association.

¹⁰ Available at www.scimac.org.uk.

COEXISTENCE MEASURES: INITIAL CONSIDERATIONS

37. To develop a coexistence regime it is necessary to consider and make a judgement on the following elements:

- the overall scope of the regime (what it will cover);
- the various ways that a GM presence can arise in a non-GM crop, and what can be done to minimise this; and
- what each potential source of GM presence might contribute to a cumulative total, allowing for the application of reasonable minimisation measures

38. These issues are explained in the following paragraphs. The paper will then set out and discuss the specific coexistence measures that Defra proposes should apply on a statutory basis to farms in England.

Overall Scope

39. The regime that Defra is proposing focuses on managing coexistence:

- (i) at farm level. Coexistence is an issue for the whole supply chain, but beyond the farm gate the industry will implement its own arrangements to ensure that conventional (non-GM) and organic chains can function effectively, based on normal contractual relationships and operating in line with the EU rules on the tracing and labelling of GM products.
- (ii) between neighbouring farms – the situation where one farmer intends to grow a GM crop and his neighbours could be affected by the transfer of a GM presence into their conventional or organic crops.¹¹
- (iii) for maize, beet, potato and oilseed rape crops. It is not certain what crop species might be cultivated first in the UK in GM form. This paper focuses on species where GM varieties already exist or are in development. If other species of GM crop are proposed for commercial use Defra will consider the coexistence requirements for them as necessary.
- (iv) for crops other than those produced for certified seed. The European Commission is due to propose specific labelling thresholds for GM presence in non-GM seed stocks. Once adopted, these will govern the relationship between GM crops and certified seed production. Certified seed crops are a specialised and limited area of production where it is already usual to apply coexistence measures to achieve statutory levels of seed purity.

¹¹ Coexistence may also be an issue within a farm – where someone intends to grow both GM and non-GM crops of the same species on a single production unit. In this case, the farmer may need to minimise GM cross-contamination because it could affect his own non-GM production. This is a different scenario on which the Government does not intend to legislate. SCIMAC is developing appropriate guidance for farmers on within-farm coexistence and Defra will assist with that process.

(v) for crops that are placed on the market. The EU 0.9% labelling threshold for GM presence relates to crop material that is marketed. In general, therefore, it is not necessary from a regulatory standpoint to apply measures to minimise GM presence where someone produces a crop for their own use. So, for example, Defra's proposals are not intended to cover the situation where:

- GM maize may cross-pollinate a fodder maize crop that a conventional (non-GM) farmer¹² will use to feed to his own animals; and
- GM crops may cross-pollinate plants grown in allotments or domestic gardens intended for private consumption¹³.

Do stakeholders have any comments on the proposed scope of the coexistence regime?

Potential Sources of GM Presence

40. The most likely sources of GM presence in a non-GM crop are from:

- unintended GM presence in non-GM seed
- crop-to-crop cross-pollination
- GM 'volunteer' plants
- GM seed transfer via machinery

Non-GM seed

41. The seed used by non-GM farmers may itself have a GM presence. As noted, it is planned to establish specific EU labelling thresholds for GM presence in non-GM certified seeds. Values in the range 0.3%-0.5% have previously been considered in EU discussions. It is expected that a GM presence above the threshold will have to be declared on the seed label (i.e. it would have to be sold as 'GM'), but a presence below the threshold will not need to be indicated. This means that non-GM certified seed may have a very small, unlabelled GM content. Seed companies will decide how they want to produce and market their seeds taking account of the EU requirements. Farmers wanting to produce non-GM crops will use non-GM seed, and the intention is that seed thresholds will be set sufficiently low to allow this. No labelling thresholds will apply for GM presence in farm-saved seeds as these are not marketed.

Crop-to-crop cross-pollination

42. GM and non-GM crops of oilseed rape or maize grown in proximity to each other are liable to cross-pollinate. This could result in a significant level of GM transfer unless farmers take specific action to avoid it. Whilst beet or

¹² The European Commission has proposed an amendment to the EU organic production regulation 2092/91 which, if adopted, would prevent organic farmers using home-grown feed with a GM presence above 0.9%. In that case, therefore, there would be a regulatory constraint to justify the imposition of coexistence measures, to ensure any GM presence is within 0.9%.

¹³ See also paragraphs 172-181 of this paper which discuss the idea of a public GM crop register. This includes further consideration of the situation where allotment or garden plants might be cross-pollinated by an approved GM crop.

potato crops might also cross-pollinate each other, this is not a significant issue for coexistence because:

- cross-pollination does not affect the composition of the harvested crop material (the roots or tubers). So if a GM beet or potato crosses with a non-GM variety, the product of the latter will not have any GM presence. The recipient plant will, however, produce GM seed, which means that GM volunteers may be created (see below). It is possible that over time there could be some limited GM transfer between farms via the development and persistence of GM volunteers.
- in the case of beet, moreover, it is a biennial plant that usually flowers and produces pollen in the second year of growth, whereas commercial crops are harvested at the end of the first growing season. In general, therefore, beet crops do not flower and cross-pollinate, although this may still occur on an unwanted basis due to the phenomenon known as 'bolting' (plants that develop flowers prematurely). It is already good practice for farmers to destroy 'bolters' before they flower.

43. Cross-pollination between sexually compatible crops can be minimised by various means:

- crop separation distances. these are used in certified seed production and information is available to identify the distances that should minimise cross-pollination frequency to specified levels. The general pattern is that most cross-pollination occurs at close range, and therefore relatively modest separation distances should ensure that it is reduced to a low level. However, it is also known that it may occur infrequently over very long distances (up to a kilometre or more), depending on the weather, local topography and insect movements¹⁴.
- border or barrier rows: a GM farmer might grow a strip of non-GM plants of the same species as his GM crop, between the GM crop and his neighbour's non-GM crop. It would absorb pollen from the GM crop, extend the distance between the GM and non-GM crops and produce non-GM pollen that will 'compete' with the GM pollen, all of which will reduce the level of crop-to-crop cross-pollination.
- non-synchronous flowering: crops can only cross-pollinate if they are flowering at the same time. Different varieties of the same species may have different flowering periods, and it is possible to alter flowering times by delaying crop planting. In principle, therefore, cross-pollination between crops can be minimised through measures that achieve non-synchronous flowering. However, this is not seen as a realistic option in the UK because the varieties normally grown here have flowering periods that largely overlap, and the scope for altering this is small. A specific point to note here is that winter oilseed rape

¹⁴ Insects can play a significant role in cross-pollination between oilseed rape crops but not in relation to maize, which is largely wind-pollinated.

has normally completed flowering well before spring rape begins, so there should not be a significant coexistence issue between autumn and spring-sown crops.

44. Unlike with separation distances, there has been little practical experience with, or studies of, the application of barrier rows/strips. Therefore, information is lacking with which to assess their possible application. They may be an attractive option if it is difficult to observe a separation distance, and especially so if the GM crop is destined for an undifferentiated market (mixed GM and non-GM), because then the GM crop and the non-GM strip might be harvested and sold together. At the same time, however, it could in practice be difficult for GM growers to apply a barrier row because:

- in the case of herbicide-tolerant GM crops, it would be awkward to manage the non-GM barrier alongside the GM crop given their different herbicide requirements, and the GM herbicide could damage the barrier plants
- in the case of a GM crop with a quality trait, cross-pollination from an immediately adjacent non-GM barrier could prejudice achieving the desired quality specification

45. Nevertheless, there may be situations where a barrier is preferable to a separation distance. Defra is considering the evidence needed to stipulate a barrier option and may provide further information to stakeholders in due course. For the time being, it is envisaged that separation distances will be the key coexistence measure to limit cross-pollination between GM and non-GM maize or oilseed rape crops. For the reason indicated, it is not proposed that separation distances will apply for beet and potato crops. For beet, it will be desirable for farmers to minimise the already limited scope for cross-pollination by controlling 'bolters' in line with normal practice.

46. Cross-pollination can be influenced by the physical barriers between fields. If there is a particularly high hedge or dense stand of trees between two crops this may lessen cross-pollination, compared to a situation where there is just a low hedge. As individual circumstances can vary greatly, it is not possible to advise on how a particular physical barrier will influence the level of cross-pollination. Recommended crop separation distances assume the presence of field boundaries that do not have any specific effect on the degree of cross-pollination.

'Volunteers'

47. These are plants that develop from shed seed or potato tubers that are not harvested from the soil. If GM oilseed rape is grown it will drop seed at harvest that could result in GM rape plants appearing for a number of years amongst the subsequent crops in that field. If a subsequent crop is non-GM rape any GM volunteers will mix and cross-pollinate with it, transferring a GM presence. GM volunteers may also cross-pollinate non-GM crops grown in the vicinity. Beet crops can have volunteers (weed

beet) but maize will not because spilt maize seed does not remain viable over winter in UK soils. Potato volunteers are known as ‘groundkeepers’.

48. Volunteers are effectively weeds in the crop field and conventional farmers normally control them by applying a suitable herbicide. The frequency and persistence of volunteers can also be influenced by the cropping interval between crops of the same species. It is not possible to guarantee the complete elimination of volunteers, but they will not be a significant source of potential GM transfer between farms.

Seed transfer via farm machinery

49. Machinery that has been used on a GM crop may have some GM seed lodged within it, and if it is taken to another farm this could provide a pathway for the seed to be transferred into a non-GM crop. This could arise in particular with combine harvesters used on oilseed rape crops, although even this would not be expected to result in a significant GM transfer. It is not standard practice to clean combine harvesters between operations on separate farms (where machinery is shared), and it would be disproportionate to expect a total clean-down to try and remove every last seed that might be present. However, farmers or machinery contractors could minimise the scope for unwanted GM transfer by making sure that those parts of a combine that are readily accessible are cleaned reasonably-free of any lodged seed.

Allowing for different sources of GM presence within a 0.9% threshold

50. Table 1 is taken from a report by the EU Scientific Committee on Plants. It illustrates the point that a non-GM crop may acquire a GM presence at various stages in the production process on farm. To determine coexistence measures an assumption must be made of what each source of GM presence may contribute, after reasonable measures have been applied. This gives rise to the questions in the following paragraphs.

Table 1: Estimated average potential rates of adventitious presence occurring at various stages during on-farm production¹⁵			
	Oilseed rape (fully fertile)	Maize	Sugar Beet
Seed	0.3%	0.3%	0.5%
Drilling	0%	0%	0%
Cultivation	0%	0%	0%
Cross pollination	0.2%	0.2%	0%
Volunteers	0.2%	0%	0.05%
Harvesting	0.01%	0.01%	0.01%
Transport	0.05%	0.01%	0.01%
Storage	0.05%	0.05%	0.1%
% achieved	0.81%	0.57%	0.67%

¹⁵ Scientific Committee of Plants (SCP) March 2001 Opinion on possible seed thresholds. The accompanying text says: ‘These figures are mean values and assume good agricultural practice including reasonable attempts to isolate crops and segregate products.’ (the full SCP report is available at http://europa.eu.int/comm/food/fs/sc/scp/out93_gmo_en.pdf).

What assumption should be made about GM presence in non-GM seed?

51. This will be influenced by the thresholds that the EU eventually adopts for labelling GM presence in conventional seed. At this stage it is not certain what those thresholds will be, as they have yet to be formally proposed and negotiated. However, for the purpose of this consultation, and as a basis for discussion only that is without prejudice to further developments, Defra is asking stakeholders to consider a hypothetical scenario where the EU has adopted the thresholds of 0.3-0.5% previously canvassed by the European Commission. In this context there are two different assumptions that could be made about the level of GM presence in non-GM seed. That it is either:

- up to or just within the EU seed labelling threshold; or
- at some distinct point well below the EU threshold. This possibility arises because seed companies will seek to ensure that their seed is comfortably within whatever legal standard is established, and for the foreseeable future it is likely that in practice most non-GM seed will not have any detectable GM presence. Defra would expect this to be the case at least in the early years of any commercial GM cropping in the UK.

52. The first option is more straightforward and cautious, in that it covers possible 'worst-case' eventualities and should mean that in practice actual levels of GM presence are well within the assumed level. Defra is therefore inclined towards this option, but would appreciate stakeholders' views on this question.

What level of GM presence is expected to arise from sources other than seed impurity and crop-to-crop cross-pollination?

53. Table 1 refers to the GM admixture expected to result from volunteers and at the harvesting, transport and storage stages. However, Table 1 is based on GM and non-GM crops being grown within an individual farm¹⁶, whereas Defra's proposals address the situation where GM and non-GM crops are grown on adjacent farms. In this *farm-to-farm* context Table 1 gives too high or unnecessary values for the GM presence that could arise via volunteers (in the case of oilseed rape), harvesting, transport and storage. Adjusting for that, Defra is planning on the basis that the total GM presence that might result from these sources should conservatively be no more than 0.1%, assuming good practice where this is relevant (e.g. if combine harvesters are shared between farms, an effort is made to minimise the presence of lodged seed). This is based on a general assessment rather than direct empirical evidence (which is lacking and would be difficult to obtain), but Defra has put this issue to independent experts who have agreed that a 0.1% value is reasonable.

¹⁶ This means that GM and non-GM varieties of the same species would be cultivated in the same field over successive crop rotations. Footnote 11 confirms that it is intended to address separately the issue of *within-farm* coexistence.

What allowance should be made for GM presence arising from crop-to-crop cross-pollination (in oilseed rape and maize)?

54. It is planned that cross-pollination between GM and non-GM oilseed rape or maize crops will be limited principally by using separation distances. Unlike the other potential sources of GM presence, where a 'fixed' value is assigned for the potential level that may arise, in the case of cross-pollination it is possible within reason to vary the level that occurs (i.e. by applying longer or shorter separation distances). Therefore, having determined the GM presence that might arise from all other sources, a specific figure must be derived for the level to which cross-pollination is to be minimised, bearing in mind the overall 0.9% threshold. Table 2 illustrates this.

Table 2: Potential rates of GM presence in non-GM crops from various sources (in context of 0.9% threshold and <i>farm-to-farm</i> co-existence):			
	Oilseed rape	Maize	Beet
<u>Seed impurity</u> (if taken to be present up to assumed EU threshold of 0.3-0.5%)	0.3%	0.3%	0.5%
<u>All other sources apart from cross-pollination</u> (assumes reasonable volunteer control, bolter control, machinery cleaning)	0.1%	0.1%	0.1%
<u>Crop-to-crop cross-pollination</u> (assumes this is minimised by an appropriate separation distance)	0.1%-0.5%	0.1%-0.5%	(not applicable)
Total %	0.5%-0.9%	0.5%-0.9%	0.6%

55. To stay within a threshold it is normal to aim below it, to ensure as far as possible that it is met even in 'worst-case' situations. At the same time, it would be disproportionate to apply measures to try and rule out GM transfer completely. Defra is proposing that separation distances should be chosen for oilseed rape and maize that aim to limit cross-pollination to a maximum of 0.3%. This is consistent with the general principle of minimising unwanted GM presence in line with the 0.9% benchmark. This point will be discussed further in a later section of the paper where separation distances are covered in more detail (paragraph 67).

GM admixture after produce has left the farm

56. GM and non-GM material may also be mixed in the supply chain beyond the farm gate. However, if all non-GM crops leave the farm within the 0.9% threshold, any further mixing of crop material should not result in a GM presence above 0.9%, and generally speaking subsequent mixing will tend to dilute rather than enhance any GM content. The exception to this would be if non-GM produce is mixed with material that is wholly GM (or material that is a deliberate blend of GM and non-GM with a GM presence well above 0.9%). It is expected that processors and others in the supply chain who do not want to mix GM and non-GM produce will apply their own measures to segregate material and prevent admixture failures.

Do stakeholders accept the above analysis of the potential sources of GM presence and the assumptions that Defra is proposing should underpin the coexistence regime?

PROPOSED COEXISTENCE MEASURES

What measures will be given statutory backing?

57. Based on the preceding analysis, a distinction can be made between those measures that are essential for effective coexistence and those that, whilst desirable, are less significant. The first category includes separation distances for oilseed rape and maize, without which there could be a significant level of GM transfer into non-GM crops. To apply a separation distance neighbouring farmers may have to liaise over their respective cropping plans. Therefore, Defra envisages that it will be necessary to require GM farmers to inform neighbouring producers of their intention to sow a GM crop, where neighbouring farmland is within the relevant separation distance.

58. The other measures that have been mentioned (controlling volunteers and beet bolters, cleaning farm machinery) would fall into the second category of being generally desirable but not essential. They are measures or practices that:

- are of more marginal significance in terms of the potential level of GM transfer between farms¹⁷ (in the context of a 0.9% threshold)
- are already normal farm practice (in the case of volunteer and bolter control)
- would be very difficult to specify unambiguously in legislation¹⁸ and very difficult to enforce¹⁹

59. Because of this, Defra is proposing that crop separation distances for oilseed rape and maize combined with a 'notification' rule should be statutory requirements, whereas the other non-essential measures will be set out as advice in a non-statutory code of practice. It is envisaged that this will take the form of an updated version of the existing SCIMAC code noted previously. Defra and SCIMAC will liaise to develop the proposed content of the code, and Defra will then consult other stakeholders before agreeing a final version with SCIMAC. Table 3 below summarises the proposed situation.

Table 3: Overview of Proposed Coexistence Measures		
<i>Crop</i>	<i>Measures to apply on a statutory basis</i>	<i>Measures to apply on a voluntary basis</i>
<u>Oilseed rape</u>	Separation distance Farmer-to-farmer notification	Volunteer control Cleaning of shared combine harvesters (before machinery goes from GM to non-GM farm)

¹⁷ Factors like volunteer control and machinery cleaning would be of more significance if a farmer wants to grow both GM and non-GM crops on the same farm, as indicated in Table 1.

¹⁸ For example, it would be hard to define precisely what is meant by 'good' volunteer control, or the specific process by which a combine harvester is to be cleaned reasonably-free of lodged seed. A number of different practices might be equally effective in achieving the desired result.

¹⁹ Compliance would have to be checked in real-time as the farmers are undertaking the measures or shortly thereafter. This would require a bureaucratic and disproportionate enforcement effort.

<u>Maize</u>	Separation distance Farmer-to-farmer notification	(not applicable)
<u>Beet</u>	(not applicable)	Bolter control Weed beet (volunteer) control
<u>Potato</u>	(not applicable)	Groundkeeper (volunteer) control

Who will be responsible for implementing the measures?

60. Defra is proposing that farmers growing GM crops should bear the primary responsibility for applying coexistence measures. It would fall to them, therefore, to make sure that a crop separation distance is observed where necessary, and to initiate any required liaison with neighbouring producers by notifying their intention to sow a GM crop.

61. But non-GM farmers will also have a role to play in ensuring successful coexistence. They will be expected to provide relevant cropping information to GM growers in response to their notifications, and they should also undertake routine control of volunteers and bolters in their own crops, to help minimise the potential for GM transfer via these routes.

62. Where contractors are involved in crop production they should help to implement relevant coexistence measures. For example, cleaning a combine harvester after it has been used on a GM oilseed rape crop is something that might fall to a machinery contractor to undertake.

How will measures be given statutory backing?

