Annex – Supplementary Section 32 Evaluation

1. Introduction

Subsequent to the section 32 report (the Report) being completed, an amendment to the RMA set out additional requirements for the section 32 evaluation.[1] The complete replacement of section 32 in that Act resulted in various changes of wording intended to bring additional rigour to the evaluation process and included a new requirement that the assessment of costs and benefits specifically consider anticipated effects on economic growth and employment.[2] Accordingly, this Annex supplements the Report's assessment of costs and benefits, with particular reference to potential economic growth and employment effects. This Annex should be read in conjunction with the Plan Change provisions and the Report.

By way of background, it is important to note that the proposed plan change would not restrain any existing activity: rather it targets future potential activities. However the nature of those future potential activities is poorly defined, with the following being contributing factors:

- GM pasture grasses and GM forestry are considered the most likely subjects of a first application to commercially release a GMO in New Zealand. These domestic projects are long-term, largely because of the complexity of the traits targeted, the long life cycles of trees, together with there being comparatively less experience genetically engineering these species than the broad acre crops currently commercialised. While the GM grass development work began in 1999 and Pastoral Genomics initially targeted commercial release from 2007, by 2010 the consortium was not expecting to have commercial varieties available before 2020.[3] In 2012, it stated that it would be 10-12 years after a field trial before commercial seed was available, and no updated timeframe for trialling has been issued.[4] Research into GM trees has similarly been ongoing for many years but no intention to release a particular variety has been announced to date. At the present stage of research, no field data is publicly available for either of these long-term projects that would allow a sound estimate of projected benefits to be derived.[5]

---

1 Section 32 was amended on 4 September 2013 and except for the Auckland Council's Unitary Plan, came into effect 3 months later on 3 December 2013.

2 See the new section 32(2)(a) in particular which states:

2) An assessment under subsection (1)(b)(ii) must—
   (a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—
      (i) economic growth that are anticipated to be provided or reduced; and
      (ii) employment that are anticipated to be provided or reduced;

The full set of differences can be seen by comparing the current and former versions at the following links respectively: http://www.legislation.govt.nz/act/public/1991/0069/latest/DLM230265.html http://www.legislation.govt.nz/act/public/1991/0069/108.0/DLM230265.html

3 See: Mountfort M, "Ryegrass R&D: Lateral look at gene technology", *NZ Dairy Exporter,* August 2004; and Mike Dunbier, Transcript of RSNZ Media briefing on GM forages, 2 March 2010.

4 Finnie S. Dilemma over GM pasture research, *Straight Furrow, August 13 2012.*

5 Published assessments of GM grass prospects have relied on hypothetical gains being postulated and we are not aware of any results from offshore field trials conducted by Pastoral Genomics having been publicly disclosed. Harris Consulting, *Assessing the Economic Impact of Cisgenic Technologies in Ryegrass,* December 2009. Scion states that "It is projected that herbicide resistance [in genetically modified pine] could significantly reduce the cost of herbicide treatment due to lower labour and chemical input", but we are not aware of specific results having been published. Scion Annual Report 2013, p 14.

- Domestic projects have also targeted a number of food crops but the emphasis on this work has diminished in recent years, and there are currently no field trials active in New Zealand involving food crops. This in general reflects a caution by GMO developers and food producers alike that a GMO release should not be pursued until there is both consumer acceptance in export markets and broad domestic public acceptance.[6] At present, key consumer markets remain resistant to acceptance of GM content in foods. It is also unclear that any of the past research has demonstrated a GM application that would offer a productivity profile significantly different to that available from non-GM sources.

- With respect to potential applications from entities in other countries to grow GMOs in New Zealand, over 99% of the land cultivated globally for GM agriculture hosts just four crops: soy, maize, canola and cotton.[7] This statistic has remained remarkably similar over the past decade despite frequent forecasts of crop diversification. New Zealand does not grow canola or cotton, and has only boutique soy plantings under organic certification. New Zealand maize farmers rely on the non-GM status of their production to meet key export contracts and for these sales to in turn hold up domestic maize prices. Thus New Zealand is not a likely market for the main GM varieties commercialised to date and the food crops that have been the focus of overseas GMO developers which predominantly go to animal feed. Commercialisation and uptake of GM varieties intended for human consumption has been limited for a number of reasons, and particularly by market resistance.

