

**IN THE ENVIRONMENT COURT
AT CHRISTCHURCH**

UNDER The Resource Management Act 1991

IN THE MATTER OF appeals under clause 14(1) of the First Schedule to the Act

BETWEEN **FEDERATED FARMERS OF NEW ZEALAND
(INCORPORATED) MACKENZIE BRANCH**
ENV-CHC-2009-000193

**HIGH COUNTY ROSEHIP ORCHARDS LIMITED AND
MACKENZIE LIFESTYLE LIMITED**
ENV-CHC-2009-000175

MOUNT GERALD STATION LIMITED
ENV-CHC-2009-000181

MACKENZIE PROPERTIES LIMITED
ENV-CHC-2009-000183

**MERIDIAN ENERGY LIMITED AND GENESIS ENERGY
LIMITED**
ENV-CHC-2009-000184

THE WOLDS STATION LIMITED
ENV-CHC-2009-000187

FOUNTAINBLUE LIMITED & OTHERS
ENV-CHC-2009-000190

**R, R AND S PRESTON AND RHOBOROUGH DOWNS
LIMITED**
ENV-CHC-2009-000191

HALDON STATION
ENV-2009-CHC-000192
Appellants

AND **MACKENZIE DISTRICT COUNCIL**

Respondent

**STATEMENT OF EVIDENCE IN CHIEF OF JAMES DOUGLAS MARSHALL
FAIRGRAY ON BEHALF OF MACKENZIE DISTRICT COUNCIL (ECONOMICS)**

DATED 15 JULY 2016

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**STATEMENT OF EVIDENCE IN CHIEF OF JAMES DOUGLAS MARSHALL
FAIRGRAY**

1. Introduction

- 1.1 My full name is James Douglas Marshall Fairgray. I have a PhD in geography from the University of Auckland, and I am a principal of Market Economics Limited, an independent research consultancy.
- 1.2 I have 37 years' consulting and project experience, working for public sector and commercial clients. I specialise in policy and strategy analysis, the geography of urban and rural economies, assessment of demand and markets; and the evaluation of outcomes and effects in relation to statutory objectives and purposes. I have applied these specialties in more than 900 studies throughout New Zealand.
- 1.3 Five areas of my experience are most directly relevant to this case:
- i.* I have undertaken economic assessment of council policies which will affect farming activity and farm production. This relates especially to dairy farming, and the implications of limiting farm activity and output in order to manage runoff (of P and N). In this work, I drew on the knowledge of relevant farming experts using model farms, to estimate the aggregate effects of policies at district and region level, and identify the implications for district and regional economies and employment (using regional economic models), in Canterbury and Manawatu-Wanganui.
 - ii.* I have undertaken a range of studies into regional and district economies, throughout New Zealand. This work is typically a basis for assessing the roles of key sectors (such as farming or tourism), or the effects of new development or change in economic activity. It includes examination of the implications of growth or decline in specific sectors, as well as effects of policy change.
 - iii.* I have undertaken a wide range of studies of tourism and travel, including the roles of tourism in national and regional economies. My work includes growth projections, and development of regional tourism statistics for assessing impacts and growth potential in specific districts.
 - iv.* I have undertaken research into the concepts and role of economic assessment in the RMA. I prepared the material for the MfE Section 32 guide which the Ministry released in 2014. I was the presenter on economic matters for the nationwide workshop series on s32 guidance commissioned by the Ministry and NZPI on s32 series, undertaken during 2014. My work includes consideration of the nature and theory of economic assessment, and the scope of the "economy" for planning and policy purposes.