63. It is proposed that the separation distance and notification requirements would be specified in a Statutory Instrument made under Section 2(2) of the European Communities Act 1972. Defra will consult separately on a draft Statutory Instrument as a further stage in developing the coexistence regime.

Do stakeholders accept Defra's proposed overall basis for the coexistence regime as outlined above?

Regulatory Impact Assessment - considering other options

64. Defra's firm preference is to give statutory backing to the key measures required for a successful coexistence regime. However, in line with the Government's general commitment to avoid excessive regulatory burdens, any proposed new statutory controls have to be accompanied by a Regulatory Impact Assessment (RIA). This must analyse and compare options for achieving the policy aim, and in particular test whether statutory controls are necessarily the right solution. A draft RIA on Defra's coexistence proposals is at Annex B. This repeats some of the material in the main paper because the RIA is a self-contained document. It does, however, set out fully for consideration:

- the option of a wholly non-statutory coexistence regime (SCIMAC is developing an industry scheme going beyond its existing code of practice, where effective coexistence might be ensured via a link with farm assurance arrangements);
- the arguments on whether a statutory or non-statutory approach should be preferred;
- the equity arguments around making GM growers primarily responsible for statutory coexistence measures;
- an analysis of the possible costs and benefits and effect on competition of a coexistence regime.

Enforcement and Monitoring

65. The RIA also sets out Defra's plans for enforcing statutory coexistence measures and for monitoring the overall regime (both statutory and voluntary elements). It is proposed that compliance with statutory requirements will be checked via Defra farm inspections, and that there will be a range of monitoring activities to enable a proper assessment of whether the regime is meeting its objectives.

Reviewing the coexistence regime

66. Another important point fully explained in the RIA is that Defra will review the performance of the coexistence regime and propose any necessary changes after a monitored introductory period. This will be done in consultation with stakeholders. The fact that a review is planned is particularly relevant to the next two sections of the paper on the envisaged separation distance and notification requirements. The review is expected to take place around 2-3 years after the start of commercial GM cropping in England (the precise timing will depend on the rate of GM uptake).

Do stakeholders have particular comments on the analysis in the draft Regulatory Impact Assessment (at Annex B), and on what it says about Defra's plans to enforce, monitor and review the coexistence regime?

STATUTORY SEPARATION DISTANCES

67. This section explains Defra's detailed thinking on the crop separation distances that it proposes should apply for oilseed rape and maize on a statutory basis.

NIAB Report

68. There is a large volume of scientific information available from the UK and abroad on cross-pollination between crops and the setting of crop separation distances to minimise cross-pollination to specified levels. To provide a specific and up-to-date basis for informing this consultation, Defra commissioned a report from NIAB (formerly the National Institute of Agricultural Botany) which considers the situation from a UK standpoint. This report has been published on the Defra website and can be found at http://www2.defra.gov.uk/research/project_data/More.asp?I=CB02039&M=KWS&V=CB02039&SCOPE=0.

69. To produce recommended separation distances for oilseed rape and maize, NIAB have modelled data on actual levels of cross-pollination derived from the Farm Scale Evaluation (FSE) GM trials in the UK²⁰. Annex C summarises the distances NIAB recommend to minimise cross-pollination to levels between 0.1-0.6%²¹. There are several points to note about the NIAB report and these are explained in the following paragraphs.

Crop-specific distances

70. NIAB have calculated specific separation distances for spring oilseed rape, winter oilseed rape, grain maize and forage (silage) maize. As noted above (paragraph 55), Defra is proposing that separation distances should be chosen that aim to minimise cross-pollination to a maximum of 0.3%. At this level, the NIAB figures for spring and winter rape are broadly similar. For simplicity, therefore, Defra proposes that a single distance for both types of rape should be specified. The vast majority of the rape grown in England is of the winter variety.

71. The NIAB figures for grain and forage maize are more distinct. Cross-pollination in maize only affects the cobs, not the rest of the plant (i.e. only the kernels on the cob would have a GM presence where GM cross-pollination occurs). In the case of forage maize, the cobs are chopped and mixed with the leaves and other parts of the plant²², so any GM presence would be 'diluted' relative to the situation where just the cob kernels are used, which is the case with grain maize. This is why longer separation

²⁰ As part of a separate Defra-funded research project, measurements were taken of cross-pollination between the GM and comparison non-GM crops in the FSE trials. The results for maize are available on the Defra website at www.defra.gov.uk/environment/gm/research/pdf/epg_1-5-138.pdf. A report on the oilseed rape results has been published in the journal *Transgenic Research* (available at www.ingentaconnect.com/content/klu/trag).

²¹ For completeness NIAB actually calculated values between 0.1-0.9%, but values above 0.6% are not relevant given the need to allow for other sources of GM presence within the overall 0.9% threshold.

²² Based on an earlier assessment, NIAB have assumed that cobs are about 50% or half the total content of the forage maize product.

distances are needed for grain maize to achieve a given level of GM presence in the final product. If at all possible, Defra would favour having a single separation distance for both types of maize (grain and forage), as this would make the coexistence rules particularly straightforward and easy to follow. However, having a single distance would be a compromise solution and would imply that instances will arise where GM farmers have to observe a longer distance than is strictly necessary in the circumstances. On a precautionary basis, a single distance would need to be set towards that needed for grain maize, whereas in fact the vast majority of the maize grown in England is for use as forage. On balance, Defra is proposing that separate distances should be specified for grain and forage maize, although it would appreciate stakeholders' views on this specific point²³.

72. NIAB did not have data to produce recommended distances for sweetcorn maize. Up to date scientific information on sweetcorn is expected to be available in due course (see paragraph 84 below). Defra will consult stakeholders on proposed sweetcorn separation distances at that time.

73. The NIAB figures for oilseed rape are for fully-fertile varieties. Previously in England a small percentage of the rape grown has been of a type known as Varietal Associations (VA). This is up to 80% male-sterile, making it more likely to be cross-pollinated than ordinary, fully-fertile varieties. It would therefore need a proportionately longer separation distance to achieve a given level of cross-pollination frequency. The use of VA rape has stopped in England as it seems generally to have fallen out of favour. If it or another form of partially-sterile oilseed rape is proposed for cultivation, Defra will propose specific separation distances for coexistence purposes.

Whole field/crop assessment

74. NIAB's figures are based on calculating the average level of cross-pollination across the recipient crop as a whole, as this is how the 0.9% threshold would be measured and applied for the crop types that NIAB have considered. Generally speaking, the highest levels of cross-pollination will be found at the edge of the recipient field facing the donor (GM) crop, with declining levels thereafter moving across the field away from the donor crop.

75. A specific point to note with sweetcorn is that where this is to be sold as individual non-GM corn-on-the-cob, it will be necessary to minimise GM cross-pollination so that each cob is within the overall 0.9% threshold (allowing for other possible sources of GM presence). This means that a longer field-to-field separation distance will be needed for crops of

²³ Note that, as explained at paragraph 39(v), the application of a separation distance will not be required where a conventional (non-GM) maize crop is to be fed to animals owned by the same farmer, as opposed to being sold off the farm.

sweetcorn cobs, compared to the other types of maize where cross-pollination is measured on a whole crop/field basis²⁴.

GM Index

76. For each type of crop they have assessed, NIAB have differentiated their recommended distances according to a so-called 'GM Index' of 1 or 2. This is because GM crops of the same species may contain a different number of GM 'events' per genome²⁵, and this in turn influences the level of GM presence that will be transferred into a non-GM crop through cross-pollination. A crop which is Index 2 will transfer more GM presence than a crop which is Index 1, so it will need a proportionately longer separation distance to achieve a given cross-pollination threshold.

77. The NIAB figures for oilseed rape at Index 1 and 2 are broadly similar whereas the respective maize figures are more distinct. For operational simplicity Defra would favour having a single distance per crop, rather than differentiating according to the specific GM Index in each case. For reference, the type of GM oilseed rape in the FSE trials was Index 1.5 and the GM maize was Index 1.16. This might suggest that if a single distance per crop were to be adopted, it should be a figure somewhere between those indicated for Index 1 or 2, but Defra would propose erring towards the figures for Index 2 as this is more precautionary.

Varying distances by field depth

78. NIAB have also given different recommended distances according to the depth of the recipient field (i.e. the non-GM crop that is receiving the GM pollen). This is because field size is an important factor in determining expected levels of cross-pollination. The question then is whether statutory separation distances should vary by field depth, or whether a 'one-size-fits-all' approach should be followed, where just a single distance is specified per type of crop. The relevant considerations, on which Defra would appreciate views, are

- specifying a range of distances by field depth is a more refined approach that will ensure that any regulatory burden is kept to a minimum (with larger fields it is more likely that no specific action would be required to observe a separation distance)
- it could, however, make it more likely that the wrong distance is applied, because it would depend on the non-GM farmer reporting the correct field size to his GM-growing neighbour
- the scientific model assumes that neighbouring GM and non-GM fields are of equal size and shape, which is unlikely in practice and raises a doubt about how far a more refined approach could be trusted to ensure the right outcome

²⁴ If sweetcorn is intended for processing (i.e. as tinned or frozen kernels), cross-pollination would be assessed on a whole field/crop basis, and therefore the same separation distances would be required as for grain maize.

²⁵ Put simply this means the extent to which the plant's genetic makeup is GM. Genome means the complete set of genetic material (DNA) of an organism.

- having a single distance per crop is more straightforward and less prone to error, but could oblige GM farmers to take action that is not strictly necessary

79. To establish a single distance per crop using the NIAB figures, it would be necessary to decide what field depth to use as the appropriate benchmark. The following table gives relevant data to consider this.

		<i>Under 1ha</i>	<i>1-1.99ha</i>	<i>2-3.99ha</i>	<i>4ha & over</i>	<i>Total</i>
Oilseed rape	No. of fields	2692	3666	11354	45215	62927
	% of total	4.3%	5.8%	18.0%	71.9%	100%
Maize	No. of fields	3614	3667	8768	11539	27588
	% of total	13.1%	13.3%	31.8%	41.8%	100%

80. Defra would propose adopting the NIAB recommended distances that are based on a field depth of 200m for rape and 100m for maize (broadly equivalent to fields of 2ha and 1ha respectively). This should ensure that the specified distance is more than adequate in the vast majority of cases. Defra would see this as a reasonable compromise between taking account of smaller possible field sizes and avoiding a disproportionate burden.

81. In the introductory phase of the coexistence regime there could be particular merit in keeping the arrangements as simple as possible. On balance, Defra is inclined towards starting with a single distance per crop, but with the intention of reconsidering this as part of the proposed review, in the light of increasing scientific knowledge and practical experience.

Taking account of the overall level of GM cropping (Scale Effect)

82. NIAB's figures assume that non-GM crops will be liable to cross-pollination from just one nearby GM crop. This is the most likely scenario in the introductory phase of GM cropping in the UK. The number of GM crops is expected to be relatively small to begin with and to build up over time subject to market conditions. When and if GM cropping becomes widespread, there will be a stronger possibility of non-GM crops being cross-pollinated by more than one GM crop in the vicinity. In this situation longer separation distances are likely to be needed than those in the NIAB report. Defra will take stock of this situation as part of the proposed review after the introductory phase. This will take account of the scale and rate of growth of GM cropping at that time, and the latest scientific information that is available on separation distances. As necessary, Defra will propose the use of increased separation distances.

²⁶ Based on 2004 IACS returns. A one hectare (ha) square field would have sides 100 metres (m) long. Therefore, the range of field depths expressed in the NIAB report of 100, 200m, 400m and 600m broadly equate with fields sizes of 1ha, 2ha, 4ha and 6ha respectively.

Confidence Rate

83. The results of statistical modelling are expressed in terms of a specific confidence factor which denotes the probability of the real-world outcome being within the calculated value. It is normal for scientists to use a 95% confidence interval, but Defra asked NIAB to calculate their recommended distances on the basis of a more precautionary 98% interval. This means that where the distance between two crops exactly matches that recommended by NIAB, cross-pollination should be within the relevant threshold at least 98 times out of 100 (and in practice crops will normally be more than the specified distance apart, so in fact cross-pollination will generally be less than the threshold).

Expected new scientific information

84. Research on cross-pollination is ongoing with various projects underway at UK and EU level that will provide further information that is relevant for setting separation distances. Most of this is likely to be published before any commercial GM cropping in the UK, given that this is not expected before 2009 at the very earliest. As and when new scientific evidence becomes available Defra will consider it and, if necessary, propose revised separation distances. The distances being proposed now should therefore be seen as Defra's best assessment based on current information.

Defra's proposed statutory separation distances

85. Reflecting the preceding analysis, Defra is suggesting adoption of the following distances based on the NIAB report:

- oilseed rape (fully-fertile varieties): 35m
- forage maize: 80m
- grain maize: 110m

Do stakeholders agree with these proposed distances? If not, which aspect(s) of the supporting analysis and proposed assumptions made by Defra are thought to need further consideration? What do stakeholders think of Defra's proposal not to differentiate separation distances by GM Index or field depth?

86. The statutory requirement would be for GM growers to ensure that these distances are observed in relation to any crop of the same species grown by a neighbouring producer that is intended to be sold as non-GM or organic. The specified distance would be measured as the shortest distance between the two relevant crops. If the GM farmer is unable to ensure the distance is met then he must not sow the GM crop (i.e. it would be an offence to fail to observe the distance). Defra intends that the legislation may also provide for the use of a barrier row/strip instead of the separation distance, although as explained at paragraph 44 it is not possible to offer specific details for this at present

87. Another issue for consideration is whether the legislation should allow the application of measures other than the specified crop separation distance (and/or barrier row), *where this is agreed by both farmers*. The idea is that

neighbouring producers might be happy to apply their own novel coexistence solutions or perhaps agree to derogate from the specified separation distances²⁷, and that in principle the legislation should perhaps allow for this. Defra can see some merit in having this option, but there is a question as to whether neighbouring farmers should be completely free to implement their own arrangements or should have to check their proposed alternative measures with Defra, to ensure they are sufficient to minimise GM presence to the required level.

Do stakeholders accept how the proposed separation distance requirement would apply? What do stakeholders think of the idea at paragraph 87 that some local discretion might be allowed?

88. The distances at paragraph 85 above are only likely to be an issue for coexistence between immediately adjacent farms. And in practice, Defra expects that in many instances GM growers will find that they do not need to take any specific action to observe a separation distance because:

- they can accommodate the distance within their own land (i.e. measured from the intended position of the GM crop, all neighbouring land is beyond the distance)
- the nearest neighbour is not intending to grow a non-GM crop of the same species or, if he is, it is planned for a field that is already beyond the required distance.

89. In the case where neighbouring farmers intend regularly to produce sexually compatible GM and non-GM crops, ideally they will co-operate and maintain close liaison on their forward cropping plans. This may make it possible for them to organise their respective crop rotations so that they consistently avoid a situation where compatible crops are due to be grown within the specified distance of each other.

²⁷ For example, because the actual size of the non-GM field is much bigger than the assumed field-depth that underpins the single separation distance.

STATUTORY NOTIFICATION AND LIAISON REQUIREMENT

90. To facilitate effective application of the proposed separation distances, Defra is also proposing a statutory notification/liaison requirement. This will require GM growers to notify neighbouring producers of their intention to sow a GM crop of maize or oilseed rape, if neighbouring land falls within the relevant separation distance (if it does not, then no notification will be necessary). This will enable the GM grower to be informed in return of his neighbour's cropping plans, and thereby to clarify what further action, if any, the GM grower must take to observe the specified separation distance.
91. Where it is necessary for a GM grower to make a notification, it would be advisable for this to take place as soon as possible, stating the type of crop involved. The proposed statutory requirement would be for the notification to take place no later than:
- 1 March in the case of spring-sown crops; and
 - 1 August in the case of autumn-sown crops
92. The above dates are the same as those in the SCIMAC guidelines that were applied in the context of the Farm Scale Evaluation GM trials. Defra believes that having a single notification deadline for spring and autumn-sown crops would be a pragmatic way forward. It is the case, however, that spring rape is normally sown in March/April, whereas maize is normally sown in May/June. There is a basis for arguing, therefore, that separate notification deadlines might apply for spring rape and maize respectively. Defra would appreciate stakeholders views on this specific point.
93. Where the intended GM crop is maize, it is proposed that the separation distance for notification purposes will be the 110m specified for grain maize (the longest possible distance for maize would have to apply on the assumption that the GM grower will not know what type of maize his neighbour might plan to cultivate²⁸).
94. The neighbour will be expected to respond to the notification as soon as possible and no later than 14 calendar days after receiving it, confirming back to the GM grower the following information:
- whether he plans to grow a crop to be sold as non-GM of the same species as the intended GM crop; and if so
 - where he plans to grow the non-GM crop (at what distance from the GM growers land)

²⁸ If the GM grower did know that his neighbour intended to grow forage maize rather than grain maize, e.g. because they had already discussed this prior to a formal notification being made, then the shorter separation distance for forage maize could apply for notification purposes.

95. Defra envisages that neighbouring farmers will exchange a standard form (with simple tick-box format) in which they record the information required for the notification/liaison process. This could be done face-to-face or by email, fax or post. Where relevant, the same form would also be used to confirm a mutual agreement between neighbouring farmers to apply their own coexistence solution (as outlined in paragraph 87). Both the GM and non-GM farmer will be expected to keep a copy of the form for reference.
96. Defra's current thinking is that it will not be a direct statutory obligation for non-GM neighbours to respond to notifications they receive, but that the legislation would be framed so that if they do not respond within the time allowed the GM farmer will then not be legally bound to take any further action to safeguard the neighbour's interests. It is also part of Defra's current thinking that to encourage fair play in the notification/liaison process there should be an offence of giving false information.
97. Where a neighbour confirms in response to a notification that he intends to grow a compatible non-GM crop within the separation distance, the GM grower will be expected either to change the intended position of his crop so that the separation distance is observed or apply a barrier row/strip (if there is sufficient scientific information to include this option as part of the statutory regime).
98. If the regime does provide for the use of barrier rows/strips, Defra envisages that GM growers would not be required to make a notification to neighbours where they intend to apply a row/strip of the appropriate dimension instead of a separation distance.
99. Defra expects that in nearly every case farmers will know who their immediate neighbours are who might be growing a commercial crop of oilseed rape or maize. If a GM grower is unable to identify a neighbour and therefore cannot make a required notification, he will not be able to grow the intended GM crop within the separation distance of neighbouring land (i.e. it would be an offence to do so).

Do stakeholders have any comments on how the proposed notification and liaison requirement would operate? What do stakeholders think about having a single notification deadline for spring-sown crops, rather than separate deadlines for spring rape and maize respectively (paragraphs 91/92)?