It is therefore very difficult to construct an "expected" scenario that can be compared to the business as usual baseline. Difficulties arise with determining what type of GMO to model and its timing, and often with meaningfully estimating the potential benefits and costs. Hypothetical scenarios lose their utility due to the range of possibilities and the degree of uncertainty associated with key variables within any given scenario.

In absence of readily identifiable expectations, the following assesses the potential for costs and benefits more broadly by examining factors that could meaningfully alter outcomes for the jurisdiction. It first looks at factors that could reduce economic growth or employment (i.e. costs), and then factors that could provide for economic growth or employment (i.e. benefits). In very general terms, increased agricultural productivity would improve regional economic growth and could positively affect employment, while lower producer returns would reduce regional economic growth and may negatively affect employment.

2. Potential for Reduced Economic Growth and Employment

The key potential cost is an opportunity cost, i.e. the value of any economic opportunities lost as a result of the inability to release a GMO due to the Plan Change.

The key sector of interest in the Northern Peninsula is agricultural GMO applications and in particular, varieties of plants, trees or animals already farmed in the area. Although research has been underway for many years to develop new varieties for previously unsuitable environments (for example crops with greater tolerance to drought), such research has not advanced to the point that any commercial GMO has

[6] See for example the stated positions of: Horticulture New Zealand, Plant and Food Research, Fonterra, and New Zealand Winegrowers.

[7] ISAAA, *Global status of Commercialized biotech/GM Crops: 2012*, 2012

demonstrated significant benefits. Therefore it is less likely that GM variants of plants, trees or animals that are new to the Northern Peninsula would be introduced.

The key economic benefit that GM could potentially bring about would be an increase in agricultural productivity. The main food GMOs under commercial cultivation have shown productivity increases overall, but these have been small relative to the hybrids the GMOs have been derived from. The gains introduced to hybrids are the results of non-GM breeding work and these have been the main source of ongoing productivity gains in past decades. A 2014 US Department of Agriculture paper explains that:

> Over the first 15 years of commercial use, GE seeds have not been shown to increase yield potentials of the varieties. In fact, the yields of herbicide-tolerant or insect-resistant seeds may be occasionally lower than the yields of conventional varieties … . However, by protecting the plant from certain pests, GE crops can prevent yield losses to pests, allowing the plant to approach its yield potential.[8]

A comprehensive assessment of the productivity of GM crop systems and non-GM crop systems has been made by comparing Food and Agriculture Organisation ("**FAO**") data on North America and Western Europe over the last 50 years. The researchers state that the two regions make good comparisons because they:

- grow similar types of crops at comparable latitudes;
- have similar levels of mechanization and farmer education; and
- both have access to biotechnology.

A key outcome from the assessment was that the combination of non-GM seed and management practices used by Western Europe increased corn yields faster than the use of the "GM-led package" chosen by North America. A similar result was obtained for canola. The researchers concluded that: "Europe has learned to grow more food per hectare and use fewer chemicals in the process. The American choices in biotechnology are causing it to fall behind Europe in productivity and sustainability."[9]

Productivity is influenced by many factors but even if focusing exclusively on the genetics of the seed stock, GM is not the only way to achieve productivity gains. GM is just one class of applied techniques that has been spun off from major advances in gene science since the 1970s. As discussed in Section 4.5.2 of the Report, a key non-GM technique that has arisen from the same science is Marker Assisted Selection ("**MAS**"), also known as precision breeding. MAS is generally capable of delivering the same scope of new varieties as GM.