- v. I have wide research experience in policy evaluation and impact assessment, from an economic perspective. Typically, plan provisions have effect via the key processes in the economy as people and businesses undertake their day to day activity – they decide their objectives, assess the planning and market contexts in which they may operate to pursue their objectives, make decisions, and act accordingly. Understanding these economic and behavioural processes behind peoples’ decisions and actions is a critical tool in policy evaluation - including to assess likely outcomes, and to consider efficiency and effectiveness.
- 1.4 I have applied these capabilities for the assessment of effects in evidence to the Environment Court and the High Court.
 - 1.5 Much of my work has been undertaken in relation to the RMA purpose of promoting sustainable management, and enabling people and communities to meet their needs, and it has required in-depth assessment of both processes and outcomes. The broad scope of sustainable management demands careful consideration of the processes by which the business sector and the household sector, through their actions, contribute directly and indirectly to each aspect of the Act’s purpose. This requires good understanding of those economic and social processes themselves, including their spatial dynamics and interactions among different sectors, and how – in combination with planning provisions - they are likely to affect outcomes and environmental results.
 - 1.6 I have had particular regard for how effects of relevance to the Act are driven generally by the nature, location, scale and timing of an activity. The location of activity, relative to other activities, commonly has a major influence on both the processes at work, and the likely effects. Further, it is essential to understand processes as key indicators of likely outcomes. That serves to highlight the importance of understanding efficiency and effectiveness matters in relation to the processes at work, as well as the likely outcomes.
 - 1.7 These matters are at the core of this case. At issue are the likely effects and outcomes of a proposed plan change, which will have direct and consequent outcomes for rural land use and effects of that land use. The potential to achieve positive outcomes, and avoid, remedy or mitigate adverse effects, relates directly to the efficiency and effectiveness of the proposed plan provisions.

2. **Code of Conduct**

- 2.1 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving oral evidence before the hearing committee. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not

omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence

3. Scope of Evidence

- 3.1 I have been engaged by the Mackenzie District Council (Council) to provide evidence in relation to its post consultation version of Plan Change 13 to the Mackenzie District Plan (PC13 (s 293V)).
- 3.2 For this statement, I have carried out an assessment of the economic implications of Council's proposed controls for pastoral intensification under PC13 (s 293V).
- 3.3 PC13 seeks to provide greater protection to the landscape values of the Mackenzie Basin from inappropriate subdivision, development and use. From an economic perspective, the key matters are the extent to which the provisions of PC13 - in themselves and in combination with other provisions of the district plan - are likely to achieve the greater protection which is sought; the appropriateness of the proposed provisions in terms of their efficiency and effectiveness; and the extent and nature of the costs and benefits to the community and economy of achieving such protection.
- 3.4 This is important because for the Mackenzie economy and community, and the wider regional and national communities, this protection of the Basin's natural features would come:
- i. with some benefit from protecting natural features which are valued by the district, regional and national communities;
 - ii. with some benefit for tourism activity and the tourism sector, from protecting natural features which visitors value, and which are part of what attracts them to visit the District and New Zealand;
 - iii. at some cost because the provisions will place limits on the amount of farming intensification which is possible, especially through irrigation; and
 - iv. at some cost because the provisions will limit the subdivision of rural land for lifestyle holdings.
- 3.5 In my evidence I consider from an economic perspective:
- i. Council's proposed controls under PC13 for pastoral intensification, specifically Policies 3B1, 3B7(f), 3B7(d), 3B13, and Rules 15A.1 to 15A.3. This includes the purpose of those provisions, the intended outcomes, and how they are likely to affect economic activity directly, and the wider economy and community indirectly;
 - ii. how these provisions may affect farming activity directly, and the likely flow on or consequent effects for the MacKenzie District economy and community;

- iii. how these provisions may affect the tourism sector directly, and the likely flow on or consequent effects for the MacKenzie District economy and community;
- iv. How these provisions may affect the values which the district, regional and New Zealand communities ascribe to the natural landscape and other aspects of the biophysical environment.

Structure of Evidence

- 3.6 To do this, I have first set the economic and social context, in regard to the Mackenzie District economy and community (Section 4). I have then considered the conceptual framework in terms of the relationship between the Act and economics (Section 5). In Section 6, I have considered the provisions of PC13 from an economic perspective, in terms of the processes through which the provisions of PC13 may have effect, and the efficiency and effectiveness of PC13 in those terms. In Section 7, I draw my conclusions as to the likely efficiency and effectiveness of PC13, from an economic perspective.
- 3.7 In preparing this statement, I have considered the PC13 Section 293 Package (PC S293V), including the Section 32 Report, the Council's maps relating to PC13, and the previous decisions of the Court. I have also considered a range of material relating to the Mackenzie District and Mackenzie Basin economy and community, especially the farming and the tourism sectors.