100. The following table gives an overall summary of the co-existence regime that Defra is proposing.

TABLE 5: SUMMARY OF PROPOSED COEXISTENCE REGIME

Measure	Points to note on measures
<p><u>Statutory crop separation distances</u></p> <p>GM grower must observe following distances:</p> <p><i>Where non-GM crop is:</i> Oilseed rape - 35m Forage maize - 80m Grain maize - 110m</p>	<p>Measured as shortest distance between GM and non-GM crop.</p> <p>Only applies in relation to crops to be sold as non-GM or organic.</p> <p>Observing the specified distance is not required where: (i) GM grower applies barrier strip (if scientific evidence allows Defra to specify one), or (ii) both farmers agree instead to alternative arrangements (if this option is provided).</p>
<p><u>Statutory notification/liaison requirement</u></p> <p>Using a standard form, GM grower must notify neighbouring producer of intention to sow GM crop by:</p> <p>1 March where GM crop is spring-sown 1 August where GM crop is autumn-sown</p> <p>if neighbouring land is within separation distance of intended position of GM crop.</p>	<p>Where intended GM crop is maize, relevant separation distance for notification purposes is the longest specified (i.e. 110m).</p> <p>Notification is not required if GM grower intends to apply a barrier strip (if scientific evidence allows Defra to specify one).</p> <p>GM grower will not have to observe a separation distance if neighbour does not return notification form within 14 calendar days confirming: (i) whether he plans to grow a crop for sale as non-GM or organic of the same species as the intended GM crop and, if so, (ii) at what distance from the GM grower's land he plans to grow the crop.</p>

TABLE 5 (continued)

Measure	Points to note on measures
<p><u>Non-statutory measures</u> (to be included in an industry code of practice agreed with Defra)</p> <p>Minimise presence of volunteers (including weed beet and potato groundkeepers) and beet bolters.</p> <p>Clean combine harvesters used on GM oilseed rape crops to minimise presence of lodged GM seed, if combine is to be used on a non-GM farm.</p>	<p>These measures should be applied by both GM and non-GM growers.</p> <p>GM grower to take lead in ensuring combine is cleaned before it goes to a non-GM farm. Where machinery is contracted, GM grower should ensure that contractor undertakes cleaning.</p>

Other Key points:

- Statutory measures will be specified in a Statutory Instrument made under Section 2(2) of the European Communities Act 1972
- Defra will monitor the effectiveness of the coexistence regime (both statutory and non-statutory elements) and review it in consultation with stakeholders. The review is expected to take place after an introductory period of about 2-3 years.
- Compliance with the statutory measures will be checked and enforced via Defra farm inspections. It will be an offence to fail to implement a specified measure. It is envisaged that penalties for breaches would be equivalent to those specified for the GM traceability and labelling regulations.

OTHER COEXISTENCE ISSUES

101. This section of the paper covers various issues that need to be discussed but which Defra believes do not require statutory action as part of the coexistence regime.

Non-GM oilseed rape produced from farm-saved seed

102. Many oilseed rape crops are grown from farm-saved seed (seed the farmer produces himself by retaining a proportion of the harvest from a previous crop, as opposed to using a fresh supply of bought-in certified seed). This has implications for coexistence because non-GM oilseed rape seed may contain an undeclared GM presence up to the labelling threshold for seed, and if this is grown near to a field of GM oilseed rape the resulting saved seed may have an increased GM presence which takes it over the seed threshold (i.e. before the saved seed is then used to produce a final crop). In fact this should not be a problem if non-GM farmers follow existing good practice for saving seed and:

- take saved seed from the middle of the field/crop (this should ensure that the saved seed has no more than a very low GM presence, well below the 0.3% level that the separation distance proposed by Defra should ensure, at worst, arises in the field/crop as a whole²⁹);
- do not use saved seed produced over more than one generation³⁰ (if this were to occur there might be a coexistence problem, because any GM presence in the seed could be increased over successive generations to a level that prejudices staying within the 0.9% threshold³¹);
- also, where non-GM farmers are growing more than one oilseed rape crop at the same time, they should take any saved seed from whichever of the crops is furthest away from a neighbouring GM crop.

103. Defra therefore considers that observing the proposed statutory separation distance for oilseed rape crops (paragraph 85) combined with existing good practice for saved seed will be sufficient for effective coexistence. It is envisaged that guidance on the use of saved seed will be included in the planned non-statutory code of practice for coexistence.

Do stakeholders think this is a reasonable way forward on farm-saved seed?

²⁹ The area of the field from which the seed is saved is likely to be well beyond the specified separation distance, and the oilseed rape in that part of the field between the GM crop and the saved seed area will act like a pollen sink or barrier, taking most of the GM pollen that comes into the field.

³⁰ i.e. the farmer should not save seed from a crop which itself was grown from saved seed.

³¹ For example, the original certified seed sown by the farmer may have an adventitious GM presence of, say, 0.3%. The seed saved from this crop might have an additional 0.1% GM presence as a result of cross-pollination from a nearby GM crop, giving it a total GM content of 0.4%. The crop sown from this saved seed may in turn acquire an additional GM presence via local cross-pollination, so that if seed were saved from this crop it may have a GM content of, say, 0.5%. If this cycle were repeated often enough the 0.9% threshold would be breached.

Coexistence training for GM farmers

104. Defra has considered whether there should be a formal training requirement for farmers planning to grow GM crops. Defra expects that:

- farmers should not have any problem with the proposed statutory notification and separation distance requirements – these are clear and therefore should be relatively straightforward to understand and implement;
- clear guidance on the non-statutory elements of the coexistence regime will be included in the accompanying code of practice (e.g. this will advise on best practice for volunteer and bolter control, and on machinery cleaning);
- appropriate advisory messages to growers on coexistence will be given and/or reinforced on the GM seed label, and more generally the GM seed suppliers will take their own steps to educate farmers on how best to use the new technology, including in respect of coexistence measures;
- if GM cropping become widespread the normal avenues for agricultural training (i.e. college courses) will cover specific requirements for GM crop management, including coexistence provisions.

105. In this context Defra believes that a statutory training requirement is unnecessary, and that to impose one would therefore be a disproportionate burden. This will be reconsidered as part of the review of the coexistence regime after the introductory period. Monitoring and enforcement activity will provide evidence on how well farmers have applied the rules.

Do stakeholders agree that a formal training requirement is unnecessary?

Honey production

106. If bees forage on GM crops the honey they make is likely to contain some GM pollen (of the crops considered in this paper, this would be the case for oilseed rape in particular). However, from the regulatory standpoint this is not an issue because:

- the European Commission has advised that any GM pollen in honey can generally be regarded as adventitious and unavoidable; and
- research has indicated that any GM presence in honey should always be well below the 0.9% labelling threshold³².

³² A study for Defra by the Laboratory of the Government Chemist in 1999 measured typical pollen levels in jars of ordinary honey and assessed the DNA/protein content of pollen. From this it was deduced that even if the pollen came just from GM crops, the GM presence in the honey would be much less than 0.1%.

107. Therefore, Defra does not propose any specific action in relation to the coexistence of GM crops and commercial honey production.

Do stakeholders accept this conclusion on honey production?

Coexistence regimes in other EU Member States

108. As further background, consultees may want to be aware of the coexistence measures that have been introduced or are planned in other EU countries. A report on this by the European Commission is available at http://europa.eu.int/comm/agriculture/coexistence/com104_en.pdf.

COEXISTENCE BETWEEN GM AND ORGANIC PRODUCTION - POSSIBLE SPECIAL ARRANGEMENTS

Introduction

109. Defra is supporting organic production because of the contribution it can make to environmentally sensitive farming. In particular, there is a specific scheme that offers financial help to farmers converting to or maintaining organic methods. Defra recognises that there is particular concern about how GM and organic crops will coexist, and it is keen to ensure that the possible introduction of GM crops should take due account of the needs of the organic sector. This section of the paper therefore looks at whether special measures should apply for coexistence between GM and organic production. It does so in the context of proposals made by the European Commission to amend the EU organic production Regulation 2092/91. Amongst other things, these proposals can be read as setting the legal threshold for adventitious GM presence in organic products at 0.9% (i.e. consistent with the EU labelling threshold specified in the GM-related legislation). The key question that arises is whether coexistence in the organic context should be based around a lower legal threshold than 0.9% - say 0.5%.

110. The AEBC considered this in its report on coexistence³³, looking in particular at whether a 0.1% threshold should operate for organic crops (and possibly also for conventional production). However, the AEBC could not agree a specific recommendation because of differing views on the appropriateness of imposing a GM threshold at the 0.1% level.

111. The Government's GM policy statement confirmed that Defra would explore further with stakeholders whether a threshold below 0.9% should apply. There is now a particular need to do so because of the proposed changes to EU Regulation 2092/91. If adopted, these would mean that:

- products that are labelled as containing GMOs (i.e. because they have an adventitious GM presence above 0.9%) could not be sold as organic or used in the organic process (this is already understood to be the case, but the Commission is proposing to make it absolutely clear)
- the general 0.9% EU labelling threshold for GM presence would apply to harvested organic crops and products used in organic farming (except in the case of seed, where specific EU labelling thresholds for GM presence have yet to be adopted) - so organic producers could sell crops or use inputs with an *adventitious* GM presence, providing it is within 0.9%

112. The Government needs to take a position on these proposals. The general aim for coexistence is to minimise unwanted GM presence as far as reasonably possible. In this context, should the Government support a 0.9% legal threshold for organic production or should it argue for a lower practicable figure to be adopted by the EU? Defra would like

³³ See in particular paragraphs 159-165 of *GM Crops? Coexistence and Liability* (link at footnote 7).

stakeholders' views to help inform the Government's negotiating stance, bearing in mind that the GM threshold in Regulation 2092/91 will set the benchmark against which Defra would intend to establish measures in England for the coexistence of GM and organic crops at farm level³⁴. The following paragraphs set out what Defra believes are the relevant factors for consideration and poses various questions for comment.

113. It should be emphasised that in this context the threshold issue does not relate solely to how coexistence will be managed in respect of GM and organic crops grown in the UK. Any threshold specified in Regulation 2092/91 will also dictate the legally permissible GM presence in inputs used by UK organic farmers (e.g. animal feed) and in materials or ingredients used by UK processors or manufacturers of organic food. This will cover material to be used in UK organic food production that is imported from other countries.

The possible context for coexistence between GM and organic production

114. Defra's coexistence proposals outlined in the preceding sections of this paper focus on the measures needed at farm level for maize, beet, potato and oilseed rape crops. These are crop species for which there is currently little or no UK organic production. It is possible that organic production of these crops will expand over time, but unless there is a dramatic increase the numbers involved will remain small. Approximate areas of organic and in-conversion crops in the UK as at 1 January 2005 were:

- 345 hectares of maize
- 29 hectares of sweetcorn
- 2004 hectares of potatoes
- 760 hectares of oilseed rape
- (no production of organic beet)

115. At present there is no foreseeable prospect of a GM crop being introduced of a type grown by many UK organic farmers (e.g. wheat). In general, avoiding mixing between different types of crop becomes increasingly difficult the more they are grown relative to each other. In this respect, the above figures for organic production suggest that it might be possible for coexistence between GM and organic crops to operate at a lower threshold than 0.9%, at least for oilseed rape, maize and beet.

116. In the case of inputs, UK organic farmers currently need to use conventionally produced (i.e. non-organic) seeds and may give their livestock a proportion of conventional feed material³⁵. In both cases the material may come from outside the UK (e.g. imported soya feed). Where

³⁴ UK organic certifying bodies can set rules for their own registered producers that are stricter than the minimum standards required by Regulation 2092/91, but Defra could not introduce on a national basis a stricter statutory measure as it would be inconsistent with EU law.

³⁵ The derogation under Regulation 2092/91 allowing the use of conventional animal feed will end by 2008 in respect of herbivores and by 2012 for other species, but there is open-ended permission to use other conventional inputs.

inputs other than seeds are produced in the UK they will be covered by the arrangements that Defra and the Devolved Administrations will put in place to minimise adventitious GM presence in non-GM crops to at least the EU 0.9% threshold (if the EU were to adopt a lower GM threshold in Regulation 2092/91 then that would become the relevant benchmark for domestic coexistence measures in relation to organic crops). Where organic inputs other than seeds are imported, they will have to comply with the 0.9% threshold (or lower threshold in Regulation 2092/91 if adopted), but clearly Defra will not be able to dictate what specific coexistence measures are applied in exporting countries to ensure that GM presence is within the required level. In the case of seeds used by organic farmers, seed producers will ensure that non-GM seed sold in the UK will have an adventitious GM presence below the relevant EU labelling thresholds, when these are adopted (see paragraph 41).

Responsibility for achieving a GM threshold below 0.9%

117. Against the background of a general coexistence regime which seeks to minimise unwanted GM presence as far as reasonably possible, Defra is clear that GM growers should apply the key coexistence measures needed in the context of a 0.9% legal threshold. However, it does not necessarily follow that they should also have to deliver a lower threshold for organic production, should one be specified in Regulation 2092/91. There are two basic arguments here, either:

- GM growers should implement the measures needed for any given threshold as they are introducing a new technology. To satisfy consumers organic crops may have to meet a threshold below 0.9%, and GM growers should facilitate this as it is cultivation of their crops that threatens organic producers' ability to meet the market demand.

or

- it is unreasonable to expect GM growers to deliver a threshold below the 0.9% legal standard for the specific benefit of farmers who gain a premium because their crops are based on a lower GM threshold. Precedents in agriculture suggest that those who want to produce to a special standard should take responsibility for meeting it (e.g. existing organic production rules generally put the onus on organic farmers to take the measures needed to meet the organic standard).

118. In the case of organic inputs that are imported, responsibility for observing the relevant EU threshold for GM presence will rest with whoever in the organic production chain is handling or using the material (starting with the importer in the first instance).

119. The view taken on the reasonableness or otherwise of expecting GM growers to deliver a lower threshold for organic crops may depend on the specific threshold that it is envisaged might apply. This is considered below.

Should responsibility for any threshold below 0.9% rest with GM or organic growers? How would organic producers cope with a threshold lower than 0.9% if the onus for meeting it rested with them? Are there important points that are not covered in the arguments outlined above?

'GM-free' or 0.1% (limit of detection) threshold?

120. Discussion so far on the coexistence of GM and organic production has largely been based on the idea that organic products should or must be 'GM-free'. This is commonly equated with a 0.1% threshold, on the basis that this is the effective practical limit for reliably detecting a GM presence in otherwise non-GM material. It is technically possible to detect a GM presence well below 0.1%, but this figure is used as an approximation for 'zero'. Therefore, when people refer to 0.1% what they normally mean is that if a crop/product is found to contain any GM presence it should not be called organic. This is not the same as a positive 0.1% threshold, which would permit a detected GM presence that is 0.09% or below.

121. Ideally coexistence arrangements would ensure choice to meet any desired threshold, but this would pre-suppose a perfect system of control that is unlikely to be achievable in a real-world situation. That is why food production systems normally work on the basis of pragmatic tolerances for perceived impurities. Defra considers that a 0.1% (limit of detection) threshold would present serious difficulties and ultimately not be in the best interests of the organic sector. This is because:

- (i) even if no GM crops are grown here, evidence shows that it would be difficult for UK organic production to claim 'GM-free' status where it is based on the use of imported material which is available in GM-form. For example, soya is the most widely grown and traded GM crop and a UK study³⁶ revealed that 10 out of 25 samples of soya-based organic and health food products on sale here had a detectable GM content (at levels up to 0.7%).
- (ii) in general, if a crop species is grown and traded in GM form, it is then almost impossible to produce it conventionally or organically with a guarantee that it will not have a detectable GM presence. As explained previously (paragraphs 40-49), there are various ways that a GM presence could be transferred into a non-GM crop, and it is unrealistic to expect that these could be stopped entirely. In relation to separation distances for oilseed rape or maize, for example, there is no practical distance that will guarantee that cross-pollination can never occur. It is theoretically possible to limit cross-pollination to an extremely low level (<0.1%) with very long separation distances (i.e. measured in kilometres). But in practice farmers would not be able to apply these, and imposing them on GM growers would be tantamount to a ban on GM crops, which is clearly inconsistent with EU law.

³⁶ *Detection of genetically modified soya in a range of organic and health food products: Implications for the accurate labelling of foodstuffs derived from potential GM crops*, British Food Journal, Volume 106, Number 3, March 2004.

Similarly, expecting organic growers to apply such distances would effectively preclude them from growing the type of crop in question. With crops like beet or potatoes it is more tenable to think that aiming for zero GM presence might be possible, but this is also unrealistic in practice. Farmers can ensure that volunteers and 'bolters' are minimised, but not guarantee their complete elimination. And the fact is that a 0.1% (limit of detection) threshold would not leave any margin for error.

- (iii) a 0.1% (limit of detection) threshold would assume that organic farmers have access to seed that is within this level. The EU has yet to adopt labelling thresholds for GM presence in seed, but figures in the range 0.3%-0.5% have been considered because they are consistent with meeting the overall 0.9% threshold for finished crops and food. If seed thresholds of 0.3-0.5% were adopted it would not preclude seed being available at lower thresholds, and seed producers may be able to offer seed at a threshold as low as 0.1% if there is a strong demand. But this could be very difficult, so it is likely that seed produced at or close to this level would carry a price premium.

122. In summary, Defra does not believe that a 0.1% (limit of detection) threshold is feasible, and the key question is whether it would be right to operate a threshold which may either not be achieved at all or, at best, not reliably in practice. Such a low level could not be enforced because testing is not accurate at this level (see below). It could undermine consumer confidence in the integrity of organic produce if there were repeated breaches of a specific GM threshold and/or it had subsequently to be abandoned as impractical.

What do stakeholders think of this analysis – is there any firm evidence that would call this into doubt or support a different conclusion? Is there an alternative analysis that should be considered?

A legal threshold between 0.1% and 0.9%

123. If a 0.1% (limit of detection) threshold is unlikely to be workable, could a threshold between 0.1% and 0.9% apply?

124. The difficulty of ensuring a GM presence below 0.9% varies by crop. For example, it would be much easier for beet than oilseed rape because of their differing characteristics. The aim could be a single, lower organic threshold that applies to all crops, or thresholds that vary by crop. Having different thresholds would make the situation more complicated and may confuse consumers. The same applies if a legal threshold below 0.9% were set because it is achievable in the short-term with limited GM cropping, but might have to be abandoned if the level of GM and/or organic cultivation of the crop increased.

125. Paragraph 121(iii) highlighted the potential difficulty and/or cost of obtaining seed consistent with a 0.1% (limit of detection) threshold. If the EU adopts seeds thresholds between 0.3-0.5% and organic farmers

cannot find or commercially afford seeds that are below these levels, then it follows that it would not be possible to operate thresholds in relation to finished organic crops that are lower than about 0.5%. This is illustrated in Table 6 below.

Table 6: Lowest practical rates of GM cross-contamination between farms for possible lower organic threshold(s), if EU seed thresholds are 0.3-0.5% and seed is unavailable at a guaranteed lower level of GM presence:

Source of GM presence	Oilseed rape	Maize	Beet
<u>Seed impurity</u> (if taken to be present up to assumed EU threshold of 0.3-0.5%)	0.3%	0.5%	0.5%
<u>Crop-to-crop cross-pollination</u> (assumes this is limited by appropriate separation distance)	0.1%	0.1%	(not applicable)
<u>Other sources</u> (i.e. via volunteers, bolters, seed transfer by machinery: assumes good standard of control)	0.1%	0.1%	0.1%
Total %	0.5%	0.7%	0.6%

What do stakeholders think about this? Is the expectation that demand from the organic sector will generate production of enough seed which is below EU labelling thresholds to enable a threshold for organic produce lower than 0.9% to be met? Will consumer demand for organic products distinguish between a GM threshold of 0.9% and, say, 0.5%?