New Zealand's leading GM grass developer, Pastoral Genomics, stated in 2011 that around half its research budget was devoted to MAS, with the other half to GM. The consortium considers both techniques capable of achieving the same level of productivity gains and that they require similar time to commercialisation.[10] Internationally, even the major GM developers are increasingly turning to MAS:

> The big multinational companies, including Monsanto, Syngenta, DuPont Pioneer, Bayer CropScience and Dow AgroSciences, have invested heavily in the new plant-breeding programs, which will increasingly require colossal data-processing abilities. "In many ways, the company has gone beyond" genetic

---

8 Fernandez-Cornejo H, Wechsler S, Livingston M and L Mitchell. 2014. *Genetically Engineered Crops in the United States.* US Department of Agriculture. Report for the Economic Research Service.

9 Jack A. Heinemann, Melanie Massaro, Dorien S. Coray, Sarah Zanon Agapito-Tenfen & Jiajun Dale Wen, *Sustainability and innovation in staple crop production in the US Midwest*, International Journal of Agricultural Sustainability, 14 Jun 2013; and University of Canterbury, *GM a failing biotechnology in modern agro-ecosystems*, Press release, 18 Jun 2013. An early version of this work was referred to in Section 4.5.2 of the Report.

10 Sustainability Council, *Betting the Farm*, June 2011.

> engineering, said Robert T. Fraley, Monsanto's chief scientist. "The breeding technology has changed dramatically in the last few years."[11]

As also noted in Section 4.5.2 of the Report, because non-GM techniques can achieve similar outcomes to GM methods, in principle there need not be any foregone benefits from prohibiting the release of GMOs.

If it became evident that a particular GMO offered important benefits to the jurisdiction, and a non-GM technique was not available to offer the same benefits, a plan change could be considered that allowed for that particular organism to be used. A key consideration would be whether the gains from use of that particular GMO were enough to sufficiently offset expected spillover costs that such a release would impose on non-GM producers.

Overall, the existence of the option to reverse the constraint on GMO use effectively caps the potential value of any lost opportunities at the cost of making a further plan change.[12] It is therefore difficult to identify the basis for a meaningful opportunity cost during the life of the plan with respect to economic growth or employment.

The need to make a plan change in order to relieve the constraint puts the onus on the user of the new GM variety to make the case that there would be a net benefit to the region from such a change. That is directly analogous to the test at the national level under the HSNO Act, which requires the applicant to demonstrate a net benefit to New Zealand in order to gain an approval. As outlined in section 2.3 of the Report, the more stringent test at the regional level arises due to deficiencies in the national level test, and because what is beneficial for the nation may not be beneficial for a particular region and may not reflect local values.[13] A practicable alternative that meets these concerns and avoids any dual permitting (but is unavailable) is discussed in section 4.2.2 of the Report.

No environmental or cultural opportunity costs are expected as environmental gains can also generally be achieved by alternatives to GMOs that carry less ecological risk, and these are similarly capped at the cost of a plan change should an alternative be unavailable.

3. Potential for Increased Economic Growth and Employment

The key potential economic benefits are:

- Avoidance of accidental or unintentional migration of GMOs resulting in GMO contamination of non-GM crops – an impact that could result in a range of economic costs; and
- Increased producer returns through price premiums and/or additional sales as a result of branding and marketing campaigns that rely on continuation of a regional GM Free status.

---

[11] Adrian Higgins, Washington Post, *Trait by trait, plant scientists swiftly weed out bad seeds through marker-assisted breeding*,16 April 2014, http://www.washingtonpost.com/local/scientists-breed-a-better-seed-trait-by-trait/2014/04/16/ec8ce8c8-9a4b-11e3-80ac-63a8ba7f7942_story.html

[12] Given the time frames for development of a GMO, and the status of current local initiatives, it is possible that the plan will be due for general revision by the time active consideration is being given to a commercial release, such that no additional cost is involved.