4. Mackenzie District Economy and Community

- 4.1 It is important to first understand the economic and social context of PC13, by considering the structure of the economy and the community in the Mackenzie District.
- 4.2 This context is relevant for two reasons. First, it is important to understand the relative size of the community in the Mackenzie District, because many of the costs and benefits associated with PC13 will accrue to the households that live in the Mackenzie District.
- 4.3 Second, this context provides an understanding of the relative importance of tourism and farming. These two industries are the main parts of the economy that can be expected to be affected by the PC13, specifically most of the benefits will accrue to tourism operators and the majority of the opportunity cost will accrue to farmers.
- 4.4 I have reviewed the Census data for the towns and rural areas in the Mackenzie District. In 2013 approximately two-thirds of the Mackenzie District community lived within the towns in the district and the remaining one-third lived in rural areas.¹ Between 2001 and 2013 the number of resident households increased from 1,365 to 1,614, which

¹ Twizel and other Rural centres had 1,005 households, while the rural areas had 609 households.

is equivalent to 21 new households per annum or growth of 1.4% per annum.

- 4.5 This data is important because it shows that the community in the area has been growing slowly. The small scale of the community indicates that there is likely to be a small group of households, predominantly engaged in farming, most impacted directly by PC13.
- 4.6 In terms of the costs associated with PC13, most will accrue to farmers in the rural areas. Therefore, it is likely that the people that are directly impacted by the costs of PC13 will be a subset of the households living in the rural area (i.e. somewhat less than a third of the community).
- 4.7 The benefits associated with PC13 are likely to flow mostly to households in the towns in the District, specifically to tourism operators and their employees. Again not all of the households in the towns will be impacted equally, it is likely that the benefits will be concentrated to a subset of the households living in the towns (i.e. much less than two thirds of the community).
- 4.8 I have also considered the projected household growth in the District², which suggests that the growth in the community is expected to slow in the future, to 15 households per annum between 2016 and 2031. This is important as it indicates that the community is not expected to change rapidly in the near future.

Mackenzie District Economy

- 4.9 When assessing the potential implications of PC13 it is important to understand the structure of the Mackenzie District economy, both today and in the past, to show the relative significance of tourism and dairy farming.
- 4.10 It is relevant to first provide some national level facts for tourism and dairy farming.
- 4.11 At the national level the tourism sector,
- a. generated spend of \$29.8 billion of gross output in 2015, which was a 10% increase on the previous year. Of the total tourist spend, \$18.1 billion was domestic tourist spend and \$11.8 billion was international tourist spend.³
 - b. has experienced strong growth, with a 4% per annum growth rate on average since the year 2000.
 - c. is forecast to grow by 7.5% per annum until 2022, mainly as a result of growth in tourist from Asia (India and China).⁴
- 4.12 At the national level, the dairy sector

² I have estimated future household numbers based by Statistics New Zealand Population Projections – Medium

³ Statistics New Zealand Tourism Satellite Accounts 2015

⁴ Ministry of Business, Innovation & Employment (2016) New Zealand Tourism Forecasts 2016-2022

- a. was worth approximately \$14.8 billion of gross output in 2015⁵, of which most was exported (\$14.2 billion).
- b. recently the milk production has decreased, with the value of exports declining by -11% last year, driven by lower dairy prices.⁶
- c. is forecast to rebound from the recent slump, with growth of 4.6% per annum until 2020.⁷

4.13 This national level context is important because the local Mackenzie District activity in both the tourism and dairy sectors will also face similar futures. The national level data suggests that tourism will continue to grow rapidly in the future to become the largest export earner. The dairy sector is expected to decline in the near future and then stabilise at a slower rate of growth (substantially slower than tourist activity).