Coexistence measures needed for a legal threshold below 0.9%

126. The measures required to operate below a GM presence threshold lower than 0.9% will be the same as those needed for the 0.9% threshold, except that longer crop separation distances would have to be applied for oilseed rape and maize. Based on Table 6, the aim would be to limit cross-pollination to no more than 0.1%, and on the face of it the NIAB report provides recommended distances for this purpose (Annex C). However, there is a general point here about the difficulty of establishing measures for a 0.1% threshold. The NIAB data is robust for cross-pollination thresholds down to 0.3%, but at the 0.1% level any data has to be treated with caution. Margins of error and issues of statistical sensitivity and uncertainty become much more pronounced at such a very low level. It is possible that appreciably longer distances would be required than those in the NIAB report to be confident of routinely meeting a 0.1% cross-pollination threshold. Defra will consider this further as new scientific information becomes available.

127. It should also be noted that aiming to limit cross-pollination to 0.1% is not the same as aiming to avoid it completely. As explained previously, there is no practical separation distance that could be applied to guarantee zero cross-pollination, because it is known that in extreme circumstances it may occur over very long distances.

Testing for GM presence

128. A lower organic threshold could only reliably be enforced if levels of GM presence can be accurately quantified - e.g. if the threshold was 0.5% it would be necessary to know whether the GM presence found was 0.51% or above, 0.49% or below, or exactly 0.50%. The detection method known as Polymerase Chain Reaction (PCR) is the recognised means of obtaining quantified GM measurements. PCR tests must be done in a laboratory with trained staff and specialised equipment. They cost about £200 per sample, with a turnaround time of between 3-10 days. At present there are only a limited number of UK laboratories that offer an accredited PCR GM testing service.

129. PCR is a sensitive analytical method that can detect a GM presence at very low levels (theoretically down to 0.001%). But the quantified measurements it produces have an inherent margin of error which derives from the test method itself. Where the results of replicated PCR tests indicate a GM presence at 0.9%, the margin of error may already be +/- 0.3 (so the *actual* GM content is somewhere in the range 0.6%-1.2%³⁷). The relative margin of error increases the lower the threshold (i.e. the accuracy of the test result decreases). Defra believes that the labelling thresholds previously discussed for seeds of 0.3%-0.5% represent the lowest levels of GM presence that might credibly be quantified using PCR.

130. Sampling is also an important factor. PCR requires the test material to be destroyed so it is only possible to analyse a fraction of the crop in question. How the sample is derived and the size of the sample³⁸ influences the accuracy of the test results. Sampling also introduces a margin of error in testing for GM presence, *in addition* to that which arises from the PCR method itself.

131. Operating a threshold well below 0.9% implies a greater use of GM testing than might otherwise be the case. With the co-existence measures proposed in relation to the 0.9% threshold, Defra believes that non-GM producers will not need to undertake routine testing to be confident that GM presence is within the required level. With a much lower threshold there would be less leeway in the measures being applied, and consequently a likely need to demonstrate more routinely that the threshold is not being exceeded. The extra testing implied for a lower threshold would increase costs and this may not be a realistic option in the context of commercial crop production (i.e. the extra costs may be more than existing profit margins).

132. In Defra's view, it would not serve the interests of either producers or consumers to adopt a threshold that because of sampling and testing limitations cannot be reliably monitored or enforced. If this is accepted, it

³⁷ Based on a 95% confidence interval – i.e. in 95 cases out of 100.

³⁸ Testing for a lower threshold needs very large samples – e.g. a sample of 3000 seeds would be required to give 95% certainty of levels being below 0.1%.

implies that any specific GM threshold for organic production could not reasonably go below a level of, broadly, 0.5%.

Do stakeholders accept this analysis? Are there technical points that need to be clarified or points not covered above that should be considered?

A process-based standard

133. Organic farming normally operates on the basis of process-based standards, as opposed to testing of the end product to guarantee a particular level of compositional purity. Rather than applying a specific threshold, an alternative approach could be to work towards a process standard written in terms of using best endeavours to minimise GM presence as far as possible.

134. The aim of the general coexistence regime is to keep unwanted GM presence as low as possible, and it will require GM growers to ensure that any GM presence in organic crops is below 0.9%. With a process-based standard organic farmers could take additional steps to avoid GM presence still further (e.g. use GM-free seed where available, apply extended separation distances and extra rigorous volunteer control, etc). No guarantee would be given that any GM presence in organic products is at a specified level lower than 0.9%. General monitoring would be done to check compliance with a 'best endeavours to minimise' standard, but there would not be routine GM testing of organic products.

135. If the aim were to promote organic products as 'GM-free', measures would have to be applied on the same basis as a 0.1% limit of detection threshold. This would raise the same questions about the practicality of such an approach as discussed earlier. As noted, a GM-free label would imply a product that is *guaranteed* not to have any GM presence.

Is a process-based standard an alternative way forward? How practical is it?

Overall, what do stakeholders think is the appropriate legal threshold for adventitious GM presence in organic products, bearing in mind the various factors considered above? With the general objective being to minimise GM presence as far as possible, but allowing for the practical constraints, what should be the specific aim in relation to organic production? Should the Government support the Commission's proposal to fix the threshold at 0.9% or argue for a lower figure?

REDRESS FOR ECONOMIC LOSSES

136. The Government's GM policy statement confirmed that Defra would consult stakeholders on "options for providing compensation to non-GM farmers who suffer financial loss through no fault of their own", making it clear that any compensation would need to be funded by the GM sector itself, rather than by Government or non-GM producers. This section explores the issues at stake and sets out potential models for a mechanism to redress potential economic losses.
137. The basic issue is that crops grown as non-GM (conventional or organic) could be worth less if they must be sold as 'GM', because they have a GM presence above the EU 0.9% labelling threshold. This outcome would be unfair to the farmers affected, so there is a need to consider possible redress mechanisms should this occur. Existing means of seeking redress are unproven in this area. The application of the common law of negligence or private nuisance to GM cross-pollination is untested and uncertain. It may also be difficult for a non-GM farmer to establish who is the proper defendant for a case. This background creates uncertainty for both non-GM and potential GM farmers.

General Assumptions

138. Defra's view is that redress for economic loss should only be available to farmers if the GM presence in a non-GM crop exceeds the 0.9% EU threshold. It would be a disproportionate burden on the GM sector to make it liable for redress on the basis of a threshold stricter than the relevant legal standard. The general coexistence regime will aim to keep GM presence below 0.9%, and it would not be appropriate for a redress mechanism to operate at a different threshold to that used for statutory coexistence measures.
139. In considering a redress mechanism a number of further assumptions underpin Defra's approach:
- GM crops will only be grown in the UK if there is a market for them, and it should generally follow that a non-GM grower with an affected crop (GM presence >0.9%) will have a market in which to sell it.
 - the potential need for a redress mechanism is predicated on non-GM crops (conventional or organic) trading at a premium. If the market does not distinguish between GM and non-GM (or if GM crops are grown which offer consumer benefits and themselves trade at a premium) no economic loss would occur to non-GM farmers and therefore redress would not be required.
 - if effective coexistence measures are in place, then the instances where non-GM growers might face a loss due to a GM presence above 0.9% should be very infrequent; in addition, the value of any redress claim is likely to be relatively low (details on costs are given in the

Regulatory Impact Assessment at Annex B). The possible implications of this are explored later on.

- the redress scheme should only cover direct financial loss from individual incidents.

What claims for economic loss should be considered?

140. In establishing any redress mechanism the specific economic losses for which redress is available need to be clearly identified. The general or default position will be that the loss is the difference in crop value where a crop has to be sold as 'GM' instead of non-GM or organic. However, a number of additional losses can be envisaged which need consideration.

Loss in Crop Value

141. If a farmer grows a crop for sale as non-GM but can then only sell it as 'GM', there may be circumstances in which there is no market for the GM equivalent (e.g. the non-GM farmer may be growing sweetcorn maize while GM maize is only being grown as a forage crop and there is no market in which it is traded). The loss in this case would be the whole of the non-GM or organic price that has to be foregone, as there is no GM market to sell into to mitigate the loss.

142. The EU 0.9% labelling threshold applies at the point where crops are sold off the farm. For crops like oilseed rape, beet or sweetcorn maize for processed food use, Defra expects that in all normal circumstances the relevant unit of production when considering possible redress will be the crop obtained from a whole field. This is because farmers will trade these crops, as a minimum, on a whole field basis. Therefore the issue of whether a non-GM crop has a GM presence above 0.9% would be assessed on a whole-field basis, and calculations of possible economic loss would be based on the value of the crop in the whole field.

143. The situation is less straightforward for sweetcorn maize intended for sale as individual corn-on-the-cob. The cobs in the nearest row of plants facing the GM field might have a GM presence above 0.9%, but the remainder of the field could be within 0.9% and therefore still be saleable as non-GM. It would be impractical to undertake widespread spot testing in the field to determine the precise extent of any excessive GM presence. At the same time it would be unreasonable to deem that the whole field must be treated as 'GM' because the 'leading' row of cobs has tested above 0.9%. Therefore, where tests for GM presence are undertaken in this context, Defra proposes a standardised approach broadly as follows:

- a first test is done on a sample of cobs in the first row nearest the GM crop; if this shows a GM presence above 0.9% a further test should be done on a sample of cobs halfway into the field.
- if the second test shows a GM presence above 0.9% the whole field must be treated as 'GM'; if the result is below 0.9%, the second half of the field can be sold as non-GM and only the first half is deemed 'GM'.

144. If a conventional (non-GM) forage crop has a GM presence above 0.9%, the EU rules still allow the farmer to feed this to his own animals and the associated products (meat, milk or eggs) do not have to be labelled as GM. Therefore from a regulatory standpoint there is no reason why an economic loss should occur and no need to consider redress. An economic loss might arise because the farmer is subject to a supply contract which stipulates the use of non-GM feed. But this would be a market-led rather than regulatory requirement, and as such Defra does not think it would be appropriate for the Government to provide a specific redress solution (the Government's general stance is to facilitate the coexistence arrangements that can be regarded as necessary because of the EU 0.9% labelling requirement).

145. However, if an organic forage crop has a GM presence above 0.9% the EU organic standards regulation is expected to prevent the organic producer from feeding this to his own animals³⁹. In this case, therefore, an economic loss could arise due to a regulatory constraint, and Defra would see a redress solution applying in these circumstances.

Have we correctly identified the range of losses that might occur in crop values? What are your views on the proposed approach for dealing with the corn-on-the-cob scenario?

On additional losses

146. A non-GM farmer with an affected crop (GM presence >0.9%) may face additional losses to that in crop value. Costs that may flow directly would include those incurred in testing the affected crop for GM presence; the cost of storing the crop separately, or longer than intended, as a result of being unable to sell as originally intended; or extra transport costs as a result of having to treat the crop as GM rather than non-GM. Defra is open to arguments on this point, but to decide the scope of any redress mechanism a clear rationale will be required for determining those losses which are covered and those which are not.

147. A general point to bear in mind is that the more types of loss that are covered by a redress scheme, the more complicated and bureaucratic it may be to operate. Determining a loss in crop value should be relatively straightforward, but establishing the level of additional losses would entail further effort that could be disproportionate to the sum of money involved. If additional losses were to be covered, to minimise bureaucracy the best approach might be to adopt a system of fixed or standard costs (e.g. for crop storage per day), avoiding the need to assess actual costs in detail. An effective scheme would ensure that claims for redress are settled fairly promptly, the general idea being to avoid or improve upon the cost, bureaucracy and uncertainty that would arise if cases were left to be resolved through legal proceedings.

³⁹ As noted at paragraph 111, the European Commission has proposed an amendment to Regulation 2092/91 to make it clear that material above the 0.9% threshold cannot be used in organic production.

148. Other types of loss can be envisaged which Defra does not think should be part of a redress mechanism. For example, a farmer may lose subsequent business from a buyer as a result of being unable to fulfil a previous supply contract. A potential purchaser may decide not to buy a particular non-GM crop, or pay a reduced price, if it has been grown in the general locality of a GM crop, even though GM presence is below the required threshold. Alternatively, a farmer may take a precautionary decision not to grow a particular crop, to avoid the possibility of it being unacceptable because of its proximity to GM crops. An organic certifying body may decide to decertify or remove accreditation from either a field or an entire farm. Defra's view is that losses resulting from voluntary standards or market-led decisions should not be covered by the redress mechanism, although compensation for these losses could still be sought through legal proceedings.

149. It is conceivable that losses may occur further up the supply chain. For example, a processing business may suffer a loss if it cannot meet its commitments because it is not supplied with a non-GM crop. However, Defra expects that normal contractual arrangements will govern the relationship between the farmer and the purchaser of his crop, and relationships further up the supply chain, and in these circumstances it may be unnecessary for a formal redress mechanism to operate.

Should consequential or additional losses be covered by any redress mechanism? If so, which should be covered and why? How likely are these to occur? Are there any other types of loss that should be considered?

Who should be entitled to claim redress and what eligibility criteria should they satisfy?

150. Strict eligibility criteria would need to be agreed to ensure that any scheme operates fairly and is not open to abuse. Redress should be limited to non-GM farmers who can demonstrate that there is a GM presence above 0.9% in their crop through no fault of their own. In order to demonstrate no fault and a just claim on their part, non-GM farmers may need to produce evidence, for example to confirm that:

- non-GM seed was used (i.e. below the relevant seed labelling threshold adopted by the EU).
- the affected crop was destined for a premium non-GM or organic market.
- any obligations arising from the coexistence regime had been complied with (e.g. accurate information was given in response to a GM neighbour's notification, and cropping plans were not subsequently altered in a way that compromised the required separation distance).
- the finding of a GM presence above 0.9% was based on samples taken in accordance with a recognised protocol and tested at a suitable accredited laboratory.

151. This is not meant to be a definitive list but indicates the sort of criteria likely to be appropriate. Defra expects that there would need to be an adjudication process to determine the eligibility of redress claims, including an appeal or arbitration mechanism (see paragraph 168).

152. If eligibility criteria were to be applied as set out above, a further issue for consideration is whether a failure to meet one of these criteria in some minor way by a non-GM farmer, which it can be demonstrated would have had no meaningful effect, should necessarily invalidate a claim for redress, or the extent to which the principle of contributory negligence should apply to reduce the compensation awarded under the scheme. In addition, it would also be necessary to consider whether eligibility for compensation is dependent upon the excessive GM presence being identified before the affected crop leaves the farm, after which there may be other sources of GM presence.

What should the eligibility requirements be for non-GM farmers to seek redress? Are there particular criteria that have not been highlighted?

Who should pay any compensation?

153. The Government's policy statement made clear that any compensation should be funded by the GM sector. But this could take a number of forms.

GM farmers who do not comply with the specified coexistence measures

154. This would have the advantage of placing the burden on those farmers most likely to be the cause of an excessive GM presence in neighbouring crops. The GM farmer would pay for the economic loss direct to the non-GM farmer affected. This would provide a strong incentive for GM farmers to comply with coexistence measures. However, it would not cover the situation where an excessive GM presence arises through no fault of a GM farmer, or where fault cannot be specifically attributed.

All farmers growing GM crops.

155. This would spread the burden evenly among all GM growers. However, it does not have the advantage of the first option of providing a direct incentive for GM growers to comply with coexistence measures, and it could be said to penalise unfairly those farmers who do comply.

GM seed companies.

156. If GM seed companies were to fund a redress mechanism this is likely to involve the entire GM sector in the process. It would be a commercial matter between the companies and GM farmers to determine through their market relationship the precise allocation of the burden. For example, the seed companies could recover their costs through increased seed prices. It would also be open to them to recover some costs from GM farmers who have not complied with coexistence rules, by making compliance a condition of the GM seed contract. Making GM seed companies responsible would give them a clear incentive to ensure an effective

coexistence regime. This in turn should increase confidence in the potential effectiveness of the regime and the degree of compliance with it.

157. The burden could be applied equally on all GM seed companies, but a potentially fairer approach might be to distinguish between the companies in some manner. For example, the burden could be distributed according to market share - the companies selling more GM seed would bear more of the burden. Alternatively, it may be possible in many cases to identify the company whose GM seed has given rise to the redress claim. But a desire to target the redress burden must be weighed against the simplicity and cost of running the scheme.

Are there any alternative ways of distributing the burden on the GM sector? Are there any strong arguments or pros/cons to each approach that have not been covered?

Possible options for seeking redress

158. Having set out the relevant considerations above, Defra has identified three basic options by which affected non-GM farmers could seek and be given redress for economic losses. As noted earlier, it is expected that both the number of claims and their value will be small. The aim is to provide a mechanism that is clear, simple and proportionate, and which minimises the burden on both the non-GM farmer making the claim, and the GM sector in providing redress.

Option 1: Seeking compensation under existing law

159. In principle, non-GM farmers who suffer a loss would be able to seek redress through the civil courts under the current law. The non-GM farmer could seek an injunction and/or damages under the common law of tort, claiming negligence or private nuisance. However, the application of the common law of negligence or private nuisance to GM 'contamination' is untested and uncertain. To recover economic loss, the non-GM farmer would need to show either damage to his property and the loss derived from that damage or, where there was no such damage (i.e. pure economic loss), that the defendant had a duty of care to the non-GM farmer such that recovery of that loss would be fair. It is not certain whether a GM presence in a non-GM crop would be regarded as damage by the courts. A GM crop will only be grown commercially if it passes the legal risk assessment process, so it may be a contradiction to treat as a form of damage the presence of a legally-approved GMO.

160. It may also be difficult for a non-GM farmer to establish who is the proper defendant. This background creates uncertainty for non-GM and GM farmers alike. Any GM presence may have a number of sources, and accordingly it may be impossible for a non-GM farmer to identify and seek redress directly from a given GM grower, for example by proving that he had not complied with the coexistence requirements.

161. In its report on coexistence and liability the AEBC also expressed concern that pursuing a legal case could be disproportionately time-

consuming and costly for farmers. It could also impact on general relations within rural communities. Accordingly, this does not provide either clarity or simplicity, and Defra shares the AEBC view that it would be preferable if coexistence disputes were settled without recourse to litigation. Litigation would, however, remain an option if the claimant did not want to use the redress scheme or was unsatisfied with the settlement offered.

Option 2: A voluntary industry-led scheme

162. An alternative would be for the GM sector to set up and fund a voluntary redress mechanism. To be effective, responsibility for this would need to rest with the GM seed companies, rather than farmers growing GM crops. It could be seen as a confidence-building measure. A voluntary scheme may offer a number of advantages. It could be established more quickly and would be more flexible than a compulsory scheme. It is likely to provide a strong incentive for the industry to ensure that GM growers comply with the co-existence rules.