[13] One of the deficiencies identified was uncertainty as to what level of precaution would be adopted by the EPA if it elected to act cautiously. A High Court judgment in May 2014 was critical of the EPA for not exercising caution in a decision concerning two new GM breeding techniques: The Sustainability Council of New Zealand Trust v The Environmental Protection Authority [2014] NZHC 1067, 20 May 2014.

3.1 Avoidance of GM Contamination

A jurisdiction that does not allow the release of GMOs provides a high level of assurance, to food producers in particular, that they will not suffer economic penalties arising from GM contamination of their produce.

As outlined in Section 2.2.2 of the Report, economic damage arises from market resistance to GM content in food, even at trace levels of contamination. This is demonstrated by consumer attitudes to GM food in high value markets in Europe and Asia. The European Commission summarised the trends in acceptance of GM foods since 1996 as follows: "The wider picture is of declining support across many of the EU Member States – on average opponents outnumber supporters by three to one, and in no country is there a majority of supporters".[14] Resistance to GM contamination in food similarly remains strong in wealthier Asian markets such as Japan and Korea.

Many supermarket chains in GM sensitive countries have responded to such consumer attitudes through the development of testing procedures and product declarations to support policies that aim to remove any detectable GM content from food stocked. This is commonplace in most Western European countries and near universal in France, Italy and the UK.[15] A more recent trend has been to label animal products for any use of GM feed.[16] Currently in development are moves at the US state level to require food products be labelled for GM content, with nearly half of all states set to consider such law changes and the state of Vermont having been the first to approve it.[17]

The economic cost of GM contamination was brought home to New Zealand exporters when in 2003 a Japanese pizza maker rejected corn which routine testing showed to have 0.05% trace contamination.[18] This and two subsequent incidents that were linked to impure corn seed each carried costs of $500,000 or more. Though significant, such losses are small by comparison to the costs that could arise for local producers were a GM food crop to be cultivated and its pollen and/or produce mingled with conventional production, resulting in export market rejection of otherwise non-GM foods (by means detailed in Section 2.2.2).

Even more serious economic costs could result from GM contamination by an unapproved GMO, as New Zealand's major export markets generally have zero tolerance for any level of GM content that has not been locally approved for human consumption. For example, a form of GM rice that had only ever been field trialled nonetheless got into the US supply chain and when in 2006 it was detected in export markets, "the global market for US long grain rice collapsed."[19] The owner of the GM rice, Bayer, reached an out-of-court settlement of US$750 million.[20] It took eight years to remove traces of that GM strain from the US system and over that period resulted in significant damage to export markets.

---

14 European Commission, *Europeans and Biotechnology in 2010. Winds of change?* Eurobarometer, European Directorate-General for Research, October 2010.

15 See for example: http://www.carrefour.com/cdc/responsible-commerce/product-safety-and-quality/

16 Harris Consulting, *Economic Impacts: Adventitious presence of genetically modified forages*, a report prepared for MAF, November 2010.

17 New York Times, *Vermont Will Require Labeling of Genetically Altered Foods*, Stephanie Strom, 23 April 2014. www.nytimes.com/2014/04/24/business/vermont-will-require-labeling-of-genetically-altered-foods.html?_r=0

18 See section 2.2.2 of the Report, p 8.

19 2009. Class Action Complaint Against Bayer in the East Arkansas District Court, para 73.

20 http://www.ricelitigation.com/

3.2 Increased Producer Returns

A jurisdiction that does not allow the release of GMOs provides stronger conditions for branding and marketing campaigns that rely on a GM Free status for the region. While the jurisdiction may already be free of commercial cultivation of GMOs, local rules that affirm the GM Free status can readily be translated into an area-wide branding proposition.