163. A voluntary redress 'charter' is being developed by the farming and industry group SCIMAC, as part of its wider proposals for an industry-led coexistence regime. The SCIMAC plan involves the GM seed companies committing to a charter whose aim is to restore the market position of any non-GM farmer whose crop exceeds the 0.9% threshold through no fault of their own. It envisages a number of ways that redress could be provided, including:

- direct replacement of affected produce (i.e. crop substitution)
- indirect replacement of affected produce (e.g. 'virtual' crop substitution, where affected produce is directed to an outlet and the claimant paid as if the crop were as originally intended)
- direct cash compensation
- compensation 'in kind'

164. In terms of a delivery framework, SCIMAC favours a system for redress which mirrors or builds on existing supply chain arrangements as far as possible, and which recognises that a single prescriptive approach may not be the most effective in all circumstances. With this in mind, SCIMAC has given the following examples to illustrate potential delivery mechanisms:

- *conditions of sale on GM seed*: the sale of certified seed is governed by a licence between the relevant plant breeding company and seed merchants. The licence could specify that the merchants are signatories to the redress charter, and that sales of GM seed could only take place under specified conditions relating to coexistence and redress
- *inter-professional agreements (IPA)*: it could be a condition of GM seed sales that farmers enter into an IPA that commits them to comply with

coexistence requirements, in return for being covered by the industry redress charter

- *farm assurance scheme*: Existing crop assurance schemes have confirmed to SCIMAC that they could readily incorporate coexistence provisions. It could be a condition of GM seed sales that the farmer is a fully accredited member of a relevant assurance scheme, in return for being covered by the redress charter

Option 3: A statutory redress mechanism

165. If industry does not set up a voluntary scheme, or a proposed scheme is deemed unacceptable, then the Government would need to consider establishing a compulsory redress mechanism to be funded by the GM sector. This would probably require new primary legislation to make the GM sector strictly liable for compensation and to provide for:

- a requirement to pay compensation on the terms specified
- the establishment of a body to receive and adjudicate on redress claims (with the power to order payment), and an appeal mechanism
- the costs of the process to be charged to the GM sector

166. If a compulsory scheme made GM seed companies strictly liable it would also have to establish the mechanism by which a non-GM farmer could recover any economic loss. Possible models are:

- a) Establishing a specific body with the power to require GM seed companies to pay redress directly to non-GM growers. On the face of it this is an attractive option as it should be administratively straightforward. Redress would be payable on a case-by-case basis once the claim had been established.
- b) A variation on the above would be for the Government to act as a buffer. As above, a specific body would adjudicate on claims and if a claim is confirmed the non-GM grower would receive redress from the Government. This would prevent any undue delay in the non-GM farmer obtaining redress once the claim has been established. The Government would then have the power separately to recover the necessary funds from the relevant GM seed company (or companies).
- c) Establishing a specific fund from which redress claims are paid. Defra's initial view is that this could be financed through charges on the GM seed companies, possibly through a levy on all GM seed sold. This would spread the burden across the GM sector according to market share. The money collected would be directly related to the amount of GM seed sold and hence the extent of GM cultivation. If the amount raised exceeded claims, the charge could be reduced or suspended, or the excess funds returned. However, requiring pre-payment into a fund may create a sizeable pot of money waiting inefficiently for claims to be made against it. Administering the levy to achieve the desired level of funding would be an added level of complexity.

167. If a compulsory redress mechanism is preferred the practical arrangements would need to be set out in detail, but it is not proposed to do that at this stage. Defra would seek to make the arrangements as simple as possible, to minimise the burden on farmers wishing to make a claim, to ensure that redress can be paid without undue delay, and to minimise bureaucracy and costs. Defra would consult on the detailed arrangements before they were put in place.
168. In establishing a body to administer the system and assess claims there would be various factors to consider, such as cost (relevant to individual claims and overall level of use), the level of expertise necessary (including legal expertise) and independence. It would have to inspire confidence and work in a clear and transparent manner. There would need to be an appeals mechanism and, possibly, arbitration procedures. It is envisaged that administration costs would be met from the GM sector.
169. It would also be necessary to set out the criteria by which the level of economic loss is set. Defra has set out the principle that in the first instance this should be the difference in value between selling a crop as GM instead of non-GM. If a pre-existing contract specifying a price for the non-GM crop was in place that would have been met except for the level of GM presence, then the value of the redress should be the difference between the value of that contract and the price achieved for the GM crop. If no pre-existing contract is in place Defra would propose that redress is paid on the basis of a rolling one-year average of any price difference between the GM crop and its non-GM counterpart. This is on the basis that while the price of commodity crops varies quite significantly during the year, it is expected that any differential which exists between the price of GM and non-GM crops would remain fairly constant. For an organic forage crop the loss recoverable would be the cost of sourcing suitable replacement forage. As the number of redress claims is expected to be small and the sums involved relatively small, Defra would favour establishing a simple administrative process for establishing the level of economic loss. Thus for additional losses such as the cost of testing, Defra would favour establishing standard rates if practical and equitable.

General consideration

170. In assessing options for a possible redress mechanism, the likely scale of the issue needs to be borne in mind so that any arrangements entered into are realistic and proportionate. As noted at paragraph 139, Defra expects that in practice there would be very few claims for redress, and any such claims would be for relatively small amounts. If this is the case, it may be disproportionate to incur more than minor costs to set up and administer a redress scheme, which might indicate a marked preference for a solution that keeps bureaucracy to an absolute minimum. Comparing possible voluntary (industry-led) and compulsory (statutory) schemes, the former is likely to be cheaper and more straightforward to establish and operate. And in particular, the cost of setting up a statutory

scheme could be relatively significant, given that in the first instance it may require new primary legislation to be adopted.

Insurance

171. In its report the AEBC suggested that insurance products may become available over the longer term that would provide cover for possible GM-related economic losses. Whilst Defra remains open to the idea of an insurance market developing, it does not see this as a solution in the short-to-medium term. Therefore, the issues around a possible insurance market have not been explored in this paper.

Which redress mechanism do you favour and why? If a compulsory redress mechanism is your preferred option, which of the models at paragraph 166 should it employ?

A PUBLIC REGISTER OF GM CROPS

172. A specific question which is relevant to coexistence is whether there should be a public register that specifies the precise location of every GM crop that is grown. This section outlines the pros and cons of this idea and invites stakeholders' views.

173. The AEBC report on coexistence and liability considered the possible use of a GM register⁴⁰ and the Royal Institute of Chartered Surveyors (RICS) has previously published a detailed proposal for a web-based GM land register.

EU position

174. Any new EU approvals for the commercial cultivation of GM food or feed crops will be granted under Regulation (EC) 1829/2003. This does not require the keeping of a public register of GM crop locations.

175. The cultivation of any GM non-food/feed crops will continue to be approved under Directive 2001/18/EC. Article 31(3)(b) of this Directive does require Member States to establish a form of public register to record the location of commercial GM crops. This provision was introduced specifically in connection with post-market monitoring arrangements. When a GM crop is approved for commercial release a monitoring plan must be implemented to test the assumptions made in the risk assessment and to identify any unanticipated effects. The details of each plan will be determined on a case-by-case basis, but in this context it is important to note that monitoring will not necessarily be carried out at every site where a given GM crop is grown. The level of detail and comprehensiveness of the register required under Directive 2001/18 is up to each Member State to decide.

176. Notwithstanding the legal position, the coexistence guidelines issued by the European Commission refer to a public register as a potentially useful instrument and a factor which should therefore be considered by Member States when developing their national plans.

How would a GM register help?

177. A register could include any or all of the following:

- where each specific type of GM crop *is due to be* grown (a system of advance notification)
- where GM crops *are being* grown
- where GM crops *have been* grown (i.e. as a long-term historic record of all land planted with GM crops)

178. The arguments in favour of having a detailed GM public register are that it would:

⁴⁰ Paragraphs 227-236 of *GM Crops? Coexistence and Liability* – link at footnote 7.

- a) facilitate coexistence between farmers, by providing a clear source of information on proposed GM plantings around which arrangements can operate.
- b) be a clear and transparent system for confirming the location of GM crops (or land on which they have been grown).
- c) enable others with an interest to have ready access to information they may want (e.g. people growing plants in private gardens or allotments who might be concerned about GM cross-pollination, organic farmers, farmers thinking about setting up or maintaining a voluntary GM-free zone, or people buying land who may want to know if it has been used to grow GM crops)

179. The counter-arguments against establishing a detailed GM register are as follows:

- a) it is not needed to support Defra's coexistence plans if, as proposed, GM growers are required to notify neighbouring farmers as necessary of their intention to sow a GM crop.
- b) moreover, it is unlikely to be particularly helpful or practical for coexistence. Instead of the proposed notification requirement, GM farmers would need to register their cropping plans on the system and then neighbouring farmers growing non-GM crops would have to register any compatible crops. The GM farmer would then have to check to see whether this was within the separation distance and take action accordingly. This may be a more burdensome approach than direct communication between farmers.
- c) in relation to garden or allotment plants, there are no formal rules in respect of these being cross-pollinated by ordinary commercial crops, and it is important to remember that GM crops will only be approved for release if they are considered safe for health and the environment. Rules are needed to protect the interests of non-GM farmers because they must label their crops as 'GM' if they have a GM presence above 0.9%, but people growing plants for their own use or consumption are not affected by this legal requirement⁴¹. In these circumstances it would be difficult to justify introducing a statutory requirement for a GM register in relation to plants that are not for sale.
- d) if prospective purchasers of land want to know if it has been used to grow GM crops they can ask the vendor for appropriate details. The EU traceability and labelling Regulation 1831/2003 facilitates this by

⁴¹ Of the crop types being considered in this consultation, it is perhaps only in relation to maize that there may be an issue as regards sweetcorn grown in gardens or allotments. Oilseed rape is not normally grown for personal use, and if privately-grown potato or beet plants were cross-pollinated by GM varieties, the harvested part of the plant (the tuber or root) would not have any GM presence. Even in the case of privately-grown sweetcorn plants, these are normally cultivated in a tight block to encourage cross-pollination between the immediately adjacent plants, and it is unlikely that they would be cross-pollinated by a nearby commercial crop (although this cannot be ruled out completely).

requiring farmers to keep records of where GM crops have been grown for 5 years. It would be difficult to justify setting up a detailed crop register for this purpose.

- e) a public register may be misused. The Government's policy of disclosing the location of GM trials has been abused by a small minority intent on 'trashing' the crops. There is clearly the potential for a similar situation to arise with commercial GM crops, and Defra is aware of one organisation that was set up with the specific intention of removing commercial GM crops from the ground. There has to be a concern, therefore, that a legitimate activity may be hindered if details of GM crop sites are made freely available.
- f) a register will cost money to operate. RICS has estimated that its proposed GM land register would cost about £150,000 to develop and £40,000 a year to maintain. Cheaper options are likely to be possible, but the Government would be hard pressed to justify using taxpayers' money to fund a register, or pass on the costs to the industry, unless there was a strong justification in public policy terms.

180. Another possible approach would be to limit the full availability of the information on any register to those who can demonstrate a genuine interest. This would attempt to avoid misuse of the information for purposes such as crop trashing. The public register would make information publicly available of the types of GM crops being grown in a general location (for example County level). Precise locations would be made available on application to those who demonstrate a genuine interest. This might include, for example, organic farmers, allotment growers, or farmers in voluntary GM free zones. It can be argued that these groups have an interest in knowing where compatible GM crops are being grown, and beyond the distances set for notification procedures.

181. Taken overall, Defra's current thinking is that it would be difficult for the Government to justify imposing a detailed GM crop register, bearing in mind the potential costs and burden on farmers. Whilst a register would offer certain benefits, these lie beyond what is strictly necessary from a regulatory standpoint. The Government's general policy is to facilitate co-existence measures that are a logical consequence of the EU legislation on the tracing and labelling of GM products. A particularly compelling reason would be required to introduce a new statutory provision that goes beyond that position, and at present Defra is not convinced that a GM register can be justified in those terms. Defra would nevertheless like to hear people's views on this before reaching a final decision.

How could a crop register aid coexistence? Are there other reasons to justify the establishment of a register? How should any register relate to a notification requirement? If a register is established should the information be available to everyone? How would a register be funded?

VOLUNTARY “GM-FREE” ZONES

182. The Government’s GM policy statement confirmed that Defra would offer farmers guidance on voluntary GM-free zones. Defra is not advocating these and does not see them as necessary - the coexistence regime proposed in this paper aims to safeguard the interests of all farmers. Nevertheless, it is accepted that some people may be interested in establishing a GM-free zone in their area, and that in the interests of choice Defra should provide relevant information for their consideration. The following is Defra’s initial thinking on the guidance that might be provided, but Defra would like to review this in the light of comments from stakeholders.

Legal position on GM-free zones

183. If a GM crop is approved for cultivation under EU legislation, it could be a condition of the consent that it is not grown in a particular geographic area. However, this could only be the case if the crop posed a particular risk to human health or the environment in the area in question. In practice, it is unlikely that a risk would arise only in a specific area (as opposed to more generally). In all normal circumstances, therefore, it can be expected that GM approvals will be on an EU-wide basis.

184. Under EU law it is clear that farmers are entitled to grow approved GM crops and that this should not be undermined by disproportionate co-existence measures. Mandatory “GM-free” zones would not be a proportionate measure, but the European Commission has confirmed that GM-free zones are possible if farmers in a particular area decide voluntarily to adopt one.

Defining the overall aim of voluntary zones

185. The first issue to be resolved when considering setting up a voluntary GM-free zone is to define precisely the objective. If the aim is to be able to sell crops as ‘GM-free’ then farmers should consider what they mean by this. Defra does not believe that a strict ‘GM-free’ or 0.1% (limit of detection) standard is possible, as explained earlier in this paper (see paragraphs 119-121 on a ‘GM-free’ threshold for organic crops).

186. If the aim is to establish an area in which GM crops are not deliberately grown and/or in which farmers can guarantee not to exceed a level of GM presence lower than the EU 0.9% labelling threshold, then the matters set out below should be considered (rather than a ‘GM-free zone’ it may be more accurate to describe this scenario as a ‘non-GM cultivation zone’):

- (i) how to obtain seed that is as close to GM-free as possible (see previous discussion on this at paragraph 120(iii)).
- (ii) how to apply separation distances that are greater than those required under the coexistence regime, bearing in mind that with crops like oilseed rape and maize cross-pollination at a detectable level can occur over very long distances (in this context the onus would fall on

the non-GM farmers to observe the extended separation distances needed for the 'zone').

- (iii) liaison with neighbouring farms outside the 'zone' to clarify whether and where GM crops might be due to be grown in the vicinity
- (iv) the measures needed to control volunteers and 'bolters' (if growing beet) to prevent these acting as a pathway for possible GM transfer; and ensuring that machinery which comes onto farms from outside the 'zone' is cleaned free of possible GM seed.
- (v) whether to have finished crops tested for possible GM presence. This might be needed in particular if crops were to be sold on the basis of having some special status (at or near to 'GM-free').
- (vi) whether the intention is to forego the use of all types of GM crop that are or might become available, or just to avoid the use of one or more specific types of GM crop.
- (vii) whether it is intended forego the use of bought-in animal feed that has GM ingredients. This may depend on the claims the farmers wish to make about avoiding GM in their production process.

Possible criteria for creating a 'Non-GM cultivation zone'

187. Farmers planning a zone should also consider the following points:

- (i) how large the zone needs to be to achieve the objective: having a zone may pre-suppose that it covers at least a reasonable area of land and/or number of farms. The precise number of farms (or area of land) that would need to be involved is a matter for individual judgement. If the aim is to establish a trading identity to sell crops on a particular basis (e.g. as 'low GM'), the zone would need to be large enough to be a credible entity for marketing purposes.
- (ii) whether it will be a coherent zone: does the envisaged zone cover a coherent, unbroken area, or would there be 'holes' within the boundary where a farmer is growing GM crops? If the latter, it may undermine the purpose for having the zone or its credibility.
- (iii) whether the boundary should follow topographical features: although not essential, it would be ideal if the farms on the boundary of a zone were not immediately adjacent to other cropping farms – i.e. if there were a road, river or other topographical feature between their land and the nearest farm outside the zone. This would help to define the boundary and make it easier to minimise potential GM presence.
- (iv) whether the zone should correspond to a particular geographic area: this may be necessary if the aim is to establish a specific marketing identity (e.g. the 'North Enfield Non-GM Farmers Co-operative').

Formalising the establishment of a zone

188. Farmers will need to obtain their own legal advice on setting out the rights and responsibilities of the participants in a zone (Defra cannot supply legal advice). The relationship may be similar to establishing a local co-operative. The written understanding (or contract) may need to take account of the possibility that farmers who initially sign up to be part of the zone may change their mind and want to withdraw. This points to the use of a time-limited membership period or review clause, unless farmers are happy to be locked into an open-ended commitment.

189. The arrangements may also need to deal with the possibility of group members wanting or being forced to pass on ownership of their land to a successor who may not want to be part of the zone (e.g. because of retirement, ill-health, death or insolvency). Otherwise, a situation could arise where GM crops begin to be grown within the zone, undermining its rationale. This suggests that the original participants should ensure that anyone who takes over their land is obliged to continue with the rules they have agreed. Depending on the circumstances, however, this form of conditionality may make their land less attractive to potential buyers.

Setting up a zone

190. It will fall to the individual farmers who are keen on the idea to make the running in establishing a zone. They may need to identify and contact other farmers in the area to explore their possible participation, and take the lead in organising relevant arrangements. Local farmer networks may already exist that will facilitate this, or those farmers proposing a zone may need to take special steps to develop their initiative (e.g. consulting the local Land Registry to identify all the relevant farmers in an area or putting an advert in a local paper to attract support for their idea).

Do stakeholders have particular comments on the guidance that Defra could make available on GM-free zones. Are there relevant points that have not been covered in the above?

LIST OF CONSULTEES

ADAS
Advanta Seeds (UK) Ltd
Advisory Committee on Organic Standards
Agricultural Biotechnology Council
Agricultural Industries Confederation
Asisco Ltd
Association of British Insurers
Association of Independent Crop Consultants
Assured Combinable Crops Scheme
Assured Food Standards
Assured Produce
AstraZeneca
BASF Plant Science
Bayer CropScience
Bio-Dynamic Agricultural Association
Bioindustry Association
Brassica Growers Association
British Association of Seed Producers
British Beekeeping Association
British Chambers of Commerce
British Crop Protection Council
British Institute of Agricultural Consultants
British Insurance Brokers Association
British Oat and Barley Millers Association
British Potato Council
British Retail Consortium
British Seed Potato Association
British Society of Plant Breeders
British Sugar plc
Centre for Ecology and Hydrology
Central Science Laboratory
Cereal Seed Growers Association
CMi Certification
Commercial Farmers Group
Confederation of British Industry
Country Land & Business Association
Crop Protection Association
CropGen
Dow AgroSciences
Du Pont (UK) Ltd
Economic and Social Research Council
Elm Farm Research Centre
English Nature
Essex Seed Zoning Committee
FARM
Farm Inspection Service
Farmcare

Farmers for Action
Farming Wildlife Advisory Group
Federation for Agricultural Cooperatives
Federation of Oils, Seeds and Fats Association
Federation of Small Businesses
Flora Locale
Food and Drink Federation
Foodaware
Food Standards Agency
Friends of the Earth
Genesis Quality Assurance Ltd
Genewatch UK
GM Freeze
Government Office for East of England
Government Office for London
Government Office for the East Midlands
Government Office for the North East
Government Office for the North West
Government Office for the South East
Government Office for the South West
Government Office for the West Midlands
Government Office for Yorkshire and the Humber
Grain and Feed Traders Association
Green Alliance
Greenpeace
Henry Doubleday Research Association
Home Grown Cereals Authority
Horticulture Development Council
Institute for European Environmental Policy
Institute of Food Research
Institute of Food Science and Technology
Institute of Grassland and Environmental Research
International Certification Service (GB) Ltd (Farm Verified Organic)
John Innes Centre
LACOTS
Linking Environment and Farming
Local Government Association
Maize Growers Association
Maltsters' Association of Great Britain
Monsanto UK Ltd
National Association of Agricultural Contractors
National Association of British and Irish Millers
National Association of Local Councils
National Association of Seed Potato Merchants
National Consumer Council
National Council of Women
National Farmers Union
National Federation of Consumer Groups
National Federation of Women's Institutes'

National Federation of Young Farmers Clubs
NIAB
National Society of Allotment and Leisure Gardeners
National Trust
Natural Environment Research Council
Nuffield Council on Bioethics
Organic Certification Ltd
Organic Farmers & Growers Ltd
Organic Food Federation
PG Economics Ltd
Pioneer Hi-bred International
Processors and Growers Research Association
Product Authentication Inspectorate Ltd
Rothamsted Research
Royal Agricultural Society of England
Royal Institute of Chartered Surveyors
Royal Society
SCIMAC
SCRI
Seed Crushers & Oil Processors Association
Small Farms Association
Soil Association
Sustain
Sustainable Food and Farming Implementation Group
Syngenta Ltd
Tenant Farmers Association
The Central Association of Agricultural Valuers
The Environment Council
The Royal Society for the Protection of Birds
UK Maize Millers Association
UK Oilseeds Producers Ltd
Which?
Women's Food and Farming Union

PARTIAL REGULATORY IMPACT ASSESSMENT (RIA) OF PROPOSED COEXISTENCE MEASURES FOR GM AND NON-GM CROPS

This partial RIA has been produced to accompany Defra's consultation on proposed coexistence measures and related issues as set out in the Government's GM policy statement of March 2004. It should be seen as a 'work in progress'. The RIA will be developed further and reviewed in the light of the responses to the consultation process and the conclusions which the Government reaches on these. A final RIA will be published in due course.

This RIA relates to England only. Coexistence is a devolved matter and the authorities in Wales, Scotland and Northern Ireland are responsible for developing the policy to apply in their areas.

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SECTION ONE - INTRODUCTION

Summary of Issue

1. GM crops are already heavily regulated and cannot be grown commercially without EU-wide agreement that safety requirements for human health and the environment have been met and the crop variety has been authorised. To ensure consumer choice GM products must also be labelled and traced as they move through the food or animal feed supply chain. In this RIA 'coexistence' refers to the additional measures that farmers will need to take to minimise unintended mixing of GM and non-GM crops, so that a segregated non-GM supply chain can operate.

Objective

2. Defra is consulting on proposed measures to facilitate the coexistence of GM and non-GM crops, recognising that the former may be grown here commercially in due course. The policy objective is to:
 - preserve choice for producers to grow their preferred crops and for consumers to buy conventional, organic or GM products grown in England;
 - enable the crops sector in England to operate in a sustainable and efficient manner; and
 - ensure there is public confidence in the regulation of GM crops.
3. The specific aim for coexistence measures is to ensure that unwanted GM presence in non-GM crops is minimised, consistent with the relevant EU labelling threshold of 0.9%.

Background

4. No GM crop can be grown commercially unless it has been specifically approved under an EU-wide assessment process that considers risks to human health and the environment. It is not necessary, therefore, to implement co-existence measures for safety purposes.
5. EU legislation already requires food or feed materials with an adventitious or technically unavoidable GM presence above 0.9% to be labelled and traced as 'GM' through the production chain, starting with crops as they leave the farm⁴². This ensures there is an audit trail that allows GM and non-GM products to be distinguished. The primary aim of this legislation⁴³ is to ensure consumer choice.
6. When a GM crop is grown it may transfer a GM presence into non-GM crops of the same species, for example via normal cross-pollination. Non-GM farmers may not want a GM presence in their crops which requires

⁴² If a product is intentionally GM it must be labelled as such even if the GM content is less than 0.9%. It should also be noted that the 0.9% threshold relates only to the possible presence of EU-approved GMOs.

⁴³ Council Regulation (EC) No. 1831/2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms (OJ No. L268, 18.10.03, p24).

them to be sold as 'GM', because it may reduce their market value⁴⁴. Thus, the activity of one group of producers (GM growers) may unintentionally jeopardise the economic position of another group (non-GM growers), in the absence of a contractual relationship that dictates how they should behave towards each other, and GM growers may have no natural incentive to take action to safeguard their neighbours interests. There is therefore a need for an agreed coexistence regime at farm level⁴⁵, both to set the parameters for the relationship between GM and non-GM farmers and to ensure the consumer choice implicit in the EU legislation.

7. The European Commission has issued guidelines on coexistence⁴⁶, leaving Member States to determine what arrangements they should adopt at national level, subject to these being consistent with EU law. The Government has also received formal advice on this issue from the Agriculture and Environment Biotechnology Commission (*GM Crops? Coexistence and Liability*, AEBC, November 2003⁴⁷).
8. The Government's GM policy statement of 9 March 2004 confirmed a preference for coexistence measures to have statutory backing, and that it should be farmers growing GM crops who are required to implement the measures that will enable non-GM producers to stay within the 0.9% threshold.
9. It is arguable that developing coexistence proposals and applying most of the costs to GM farmers is a tax on innovation. However, in many respects it is the cost of facilitating the acceptance of GM technology. A coexistence regime will help to reassure consumers that they will have a choice between GM and non-GM UK produce, and it may also help ease concerns over the introduction of GM crops. The apportionment of costs is discussed further in Section 4.

Timing and Scope of Proposals

10. It takes a long time to secure the regulatory approval needed before a GM crop can be grown commercially in the EU, and none of the GM crops currently going through the EU consent process are of possible interest to

⁴⁴ It is not yet certain what market conditions will prevail for commercial GM cultivation in the UK, and this is likely to depend on the type of GM crop involved. If it has a novel quality trait it may trade at a premium relative to non-GM conventional crops of the same species. If the GM crop has a production trait (e.g. herbicide tolerance) it is more likely that there would be a price premium for non-GM conventional crops. If there is no price differential between GM and non-GM produce there may be no coexistence issue, as the economic position of conventional non-GM producers would not be adversely affected.

⁴⁵ Coexistence is an issue for the whole of the supply chain but beyond the farm gate the industry will implement its own measures to ensure that GM, non-GM (conventional) and organic crop materials are segregated as necessary. This will be done within the framework of existing EU traceability and labelling regulations and be governed by normal contract terms. The situation at farm level is different because there will not necessarily be a contractual relationship between neighbouring farmers.

⁴⁶ Commission Recommendation 2003/556/EC on guidelines for the development of national strategies and best practices to ensure the coexistence of genetically modified crops with conventional and organic farming (OJ No. L189, 29.07.03, p36)

⁴⁷ www.aebc.gov.uk/aebc/reports/coexistence_liability.shtml.

UK farmers⁴⁸. The specific GM traits bred into maize, beet and oilseed rape varieties in the late 1990s and grown in the UK farm-scale evaluation trials have now been withdrawn by the companies involved. In view of this, we do not expect any GM crop to be grown here before 2009 at the earliest. The Government's intention is that coexistence measures should be in place before any commercial GM cultivation, so that farmers know what controls they face and can make decisions accordingly.

11. It is not clear which crop species might be introduced first into the UK in GM form. However, GM varieties of maize, beet, oilseed rape and potatoes already exist and the development of coexistence proposals is therefore focusing on these species. If other GM crops are proposed for commercial use in due course there will be a need to consider appropriate coexistence measures for them at that time.
12. Coexistence measures need to be determined on a crop-by-crop basis. Depending on the species, there may be various pathways for a GM presence to be transferred into a non-GM crop. For beet and potatoes, the scope for transfer is limited (because the harvested roots or tubers are unaffected by cross-pollination) and coexistence can be achieved by farmers following existing good husbandry practice. For oilseed rape and maize, crop-to-crop cross-pollination could lead to a significant level of GM transfer in the absence of farmers taking specific action to avoid this (something they would not do ordinarily). Observing a crop separation distance will minimise cross-pollination, and it is envisaged that this will be the key coexistence measure for oilseed rape and maize. The application of separation distances may require neighbouring farmers to liaise with each other over their respective cropping plans. Therefore, it is also envisaged that a 'notification rule' will apply, whereby a GM farmer would inform neighbouring farms of his intention to sow a GM crop, if neighbouring farmland fell within the relevant separation distance (as measured from the field planned for GM cultivation).
13. There are other practices that it will be desirable for GM farmers to apply. These include limiting GM 'volunteers' (plants that grow from seed shed at harvest) and cleaning farm machinery to minimise the possible dispersal of lodged GM seed (where machinery is to be used on both GM and non-GM farms). However, these are measures that:
 - are not of major significance for coexistence between farms⁴⁹
 - are already part of normal farm practice (i.e. volunteer control)
 - would be difficult to specify in legislation and difficult to enforce
14. It is envisaged that these measures will be set out as advice or guidance in a non-statutory code of practice, and therefore that the only measures that

⁴⁸ Because, for example, they confer resistance to a crop pest that is not a problem in the UK, or relate to a type of production such as potato starch for which there is no UK processing facility.

⁴⁹ Factors like volunteer control and machinery cleaning would be of more significance if a farmer wants to grow both GM and non-GM crops on the same farm.

might be specified in regulations are separation distances and a notification requirement.

15. RIAs are produced to analyse and compare options for achieving the stated policy objective, and in particular to test whether a statutory solution is necessarily the right outcome. In this case the Government has already indicated a preference for statutory measures, but for the consultation process this RIA outlines two possible approaches for moving forward on coexistence:

(i) the Government makes regulations under existing primary legislation⁵⁰; these would specify the key coexistence measures to be observed (notification rule + separation distances for oilseed rape and maize), with other desirable measures contained in a non-statutory code; or

(ii) in the first instance, there is a industry-run (voluntary) coexistence regime, but the Government would prepare and consult on regulations as in (i) to be brought into force if the voluntary approach is found to be ineffective.

16. The same measures would apply under each of these approaches, the only difference being that notification and separation distance requirements would be implemented on a statutory basis under (i) and on a non-statutory basis under (ii). The RIA focuses on this key distinction.

17. Coexistence at farm level is not a new concept. Crop separation distances are already used successfully to produce certified crop seed, and to segregate food-grade and industrial oilseed rape.

Devolution

18. Coexistence is a devolved matter and the possible measures in this RIA relate to England only. The administrations in Wales, Scotland and Northern Ireland are considering arrangements for their territories, although all four administrations have shared information and ideas on the development of proposals for consultation.

⁵⁰ Section 2(2)(b) of the European Communities Act 1972.

SECTION TWO – RISK ASSESSMENT

19. The specific risk that coexistence measures address is the potential for non-GM crops (conventional or organic) to have an unwanted GM presence above 0.9% which requires them to be sold with a 'GM' label. Although not a safety issue, this could have an adverse effect because:

- if GM crops sell for less than non-GM/organic products, non-GM farmers with an affected crop may lose out economically because they would not gain the expected 'non-GM' or organic premium;
- without reliable coexistence arrangements, choice for producers and consumers would be undermined;
- the uncontrolled risk of cases of unwanted GM presence above 0.9% may undermine public confidence generally in the whole GM regulatory regime; and
- if there are coexistence problems it may reflect badly on the impact of GM crops, making their introduction more problematic and resulting in a lower and/or slower take-up rate than might otherwise be the case. This could jeopardise attainment of the benefits which the GM crops may offer, and unreasonably prejudice biotechnology seed companies.

20. There are several variables which will influence the probability of a non-GM crop having a GM presence above 0.9%. It will depend on:

- ***crop species*** – for example, it is very unlikely with beet and potatoes but a real issue for oilseed rape (with the latter it is reproductive material – seed – that is harvested and this is affected by cross-pollination between crops; with beet and potatoes, vegetative material is harvested which is not affected by cross-pollination).
- ***relative cropping areas*** - the overall extent to which a GM crop is being grown relative to its non-GM (conventional or organic) counterpart. The more GM crops there are the more likely it is that non-GM crops of the same species will be cross-contaminated⁵¹. It is difficult to predict the possible take-up rate of GM crops in the UK. Elsewhere in the world they have readily gained market acceptance and are grown on a widespread basis. The position in Europe is arguably different because of the controversy which has surrounded the whole GM issue (unlike, say, in North America). As a result there might not be strong demand at least for the present generation of GM crops which offer benefits to the producer rather than directly to the consumer. The situation in Europe is characterised by the fact that since 1998 there have been no EU approvals to grow GM crops, and the only EU country with commercial GM cultivation is Spain (limited production of insect-resistant maize). When considering relative cropping areas it is noteworthy that there is little UK organic cultivation

⁵¹ Although it should be noted that if GM crops become widespread it is likely to mean they have gained market and consumer acceptance; in which case there may not be a price differential in favour of conventional non-GM produce and co-existence may not be such a significant issue.

of oilseed rape or maize, the two crops being considered for which farmers may need to apply separation distances.

- **individual farm configurations** – the likelihood of neighbouring farmers growing GM and non-GM crops of the same species in close proximity. As noted, cross-pollination is a potentially significant route of GM transfer for oilseed rape and maize. Given what is known about the general relationship between crop separation and cross-pollination⁵², it is only likely that a 0.9% threshold would be exceeded if GM and non-GM varieties are grown next to each other in adjacent fields. Otherwise, the normal distance between crops should be enough to ensure that observing a 0.9% threshold is not a significant issue.
- **GM presence in seed** - what, if any, GM presence is in the crop seed used by non-GM farmers. The European Commission is due to propose specific thresholds for labelling GM presence in non-GM seed stocks, with values in the range 0.3%-0.5% having previously been considered. Coexistence measures will need to limit any GM transfer into non-GM crops so that, taking account of the possible GM presence in the original seed, the final harvested crops are inside the overall 0.9% EU threshold. If non-GM farmers can and do use seed that has no, or very little, detectable GM content, then it will be easier to meet the 0.9% threshold. At this stage it is not clear whether seed companies will offer seed that has a confirmed GM presence lower than any proposed seed labelling thresholds. Again, the situation may change over time depending on the uptake of GM crops. If they become widespread in the UK and Europe it will become more difficult/costly for seed producers to offer non-GM seed with a guaranteed low level of GM presence.

21. The proposed measures will minimise the risk being addressed by ensuring that there is a proportionate coexistence regime in place. The measures will be designed to be effective in all normal circumstances, although it is not possible to guarantee that in every case a GM presence will remain within 0.9%. As part of the co-existence consultation, consideration is also being given to a mechanism to redress potential economic losses by non-GM farmers should a GM presence exceed the statutory threshold. Because the Government does not yet have a firm position on a possible redress mechanism it is not covered in detail in this partial RIA, but a general overview of this issue is given at Appendix 2.

22. Defra's consultation process is also exploring the following questions that go beyond the core issue of the measures needed to facilitate coexistence based on the EU 0.9% threshold:

⁵² As set out, for example, in the report for Defra in 2000 by the National Institute of Agricultural Botany.

- is it possible and/or desirable for coexistence to be based on a threshold lower than 0.9% (or a stricter process-based standard) specifically in relation to organic production?
- is it necessary to have coexistence training requirements?
- should there be a public register giving the precise location of every commercial GM crop?

23. Because Defra either does not have a definite outcome in mind (on the organic issue) or is sceptical about the need for action (on training or a public register), these points are not covered in this RIA. Should the position be reached where Defra intends to make proposals on these aspects, the RIA would be developed accordingly.

24. Defra proposes to review the coexistence arrangements that are put in place within 2 or 3 years of their introduction, and to amend them if necessary (see paragraphs 75-78 below).

SECTION THREE - OPTIONS

25. At the highest level there are three basic options that can be considered:

- (i) **Option A** - 'do nothing', which assumes that there is no industry or Government-led attempt to manage coexistence;
- (ii) **Option B** - coexistence is managed by an industry-led scheme (as indicated at paragraph 15, this approach envisages that the Government would intervene by making regulations, if the industry scheme is ineffective); or
- (iii) **Option C** - the Government introduces statutory coexistence rules.

Option A: 'do nothing'

26. There are two reasons why this must be seen as a notional option. Firstly, there is already an industry code of practice for managing GM crops that has coexistence provisions. This was established by the farming and industry group SCIMAC⁵³ in 1999, endorsed by Defra and applied to the Government-sponsored GM farm-scale trials. The code includes a form of both the key coexistence measures being considered for Government regulations (notification rule + crop separation distance), and the non-essential measures that it is envisaged would be left to apply voluntarily (e.g. controlling GM 'volunteer' weeds and cleaning shared farm machinery). As such, the status quo or real-world situation is one in which there is an existing industry-led coexistence regime.

27. Secondly, it is inconceivable that the farm sector could do without a structured coexistence regime facilitated either by industry or Government. The EU Traceability and Labelling Regulations effectively require coexistence rules, to ensure a proper basis for segregating GM and non-GM crops. In theory individual farmers might be left to make their own arrangements, but in practice this is not credible. It would create uncertainty and this would prevent the supply chain from operating efficiently. As a minimum farmers need direction on the specific measures required for successful coexistence, and the supply chain as a whole needs these to be set out in a coherent and transparent framework.

28. Nevertheless, it may be helpful to consider a hypothetical situation where an industry code is assumed not to exist, as a basis for comparison with the following two options.

Option B: an industry-led regime

29. The cross-industry group SCIMAC is now developing its existing code of practice with other industry partners, to provide for a more stringent and comprehensive industry-led coexistence regime. At this stage the outcome of this initiative is not confirmed, but for the purpose of this RIA it

⁵³ Supply Chain Initiative on Modified Agricultural Crops: an umbrella group representing the agricultural supply chain, including the National Farmers Union, the Agricultural Industries Confederation and GM seed companies. Further details are available at www.scimac.org.uk.

is assumed that an enhanced regime will be adopted in due course (before the advent of commercial GM cropping). On this basis, there would be a regime where:

- coexistence measures are set out in an industry code of practice, reflecting the principle that, where necessary, GM growers must take steps to protect their neighbours' economic position; the code would include the same measures that the Government might impose on a statutory basis (i.e. it is expected that industry representatives will discuss and agree with Defra the detailed measures to be applied);
- adherence to the key measures in the code is a requirement of industry farm-assurance schemes (to provide for effective implementation and compliance);
- there is an industry-run mechanism to redress any economic loss that a non-GM farmer might face because a non-GM crop has acquired a GM presence above the EU labelling threshold (e.g. a crop substitution arrangement).