In Europe, premier food growing regions such as Tuscany, Champagne and Bordeaux have included GM Free as part of the package of distinguishing characteristics that is used to market produce from these areas as superior. In April 2014, the region of Bavaria (which covers almost 20% of Germany's land area) became the 62nd GMO Free farming area in Europe.[21]

In Australia, Tasmania and South Australia have actively marketed each state's GM Free credentials. As part of a "Premium Food and Wine" strategy, the South Australia government is maintaining a moratorium on any GMO release until 2019 and increasing promotion of the state's GM Free status.[22]

It is unclear to what extent branding and marketing initiatives tied to a legally proscribed GM Free area would lead to improved financial positions for producers in the Northern Peninsula. However it is notable that in addition to price premiums, there are other ways in which branding can also assist producers – such as mitigating price falls in times of gluts and/or leading to favoured access when other producers are excluded. Economic benefits could therefore come in the form of price premiums and/or sales support.

Overall, rules that prohibit the use of GMOs within the jurisdiction remove the risk of substantial costs arising from GM contamination and provide a stronger base for branding and marketing opportunities that could improve the financial positions of food producers. While positive effects on economic growth and employment are possible as a consequence of the latter, the certain benefit is the avoidance of GM contamination events from deliberate releases – events that could devastate producer returns over a number of years and reduce local economic growth and employment.

4. Other Issues and Summary

With respect to fiscal costs, the plan change would not involve ongoing administrative costs that are not recoverable through application fees. The main source of such costs would be administering any application for a GM field trial. The plan change itself is a one-off cost, and is a similar amount to that which would confront councils if a GMO release were proposed for an area and community representatives exercised legal mechanisms to press the council to address the risk under the RMA.[23]

In addition to the alternatives to the plan change that are assessed in Section 4.2 of the Report, a further reasonably practicable option identified is a symbolic declaration of the area as a GM Free zone. This could be effected by way of media statements and development of a GM Free brand for the area. The immediate benefits of this option are the avoidance of significant cost and the ease of reversal of the position. However, as a symbolic declaration would have no legal force, GM developers would

---

21. http://sustainablepulse.com/2014/04/28/bavaria-signs-agreement-stop-cultivation-gm-crops/#.U15yV4_tOL2
22. Government of South Australia, *Building Stronger South Australia: Premium Food and Wine*, 2013.
23. Simon Terry Associates and Mitchell Partnerships, *Community Management of GMOs II: Risks and Response Options*, 2005.

be free to grow GMOs in the area at any point the EPA gave approval at the national level for a release. Thus protection against costs arising from GM contamination would not be available and local producers could also be expected to invest less in promoting an area-wide brand or their own GM Free status.

With respect to overall costs and benefits, as outlined in Section 1 of this Annex, the nature of future potential GMO activities is poorly defined. It is therefore very difficult to construct an "expected" scenario that can be compared to the business as usual baseline. However, should a particular GMO or class of GMOs offer significant economic growth and employment benefits, the opportunity for Council or a GM operator to initiate a plan change ensures potential benefits of GMOs are provided for as the barrier can be overcome through a further targeted plan change. This effectively caps the potential value of any lost opportunities arising from a GMO release at the cost of making that further plan change.[24]

It is unclear whether economic growth and employment would increase as a result of the Plan Change. However, it would ensure these were not reduced by GM contamination incidents resulting from the approved use of GMOs in the area, as such events carry the potential for significant economic costs to affected producers.

The plan change is in essence a comparatively small one-off cost, proposed as an investment in protection against GM contamination events and the provision of a platform upon which branding and marketing initiatives can be built to improve producer financial positions.

[24] Note that it is assumed here that the costs of the currently proposed plan change are largely sunk.

4 June 2014 **CONFIDENTIAL**

MEMORANDUM

To: Kerry Grundy, Simon Terry, John Kyle
From: Dr R J Somerville QC
Re: **GMOs – Section 32 Review**

Section 32 has been amended and came into force in December 2013.