Option C: Statutory rules

30. As indicated at paragraphs 12-14, if the Government makes coexistence regulations these will be restricted to farmer-to-farmer notification and the observance of crop separation distances for maize and oilseed rape. Other measures such as volunteer control and machinery cleaning would be left to operate on a voluntary basis. It is envisaged that they would be included in the updated code being developed by SCIMAC, discussed with and endorsed by Defra. The Government's GM policy statement of 9 March 2004 proposed a statutory route for coexistence measures.

Differences between the three options

31. Relative to Option A ('do nothing'), Options B and C are broadly similar in their practical effect and the costs and benefits they would generate. By different means, both would require farmers to implement the two essential coexistence measures (notification and crop separation).

32. In terms of benefits, because Option A would not provide a satisfactory coexistence solution it would not yield the broad range of benefits expected from Options B and C (outlined at paragraphs 48-53 below). In particular, Option A would require routine testing of non-GM material for possible GM content, the overall cost of which to the supply chain could be very significant. Option A would also be expected to give rise to litigation costs as farmers seek to resolve coexistence disputes. In the absence of a clear coexistence framework these could arise with some frequency. Against this, Option A would avoid the expense inherent in operating the formal coexistence regimes envisaged by Options B and C (as outlined at paragraphs 54-61). A specific but minor distinction in relation to Option A is that under Options B and C farmers would be expected to implement voluntarily desirable but non-essential measures such as volunteer control and machinery cleaning. These are already part of good farm practice or would not generate significant extra costs.

33. As in reality Option A can be considered no more than notional, the real issue is the difference between Options B and C. Accordingly, the remainder of the RIA focuses on a comparative assessment of these two approaches.

Differences between main Options B (industry scheme) and C (Government regulations)

34. With broadly the same measures applied under either option, the main practical difference between the two would be in the area of implementation and enforcement. Under Option B, the industry will be responsible for enforcement checks and the application of sanctions for non-compliance. The industry code would be implemented via farm-assurance schemes. Most of the total UK arable area is cultivated by farmers who are assurance scheme members⁵⁴. They are subject to an annual inspection carried out by independent agencies (i.e. independent of the assurance scheme owners), who are accredited to EN 45011⁵⁵. The normal sanction for breaking scheme rules (loss of farm-assured status) is generally taken as a strong incentive for farmers to comply. Under Option C, Defra would check GM growers' compliance with the coexistence regulations, and statutory penalties would apply for non-compliance.

Flexibility

35. There would also be a practical difference in terms of the relative flexibility of the two options. Changes may need to be made to coexistence measures in the light of experience or new information (e.g. on crop separation distances). It would also be necessary to specify measures for new types of GM crop as they are introduced. It would be easier to make changes to an industry-led scheme compared to the more formalised procedures required to amend or extend Government regulations.
36. Apart from the practical distinction, a judgement has to be made about the relative effectiveness of the two options in achieving the aim of keeping GM presence in non-GM crops below 0.9%, and on the appropriateness of relying on an industry-led regime instead of statutory rules.

Effectiveness

37. It is taken as read that statutory coexistence rules would be effective (the Government would seek to ensure that this was so). On the face of it, the envisaged industry regime could be equally effective. Its implementation via farm-assurance schemes should ensure proper oversight and a clear incentive for farmers to comply. The only possible fear might be a general lack of will to apply the arrangements rigorously. However, there is no specific reason to think this might be the case. If, as envisaged, the industry is committed to providing redress for any economic losses that

⁵⁴ The Assured Combinable Crops Scheme and its Scottish equivalent cover approximately [85%] of UK arable production. It is expected that in practice those farmers who choose to grow GM crops will be assurance scheme members, and Defra is discussing with the GM seed companies the possibility that they may only sell GM seed to farmers who contract to abide by the industry's co-existence guidelines.

⁵⁵ EN45011 is the accepted standard relating to operating requirements for product certification bodies, administered by the United Kingdom Accreditation Service (UKAS).

non-GM farmers might face, then there will be an incentive for the relevant industry bodies to make sure that coexistence works effectively.

Public confidence

38. The Government-sponsored GM public debate indicated that there is public unease about GM crops and mistrust of the Government and multinational companies. In the context of the two main coexistence options, this suggests that any regime which relies on the industry to regulate itself is likely to be criticised as insufficient and not have the support of a wide range of interested stakeholders. This view has already been signalled to Defra by environmental NGOs, consumer and organic groups in particular. In its report to Government the AEBC said that an industry-run scheme would only command the confidence of non-GM farmers if the industry has an economic incentive to make things work, and it recommended a statutory regime as its preferred option. Against this, it should be noted that the AEBC assumed there would not be an industry-funded redress mechanism, whereas the industry has subsequently moved to accept the principle of providing one. Nevertheless, it can be argued that a statutory regime is preferable to maximize public acceptance for the introduction of commercial GM cultivation.

SECTION FOUR – COST AND BENEFITS

Equity

39. There is no difference between Options B (industry scheme) and C (Government regulations) as regards their equity or fairness – both will require farmers growing GM crops to bear the main burden of implementing coexistence measures, rather than non-GM producers⁵⁶.
40. In all the coexistence precedents in agriculture (seed production, organic farming, industrial oilseed rape) the onus for taking action normally rests with the farmer who wants to avoid ‘contamination’ of his crop (and has an incentive to do this because he receives a price premium for his product). GM crops may be introduced which have a quality trait that needs to be protected against potential ‘contamination’ from the equivalent non-GM crop, in which case the GM grower will want to apply measures such as separation distances to safeguard his own interests. However, both Options A and B address the situation where the GM grower has no need to safeguard his own crop, but require him to apply measures to minimize ‘contamination’ of neighbouring non-GM crops. Therefore, the measures are aimed at maintaining the status quo for the benefit of non-GM producers, who are not bearing the cost of implementing them.
41. In its advice to Government the AEBC recommended that it should be GM growers who apply the measures needed to minimise GM presence in non-GM crops:
- “If GM crops were to be grown commercially, farmers growing them should be required to follow legally enforceable crop management protocols designed to achieve at least the 0.9% threshold.”⁵⁷
42. This reflects the concerns currently felt by the public over GM crops and food. This is not just a UK phenomenon, but arises throughout the EU. As a result, it is generally taken as reasonable to place the onus on those growing GM crops to achieve coexistence in line with the 0.9% threshold. The coexistence guidelines of the European Commission state that:
- “As a general principle, during the phase of introduction of a new production type in a region, operators (farmers) who introduce the new production type should bear the responsibility of implementing the farm management measures necessary to limit gene flow”⁵⁸
43. The argument is that it is the introduction of GM crops that will alter the status quo and may prevent non-GM producers from marketing their crops in the way they intend. It follows the principle that the risk owner should

⁵⁶ This assumes that for the foreseeable future it would be GM crops that constitute a new production type that is introduced into an area alongside existing non-GM production. If the stage is reached that GM crops predominate in an area it will beg a question about the balance of coexistence responsibilities between GM and non-GM farmers – see the wording of the Commission guidelines at paragraph 42. Defra proposes to keep this under review in the light of developments in GM uptake.

⁵⁷ Paragraph 183 of *GM Crops? Coexistence and Liability* (link at footnote 7).

⁵⁸ Section 2.1.7 of Commission Recommendation 2003/556/EC (reference at footnote 6).

bear the cost of any measures to prevent harm that would otherwise be caused by their actions or non-actions. Indeed, given the approach being taken by the Commission and other Member States⁵⁹, farmers growing non-GM crops would reasonably expect a consistent approach to be taken in the UK and avoid placing them at a competitive disadvantage. The Government has concluded that it would be appropriate for GM growers to bear the main coexistence burden that arises from the 0.9% EU threshold.

44. It should also be noted that the coexistence framework may indirectly restrict the flexibility of non-GM farmers and impose a burden on them. In current circumstances a non-GM farmer may make a very late decision about what crop to grow and where. But where they are notified of a neighbour's intention to sow a GM crop they will have to determine their cropping plan a reasonable period in advance of sowing, to allow the GM grower to finalise his plans in good time based on what his neighbour is doing. It is intended that non-GM growers should provide relevant cropping information in response to notifications from GM growers, and that they will, therefore, have to bear a minor cost burden (see paragraph 50) if coexistence measures are to be effective.

Business Sectors Affected

45. Both Options B and C will directly affect those farmers who choose to grow crops from GM seed. Nearly all farming enterprises are classified as 'small businesses' according to the definition used for RIAs. The number of farms affected will depend on the extent to which GM crops are grown, and the following table illustrates the potential number based on a range of possible adoption rates:

		Number of farmers growing GM crops at different rates of adoption (expressed as a percentage of the number of farms currently producing the crop in conventional form):			
Number of holdings in England growing conventional crops of ⁶⁰ :		5%	10%	25%	50%
Oilseed rape:	23,126	1156	2313	5782	11563
Forage maize:	6,739	337	674	1685	3370
Sugar beet:	7,436	372	744	1859	3718
Potatoes:	8,410	420	841	2103	4205

Previous Work on Costs and Benefits

46. The potential costs and benefits of a coexistence regime are by their nature difficult to quantify and will be dependent on the particular characteristics of each individual GM crop. As a contribution to the Government-sponsored 'GM Dialogue' the Prime Minister's Strategy Unit (SU) produced a report in 2003 analysing the impact of the possible cultivation of GM crops in the UK. This reflected input from a wide range

⁵⁹ All the national coexistence arrangements so far proposed by other Member States would make GM farmers responsible for implementing co-existence measures.

⁶⁰ From Defra Agricultural Census June 2003. Farmers may grow two or more of these crops at the same time, so these figures are not additive.

of experts and stakeholders. The SU study identified that there are limitations and uncertainties in the available evidence on the costs and benefits of GM crops. The report concluded that:

- although there is a large body of international research on the commercial growing of GM crops, some of this is subject to contradictory interpretations, and its applicability to the UK needs to be treated with caution. It also covers a relatively short time period.
- there is relatively little research on the economic and environmental impacts of conventional and organic farming⁶¹. This makes it hard to establish an analytical baseline against which the economic and environmental impacts of GM crops may be assessed.
- there are also significant uncertainties inherent in looking forward over the 10-15 year time horizon considered in the study. For instance, the UK and international policy environment, public attitudes, and the state of science may well change over this time period.

47. The SU study therefore did not attempt to quantify costs and benefits but made an overall qualitative assessment based on an analysis of various possible scenarios. Further details are available at www.number-10.gov.uk/su/gm/index.htm

Benefits

48. There is little difference between Options B and C as regards their potential benefits, although a legislative approach may secure greater public confidence. Both may help to deliver advantages in the following areas.

Economic

49. An effective regime of farm-level coexistence measures will directly benefit non-GM farmers who might otherwise suffer an economic loss because their crops have a GM presence above 0.9%. This is predicated on non-GM crops trading at a premium.

50. Farmers will not grow GM crops unless there is a market for GM products and the crops give them an economic benefit of some sort. This could be a reduced production cost and/or premium price⁶², and UK farmers should not be deprived of the opportunity to derive these advantages from

⁶¹ As the Strategy Unit study was nearing completion Defra published a major review of the comparative environmental impact of organic farming, *An Assessment of the Environmental Impacts of Organic Farming*, Shepherd *et al*, May 2003. Other Defra and EU-funded studies have also explored this area. Defra believes there is ample evidence of the environmental benefits of organic farming, although in this context the point is that the data is largely qualitative in nature, reflecting the methodological difficulty of producing a firm quantitative analysis of the comparative effect of different farming systems.

⁶² The Strategy Unit study noted that from the available evidence there is uncertainty about the extent to which UK farmers might achieve cost savings or yield increases with the current generation of GM herbicide-tolerant crops. It indicated that more significant benefits might accrue from different types of GM crop that are under development, such as varieties which are disease resistant. Again, however, the study stressed that it is not possible to draw firm conclusions about the precise extent of these potential future benefits.

approved GM crops. A coexistence regime will help to facilitate the introduction of GM crops. If, over the longer term, farmers can produce crops more cheaply this will help to keep food prices down. Although the effect may be marginal, it could mean an indirect benefit to consumers and the wider economy given the potential impact of food price on inflation.

51. In the absence of effective coexistence measures it is likely that there would need to be widespread routine testing for GM presence in crop material expected to be sold as 'non-GM'. This might be a significant expense overall, given that the only reliable method currently available for quantified GM tests (PCR) costs about £200 per sample (and more than one sample would need to be tested for accurate quantification). Testing costs would be expected to fall to the 'non-GM' supply chain and be apportioned through the normal operation of the market. They might therefore fall on non-GM farmers, processors, manufacturers, retailers or consumers. A reliable coexistence regime should obviate the need for extensive GM testing.

Environmental

52. GM crops will not be approved for commercial release in the EU unless they are at least as environmentally sustainable as the conventional crops whose use they replace. It is possible that they will offer comparative environmental benefits, e.g. through reduced use of pesticides or herbicides, although this will depend on the specific nature of the crop in question. Nonetheless, it should be recognised that the use of GM crops, as facilitated by the coexistence regime, may contribute to the objective of sustainable food and farming.

Social

53. One of the principle benefits of a coexistence regime is to enable the supply chain to segregate GM and non-GM products and thereby to provide a choice for farmers and consumers, consistent with EU rules on GM labelling. By its nature, this benefit is difficult to quantify since it requires an estimate of consumer willingness to pay for benefits which are not themselves easily quantifiable. However, the principle that consumers do value choice of this nature is shown by the results of a Defra-funded study which was the first quantitative, economic assessment of consumer preferences in this area based on a nationally representative dataset (www.defra.gov.uk/environment/gm/research/pdf/epg_1-5-213.pdf). This was undertaken in connection with the then proposed new EU rules on the traceability and labelling of GM products. As such, it is not specifically relevant to the coexistence situation, but the general implication is that consumers claim to value highly their ability to choose between GM and non-GM products. Thus, although the coexistence measures will not themselves have any direct social impact, they will provide a framework to support consumers' continued ability to choose between GM and non GM foods. And insofar as GM remains a controversial subject, which at the extreme has led some people to 'trash' GM crops, an effective coexistence regime which ensures that consumer choice can be delivered may ease some of the tension around this issue.

Costs

54. The main costs that will be generated by a coexistence regime are:

- compliance costs (the cost to farmers of applying the required measures), and
- implementation costs (the cost of administering and enforcing the regime).

Compliance costs

55. Options B and C will generate broadly the same compliance costs as similar coexistence measures would apply under each. As noted above, it is envisaged that GM growers may need to apply the following key measures for maize and oilseed rape crops:

- a notification rule
- crop separation distances

56. **Notification** - notifying neighbouring farmers of the intention to sow a GM crop, if any neighbouring farmland falls within a specified distance of the intended location of the GM crop. It may often be the case that the GM grower is able to position the GM crop so that the required separation distance is accommodated within his own farm. If so, it would not be necessary for him to contact his neighbour. Where notification is required, it is envisaged that the neighbouring farmers will exchange a pro-forma setting out cropping intentions (so the GM farmer's neighbour has to indicate whether he plans to grow a non-GM crop whose value might be compromised by GM cross-pollination, and, if so, its intended position). They could do this via correspondence or a face-to-face meeting. It is estimated that completion of the pro-forma may take about 30 minutes of each farmers time (the GM farmer and his neighbour). Based on an average value for a farmer's time of £12 per hour⁶³, the following table gives a range of possible aggregate costs depending on the number of farmers involved:

Cost of time spent on notification pro-forma per farmer (average)	Aggregate cost if number of farmers affected is:			
	50	100	500	1000
£6	£300	£600	£3000	£6000

57. **Separation distances** - observing a separation distance and/or applying a barrier strip between the GM crop and any neighbouring non-GM crop of the same species. A separation distance will only generate a potential compliance cost if it means that the GM farmer has to change his cropping plans, to do something he would not otherwise have done. In practice, this

⁶³ Rate advised by Office of National Statistics for cost of time spent by agricultural/horticultural manager completing a survey form

may only occur if it transpires that neighbouring farmers intend to grow GM and non-GM crops of the same species at the same time in adjacent fields. Farmers should often find that their existing plans do not require any specific measures to be taken, because respective crops are already due to be grown sufficiently far apart. Ideally, any difficulties can be avoided by neighbouring farmers discussing and agreeing their forward cropping plans to their mutual satisfaction (as happens, for example, in the case of separating industrial and food-grade oilseed rape). In these circumstances, for example because the GM grower can accommodate the separation distance within his own land, there will be no need for action and no additional costs would arise.

58. Where farmers cannot reach agreement on their forward cropping plans, it is difficult to predict the probability of compatible GM and non-GM crops being due to be grown in adjacent fields (i.e. the frequency with which the respective crop rotations of neighbouring farms would naturally contrive for this to occur). If it were necessary for a GM farmer to change plans to observe a separation distance, the consequences would depend on the precise circumstances that arise in each case. In an ideal situation it may be possible for the farmer to adjust his plans so that the GM crop is grown in another field (from that originally intended) without incurring any cost. Alternatively, a change in plan could involve a cost in terms of a less efficient crop rotation. This would depend on variables such as crop type, field size, soil type and prevailing market prices.

59. The envisaged measures include flexibility to reduce costs. For example, as an alternative to a separation distance GM farmers may be able to apply a barrier strip (a row or strip of non-GM plants of the same species as the GM crop, grown at the leading edge of the GM crop facing the neighbouring non-GM crop⁶⁴). In some circumstances this might be a more attractive management option than changing the position of a crop to accommodate a separation distance⁶⁵.

60. ***Minimising other potential sources of GM presence*** – e.g. controlling GM volunteers and ensuring that farm machinery is cleaned if necessary. These are things that are already done as part of good practice or should not give rise to any significant additional costs. As noted, under both Options B and C it is intended that these will not be mandatory measures but will be included within general guidance or advice to farmers.

Implementation costs

61. Under both options B and C, implementation costs will arise from the need to check farmers' compliance with the specified coexistence measures. The additional costs are considered at Section 6 on Enforcement, Sanctions, Monitoring and Review.

⁶⁴ This will absorb pollen from the GM crop, extend the distance between the GM and non-GM crop, and produce non-GM pollen that 'competes' with the GM pollen, all of which will minimise the level of crop-to-crop cross-pollination.

⁶⁵ Compared to separation distances there has been little or no practical experience with, or studies of, barrier strips. As a result there is currently a lack of hard information on which to recommend specific depths of barrier strip.

SECTION FIVE – OTHER/WIDER IMPACTS

Other possible impacts

62. Options B (industry scheme) and C (Government regulations) have been reviewed to determine whether they might have other potential effects beyond the benefits and costs considered above. However, no such impacts have been identified, e.g:

- in terms of *economic* impacts, the proposals will not affect the provision of goods and services, investment levels, output, employment or competitiveness;
- in terms of *social* impacts, the proposals will not impinge on local communities, health services, safety or education; and
- in terms of *environmental* impacts, there will no effect on the use of natural resources or the generation of noise, waste, pollutants or greenhouse gases, and no adverse effect on habitats or biodiversity

Competition Assessment

63. RIAs must analyse the impact of proposals on competition between UK businesses. The market which may be affected by coexistence measures will be the farmers growing a crop species which has been introduced in GM form. As such, this market is characterised by having a large number of small businesses in which no individual business has a significant market share (>10%), and neither is it a market subject to rapid technological change. The coexistence proposals would not:

- affect the structure of the market (the number or size of cropping farms)
- lead to significant higher set-up or ongoing costs for new cropping farms that existing farms would not have to meet

64. However, any costs that arise from coexistence requirements would largely affect farms growing GM crops as opposed to those that are not, and separation distances could be said to restrict the ability of GM farms to choose the location of their crops. This might arguably affect competition between GM and non-GM farms but, as noted above, the actual burden on GM farmers from having to comply with the proposed measures is not thought to be significant.

65. The measures being considered are in line with EU legislation and the Commission's recommended guidelines. As such, they should be broadly consistent with the frameworks being developed in other Member States. However, it is possible that Member States will adopt more or less restrictive approaches. For example, Germany and Denmark have already revealed their national coexistence plans and these include measures like compulsory training for GM farmers and a detailed public GM crop register, elements that are discussed in Defra's consultation paper but which Defra is not convinced are strictly necessary to achieve effective coexistence. In addition, crop separation distances might vary between countries to reflect differences in average field size. Perhaps the

key issue in terms of competition is that all Member States' plans should be consistent with EU law and in particular the 0.9% labelling threshold. The Commission are vetting Member States' plans⁶⁶ and will inevitably question those that imply a disproportionate response. On this basis, any differences between Member States should be relatively marginal, and farmers in England (GM or non-GM) should not be placed at a competitive disadvantage relative to their EU counterparts.

66. Prospective GM farmers in England might, however, arguably be disadvantaged in comparison to their non-EU counterparts who do not have to comply with coexistence rules. This situation arises because in countries like Canada and the USA where GM crops are widely grown, there is no statutory labelling threshold for unintended GM presence in non-GM products. Having some form of coexistence regime is a logical consequence of the EU having adopted such a threshold. Indeed, it is difficult to see how one could be avoided even if it were thought to be a concern in relation to non-EU competition. As it is, however, given the limited circumstances where action would need to be taken to comply with the coexistence requirements being considered here (Options B and C), and the expected limited financial burden, any competitive disadvantage is expected to be minimal. It should be noted, moreover, that crop imports from third countries must comply with the EU rules on GM labelling. So there is no question of imports benefiting from any non-GM premium that might be available on the EU market unless they have an unintended GM presence of less than 0.9%.

67. Taken overall, both Option B and C are expected to have little or no effect on competition.

Small Businesses

68. The RIA process also requires special attention to be given to the impact of regulatory proposals on small businesses (those with an annual turnover of less than £10m and fewer than 10 employees). Most farms fall into this category, including those which are likely to grow GM crops and therefore could be affected by coexistence requirements. Defra is consulting on the possible arrangements to ensure they adequately reflect the likely impact on farmers (see paragraph 81 below).

⁶⁶ National plans must be notified to the Commission and other Member States under the Technical Standards Directive 98/34/EC.

SECTION SIX – ENFORCEMENT, SANCTIONS, MONITORING AND REVIEW

Enforcement of coexistence measures

69. Under Option B, observance of the coexistence measures in the industry code of practice would be checked via existing inspections carried out for farm assurance scheme purposes. Under Option C, it is proposed that the inspection and enforcement of coexistence regulations would be carried out by the Defra Rural Payments Agency (RPA). Compliance inspections could be combined with RPA visits for other inspection purposes, so minimising the cost both to the farmer and to Defra.
70. The additional cost of inspections under Option B would be met by GM farmers through an increased fee for assurance scheme membership. Under Option C the cost of inspections would be born by the Government (Defra), not by GM farmers. Defra does not have the power to introduce charges for coexistence inspections and this would require primary legislation. In addition, even with primary legislation any charge would have to relate to the costs incurred, which would not include overheads. This may mean that charging is not viable as a charging scheme would be more expensive to administer than the cost of inspections. Defra does not charge for analogous inspections related to the EU rules on the tracing and labelling GM products.
71. The cost of each coexistence inspection is expected to be broadly the same under Options B and C. It is estimated that the RPA or farm assurance inspector would have to spend no more than 30 minutes checking that the farmer has observed the specified requirements. On this basis we expect that the cost for each inspection would be £6 for the GM farmer's time, £20 cost to the Government (RPA inspector's time at current unit cost rate), or a similar cost in respect of a farm assurance inspector's time (passed on to the GM farmer). The table below shows a range of possible aggregate costs.

	Aggregate cost of coexistence enforcement checks if number of GM farmers inspected is:			
	50	100	500	1000
Option B				
Cost of GM farmers' time:	£300	£600	£3000	£6000
Cost of inspectors' time: (also borne by GM farmers)	£1000	£2000	£10000	£20000
Total cost to GM farmers:	£1300	£2600	£13000	£26000
Option C				
Cost to GM farmers:	£300	£600	£3000	£6000
Cost to Government (RPA inspectors' time):	£1000	£2000	£10000	£20000

72. Total inspection costs might differ between Options B and C depending on the rate at which checks are undertaken. For Option C (Government regulations), it is envisaged that initially every farm growing GM crops would be inspected annually, but after the initial period, if monitoring shows that the scheme is working well, the percentage of farms being inspected would be reduced and selected on the basis of risk assessment. For CAP scheme purposes it has been normal for the RPA to inspect arable farms at a rate of 5% per annum, and over time Defra would see this as the 'standard' rate for coexistence. For Option B, it is normal for every member of an assurance scheme to be inspected annually, and for all scheme requirements to be checked. Therefore, unless the assurance scheme departs from this convention in relation to coexistence checks, over time the total cost of inspections under Option B would be significantly more than those under Option C (borne by GM farmers).

Sanctions

73. Under Option B, if a farmer breaks an assurance scheme requirement the usual sanction is to lose scheme certification for that aspect of production (so that, in this case, the farmer would not be able to sell his GM crop as an assured product). This is generally seen as a significant penalty because supply contracts are often based on meeting assurance scheme status. Under Option C, coexistence regulations would be made under section 2(2) of the European Communities Act and the statutory offences and penalties would be consistent with the legal maxima available under the Act. The penalties would be agreed with the Home Office. It is anticipated that they would be consistent with those applied in the Genetically Modified Organisms (Traceability and Labelling) (England) Regulations 2004.

74. As well as the sanctions themselves, legal costs could arise under Option C from Defra taking prosecution action through the courts. It is difficult to predict the potential number of such cases. The nearest analogy to the envisaged coexistence measures is a rule that applied under the old Arable Area Payments Scheme, whereby neighbouring crops of industrial and food-grade oilseed rape had to be grown 50m apart otherwise both farmers concerned would lose their subsidy entitlement. This rule was rarely breached. Costs of prosecution action vary greatly depending on the circumstances, but a 'typical' cost to Defra of investigating and prosecuting after a one day trial would be around £4,000. This does not include Court administrative costs and defence costs, which are unlikely to be legally aided.

Monitoring and review

75. Defra will review the coexistence regime after it has been in operation for a sufficient period to assess its effectiveness. Our current thinking is that this might be two or three years after the start of any commercial GM cropping, but the precise timing will depend on the extent to which GM crops are being grown, as it will be necessary to have acquired enough data and experience before a proper assessment can be made.

In relation to Option B (a farm-assurance based scheme)

76. Defra would let a contract to a third party or carry out work itself to check the efficacy of the industry scheme. The aim would be to advise whether the voluntary arrangements were effective, whether they should be revised, and generally to provide a basis for considering whether regulations should be introduced. The data would be collected through:

- farm visits to check records and fields to see if the measures were being adhered to;
- taking samples and testing non-GM crops. If the results show excessive GM cross-contamination, finding out the cause i.e. if the scheme is not being adhered to or the scheme itself is not robust. If the fault is with the scheme we will need to identify the weakness e.g. if it is the separation distance;
- gaining information from farm assurance schemes on compliance rates and also ensuring that they are inspecting in line with the agreement (note: this will be in a context where assurance scheme inspections are expected to be carried out by an independent body accredited by UKAS to standard EN 45011);
- and, possibly, undertaking a farmer questionnaire survey, to get general feedback on how they have found the coexistence measures, what has proved straightforward, what might be improved, etc.

In relation to Option C (a statutory scheme)

77. In addition to the enforcement inspections by the RPA, Defra would commission work to look at both the statutory and non-statutory elements, as set out in paragraph 76 above. With information from this and the RPA inspections, Defra would be able to assess all the coexistence arrangements.

78. Defra will consult stakeholders as part of the review, and on any specific changes to the coexistence regime that the Government may propose as a result of the review. Depending on the conclusions from this review, the Government will consider if and when a further review should be undertaken.

SECTION SEVEN – SUMMARY, CONCLUSION AND CONSULTATION

Summary

79. Agreed arrangements are needed to ensure that GM and non-GM crops can coexist, based around the 0.9% EU labelling threshold for unintended GM presence. It is generally accepted that farmers growing GM crops should have the primary responsibility for applying the necessary co-existence measures. The Government could impose these on a statutory basis or they could be applied via a voluntary industry-run scheme. Both options would be expected to give rise to broadly the same costs and benefits. The costs appear to be relatively insignificant, although they are difficult to quantify because of the uncertainty surrounding the precise context in which commercial GM cultivation might be introduced and how this might impact on individual farmers. If there is no market for GM crops they will not be grown.

Conclusion

80. The key difference between the two main options relates to their acceptability in terms of securing public confidence. A voluntary regime operating via farm assurance schemes could be as effective as Government regulations, but relying on an industry-run scheme may be less likely to have the confidence and trust of all relevant interests, which is a legitimate consideration when making public policy on a controversial issue. Moreover, it is arguably in the interests of the GM sector to have a statutory coexistence solution which is more rather than less certain, to provide the clearest possible framework in which GM crops can be introduced and stand to gain market acceptance. The RIA sets out both options (Government regulations v. industry scheme) and this forms part of Defra's written consultation paper. In its GM policy statement, the Government indicated a preference for a statutory regime at a time when industry disputed the need for such a scheme. There are some indications that the industry view may have changed – at least in principle.

Consultation

81. In autumn 2004 Defra held a series of stakeholder workshops as the first phase of formal consultation on the development of coexistence arrangements. This included a specific workshop on the potential burden of coexistence measures on farmers and the assumptions to be made in this partial RIA. In addition, a member of the Defra GM Inspectorate has undertaken a programme of meetings with individual farmers to obtain their views. Further to this, Defra is now issuing a written consultation paper setting out specific proposals and options for stakeholder comment, including this draft RIA. The written consultation may generate further comment on the practicality and cost of coexistence measures and the RIA will be developed further in the light of this.

82. In developing its coexistence policy Defra has consulted the authorities in Wales, Scotland and Northern Ireland and other Government departments, including the Department of Trade and Industry, HM Treasury and the Cabinet Office Regulatory Impact Unit.

THE COMPETITION FILTER: IMPACT OF COEXISTENCE ON FARMING

Q1: In the market(s) affected by the new regulation, does any firm have more than 10% market share?

A1: No

Q2: In the market(s) affected by the new regulation, does any firm have more than 20% market share?

A2: No

Q3: In the market(s) affected by the new regulation, do the largest three firms together have at least 50% market share?

A3: No

Q4: Would the costs of the regulation affect some firms substantially more than others?

A4: No

Q5: Is the regulation likely to affect the market structure, changing the number or size of firms?

A5: No

Q6: Would the regulation lead to higher set-up costs for new or potential firms that existing firms do not have to meet?

A6: No

Q7: Would the regulation lead to higher ongoing costs for new or potential firms that existing firms do not have to meet?

A7: No

Q8: Is the market characterised by rapid technological change?

A8: In general no, although the proposals are triggered by the potential uptake of a new technology.

Q9: Would the regulation restrict the ability of firms to choose the price, quality, range or location of their products?

A9: A separation distance requirement would limit GM farmers' ability to choose the fields they might use for GM cultivation, but this is not thought to be a significant restriction.

A POSSIBLE REDRESS MECHANISM FOR ECONOMIC LOSSES

1. With any pragmatic coexistence regime it cannot be guaranteed that there won't still be instances where a non-GM crop ends up with a GM presence above the 0.9% labelling threshold. There remains the potential, therefore, for non-GM farmers to incur an economic loss if they are forced to sell a crop as 'GM' when it was meant to be sold into a premium non-GM or organic production chain.

2. In its report to Government on coexistence and liability the AEBC recommended that:

“There should be special arrangements for compensation for farmers suffering financial loss as a result of their produce exceeding statutory thresholds through no fault of their own, with a view to an insurance market developing in due course.”⁶⁷

3. Following this, the Government confirmed in its GM policy statement that it would consult stakeholders on options for compensating non-GM farmers, with the proviso that any compensation scheme would have to be funded by the GM sector.

Options

4. There are three main options for dealing with the redress issue:

(i) *'Do nothing'*: if no specific redress mechanism is provided for a non-GM farmer who wants to recover a financial loss would have to seek redress through the civil courts under the current law. However, it is generally held that this would be an uncertain process, as it not clear how the courts would treat a case under existing law relating to GM cross-contamination.

(ii) *A voluntary, industry-led scheme*: as noted previously, SCIMAC is developing plans for a coexistence regime that would include an industry-run redress mechanism. The details of this are still being considered and SCIMAC's general outlook is to avoid an overly prescriptive approach, on the basis that no single mechanism is likely to be the most effective solution in all cases. However, one specific idea is a crop-substitution procedure that mirrors existing supply chain arrangements. This would involve the affected non-GM crop being re-directed to a 'GM' outlet and the non-GM farmer being provided with a crop that meets his original non-GM specification.

(iii) *A statutory redress mechanism*: this would probably require new primary legislation to provide for:

- a requirement to pay redress on the terms specified

⁶⁷ Paragraph 293 of *GM Crops? Coexistence and Liability* (link at footnote 7).

- the establishment of a body to receive and adjudicate on redress claims (with the power to order payment), and an appeal mechanism
- the costs of the process to be charged to the GM sector

Costs

5. All of the above options give rise to costs. Under (i), the cost of litigation would have to be borne by the non-GM and/or GM farmer involved, and if the court found against the GM farmer he would have to fund the compensation awarded. Under options (ii) and (iii) the GM sector would have to cover the cost of administering the redress mechanism and the cost of the redress itself. The 'GM sector' could mean those farmers growing GM crops, the GM seed companies, or both. Under option (iii) there would be a specific cost to Government in terms of making the required primary and secondary legislation.

6. The amount of redress due in each case would generally be the difference between the value of the affected crop as originally intended (as 'non-GM' or organic) compared to it being sold into a non-premium 'GM' outlet. Whether or not there is a premium for non-GM or organic crops, or the extent of any premium, will depend on the type of GM crop involved and the market forces prevailing at the time. As a rough indication of what might constitute a 'typical' claim for redress, a premium of 5% on the value of a conventional oilseed rape crop of £140/tonne (2004 average) would suggest a figure in the region of £180 (assumes average yield for winter rape of 3.2 tonnes per ha and average field size of 8ha)⁶⁸.

7. The total costs will depend on the number of claims for redress. If the coexistence measures in place are broadly effective, then the instances where a planned non-GM crop has a GM presence above 0.9% should be rare. The likelihood will vary by crop. It should be very remote for beet and potatoes because coexistence management of these crops is relatively easy, whereas it will be more of an issue for maize and oilseed rape. It is difficult to quantify this precisely, but Defra's general thinking would put the probability in the realm of, say, one in a hundred cases where compatible GM and non-GM crops of maize or rape are grown in close proximity to each other.

8. Claims for redress will only arise if cases of excessive GM presence are identified, raising the question of the likely extent to which non-GM crops will be tested. Given the current cost of quantified tests for GM presence (c.£200 per sample) and normal crop margins, it would not be cost-effective to undertake widespread testing of non-GM crops to identify potential problem cases at an expected rate of around 1 in a 100. It is part of the logic and benefit of having a reliable coexistence regime that you obviate the possible need for routine GM testing. Decisions on the extent of any testing will be taken by relevant operators in the supply chain, but a Defra-sponsored

⁶⁸ Organic premiums would be expected to be higher than those for non-GM conventional, and thus the amount of redress due for an affected organic crop could be higher. However, there is little or no organic oilseed rape produced in the UK so co-existence with GM production should not be a significant issue. As regards maize, this is mostly grown by farmers to feed to their own cattle, in which case there is no co-existence issue in relation to staying within the 0.9% statutory labelling threshold (there is no legislative requirement for products from animals reared on GM feed to carry a GM label).

coexistence regime will be premised on being robust enough to make specific crop testing unnecessary⁶⁹.

9. The above suggests that the number of claims for redress could be very low indeed. This in turn suggests that:

- it should not be a significant overall burden on the GM sector to cover the cost of a redress mechanism; and
- it may be disproportionate to incur significant costs setting up and administering a redress mechanism; in particular, it may be difficult to justify the resources needed to introduce a statutory scheme (option 3) relative to a voluntary industry solution (option 2).

10. The redress issue is covered in more detail in the main section of Defra's consultation paper (paragraphs 136-171), and the RIA will be developed in the light of the position the Government reaches after the consultation process.

⁶⁹ Defra envisages that as part of monitoring the performance of the coexistence regime to ensure its effectiveness, there could be some anonymous testing of non-GM crops grown adjacent to GM crops. This would inform the review and possible development of the measures being applied.

ANNEX C

NIAB RECOMMENDED SEPARATION DISTANCES *(in metres; for cross-pollination thresholds from 0.1-0.6%)*

		Field depth of 100m		Field depth of 200m		Field depth of 400m		Field depth of 600m	
		Index 1	Index 2						
Spring oilseed rape	0.1%	50	58	39	46	31	38	27	34
	0.2%	41	50	32	39	24	31	20	27
	0.3%	36	45	27	35	20	26	16	23
	0.4%	33	42	25	32	17	24	14	20
	0.5%	30	40	23	30	15	22	11	18
	0.6%	28	37	21	28	13	20	10	16
Winter oilseed rape	0.1%	54	60	44	50	38	44	35	40
	0.2%	43	50	34	40	28	35	25	30
	0.3%	37	44	28	35	22	30	20	25
	0.4%	33	40	25	30	19	26	16	22
	0.5%	30	36	22	27	16	23	14	19
	0.6%	28	33	20	25	14	20	11	16
Forage maize	0.1%	86	112	57	77	41	61	34	53
	0.2%	65	92	42	62	29	47	21	39
	0.3%	53	80	34	54	22	38	14	31
	0.4%	45	72	28	48	17	32	8	25
	0.5%	40	66	23	43	13	28	4	20
	0.6%	35	61	20	40	9	24	0	16
Grain maize	0.1%	105	140	72	93	56	75	48	66
	0.2%	84	120	55	77	41	60	33	50
	0.3%	72	108	46	67	34	52	25	42
	0.4%	65	99	40	61	28	46	20	37
	0.5%	60	92	36	56	24	41	16	33
	0.6%	55	85	32	53	20	38	12	30