> **32 Requirements for preparing and publishing evaluation reports**
> (1) An evaluation report required under this Act must—
> (a) examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and
> (b) examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—
> (i) identifying other reasonably practicable options for achieving the objectives; and
> (ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and
> (iii) summarising the reasons for deciding on the provisions; and
> (c) contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.
> (2) An assessment under subsection (1)(b)(ii) must—
> (a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—
> (i) economic growth that are anticipated to be provided or reduced; and
> (ii) employment that are anticipated to be provided or reduced; and
> (b) if practicable, quantify the benefits and costs referred to in paragraph (a); and
> (c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions. [Emphasis added]

The difficulty with applying the section 32 tests as set out in the 2013 Amendment is that objectives, policies and methods being considered in the context of the proposed provisions are addressing environmental risks which cannot be clearly assessed scientifically and need to be managed when there is significant uncertainty.

Where the science is uncertain, connecting science with environmental policy requires the use of what is sometimes known as "integrative science". Adaptive management is an example of a policy response that involves integrative science. (See "Missing Links: Connecting Science with Environmental Policies" September 2004, Parliamentary Commissioner for the Environment, page 61.)

There are some relevant matters that result from the wording of the amendment which the local authority needs to be aware of. They relate to section 32(1)(b)(i), 32(1)(c) and 32(2)(b) of the Resource Management Act 1991 (the RMA).

I. Section 32(1)(b)(i) - "identifying other reasonably practicable options for achieving the objectives".

A purposive interpretation of these words would suggest that the option being proposed in the instrument should also be reasonably practicable. If it is unreasonable or impracticable then it will not meet the test contained in section 32(1)(b)(i) which is mandatory.

The word "practicable" refers to an option that is achievable in practice rather than being purely a theoretical option. The practicable application of any theoretical approach would need to be considered. The Shorter Oxford English Dictionary definition of "practicable" is "1. Capable of being carried out in action; feasible."

The word "reasonable" means that the reasons given can be considered objectively as being sufficient to address the practicable options. The words "reasonably practicable options" can be interpreted by referring to the definition in section 2 of the RMA of "best practicable option". Admittedly this definition refers to "best practicable option" rather than "reasonably practicable option". However, the definition in paras (a), (b) and (c) indicates what elements

would be relevant when determining practicable options pursuant to the RMA. I have emphasised the relevant wording.

> **best practicable option**, in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—
>
> (a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
>
> (b) the financial implications, and the effects on the environment, of that option when compared with other options; and
>
> (c) the current state of technical knowledge and the likelihood that the option can be successfully applied [Emphasis added]

When identifying reasonably practicable options, the issue is whether it is reasonable and practicable to leave the management of environmental risks associated with field trials and the general release of GMOs to the EPA, rather than requiring a plan change pursuant to the RMA. The earlier section 32 evaluation found that it was not a reasonably practicable option to leave the matter to the EPA and not involve the RMA.

The option for achieving the objective raised in the evaluation by an amendment to the HASNO legislation has been examined in the section 32 evaluation. The Government has declined to pursue that option.

II. Section 32(1)(c) states:

contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

This direction involves the proportionality principle when exercising a statutory duty. The scale and significance of environmental, economic, social and cultural effects that are anticipated from the implementation of the proposal are not restricted to adverse environmental effects. They relate to the definition of effects in section 3 of the RMA.

> **3 Meaning of effect**
> In this Act, unless the context otherwise requires, the term **effect** includes—
> (a) any positive or adverse effect; and
> (b) any temporary or permanent effect; and
> (c) any past, present, or future effect; and
> (d) any cumulative effect which arises over time or in combination with other effects—
> regardless of the scale, intensity, duration, or frequency of the effect, and also includes—
> (e) any potential effect of high probability; and
> (f) any potential effect of low probability which has a high potential impact.

Therefore, it is important that positive environmental effects of prohibiting the release of GMOs until a plan change is sought are addressed.

III. Section 32(2)(b)

- if practicable, quantify the benefits and costs referred to in paragraph (a);

Section 32(2)(b) is relevant when dealing with employment opportunities in terms of section 32(2)(a)(ii). The plan change prohibiting the release of GMOs into the environment cannot be evaluated in terms of whether there will be an increase or reduction in employment figures.

IV. Conclusion

Overall, I consider that the section 32 evaluation, with Simon's additional work, is sufficient to address the amendment.