4.14 In terms of the Mackenzie District economy I have drawn on Business Demography data from Statistics New Zealand, which details the level of employment and business numbers by detailed industry classifications.⁸ This data provides the most detailed understanding of the structure of the economy. The data shows the following key trends for the Mackenzie District,

- a. The level of employment in the dairy farming has increased rapidly from 18 jobs (persons engaged) in 2000 to 112 jobs in 2014.
- b. However over this same period the employment in other agricultural (primarily sheep and beef) has dropped significantly, with a loss of 225 jobs.
- c. Overall the employment in the agricultural sector in Mackenzie District has decreased by 121 jobs.
- d. In contrast the tourist sector in the Mackenzie District has grown rapidly since 2000, with an additional 310 jobs identified in tourism related businesses - Accommodation, Hospitality, Transport and Other tourism operations.

4.15 In 2014 the district economy had the following employment structure:

- a. Tourism 34%,
- b. Dairy Farming 4%,
- c. Other Agriculture 23%, and
- d. Other sectors (Health/education/Government/Retail) 38%.

⁵ The Treasury (2016) New Zealand Economic and Financial Overview 2016

⁶ Statistics New Zealand Tourism Satellite Accounts 2015

⁷ Ministry of for Primary Production (2016) Situation and Outlook for Primary Industries 2016

⁸ Statistics New Zealand (2015) Business Demography – 6DANZSIC

- 4.16 The employment data for Mackenzie District shows that the tourism sector has grown to become the most important sector in the economy in terms of employment. The data shows that there are approximately 900 tourism jobs in Mackenzie District, which suggests that a significant proportion of the 1,614 households in the Mackenzie District will have a member directly employed in the tourism sector.
- 4.17 In contrast the agricultural sector has been declining in size, and relative importance. The increase in dairy farming activity has not been sufficiently large to offset the declines in employment in the rest of the agricultural sectors.
- 4.18 In my view that indicates a steady structural shift in the Mackenzie District economy, with agricultural activity declining in importance and tourism becoming the largest contributor to the economy.
- 4.19 Given the national level trends for tourism (high growth) and dairy farming (slowing growth) I consider that it is likely that the structural shift observed in the Mackenzie District economy is likely to become more apparent in the future. That is, it is likely that tourism will play an increasing role in the Mackenzie District economy.
- 4.20 That said, it is also important to recognise that pastoral intensification is a key avenue for growth in the farming sector.

5. Economic Theory and RMA

- 5.1 The RMA is recognised as having an inherently “economic” basis, in that decision-makers must take into account the positive and adverse effects arising from provisions or actions, in relation to economic, social and cultural wellbeings of people and communities, and the biophysical environment. Welfare economics, with its focus on the benefits and costs to society of alternative courses of action, is conceptually well aligned with the purpose of the Act.
- 5.2 There is also close alignment in the approach to assessment. The systematic analytical approach common in economics of identifying and evaluating relevant outcomes based on understanding of conditions and core processes in the economy and the natural environment, is inherent in Section 32 of the Act with its requirements to examine benefits (positive effects), and costs (adverse effects) of likely outcomes as the basis for evaluation.
- 5.3 Similarly, the concept of efficiency is a core matter in economics, particularly as regards benefits relative to costs, and for comparing the outcomes of alternative courses of action for allocating resources. Social efficiency, which considers the distribution of resources taking into account both internal benefits and costs (market), and external benefits and costs (externality), is an especially relevant concept for the RMA.

- 5.4 I have drawn on these concepts and practices for my economic assessment of PC13. The purpose of PC13 is to provide greater protection to the landscape values and natural environment of the Mackenzie Basin. Planning regulations such as PC13 are a core mechanism for achieving outcomes which are sought by nations and communities but which will not be delivered through the operation of “monetisable” markets⁹ – commonly termed situations of ‘market failure’.
- 5.5 In economic theory, a market failure can occur when there are benefits and costs that accrue to those who are not directly involved in market transactions. These benefits and costs are referred to as ‘externalities’, and can accrue to others in the community who have no direct influence over the operation of that market. These externalities occur quite commonly, and arise because there are no structures which fully link benefits and costs through money transactions to those who receive or generate them. This is particularly the case in regard to public goods, such as landscape values.
- “The production of landscape falls under the rubric of market failure¹⁰. In essence the public cannot easily transact to satisfy a demand for landscape as a good. In the absence of a demand backed by a willingness to pay, land owners, predominantly but not exclusively farmers, may not be motivated to provide the features that might match demand. This is because landscape is a public good and they cannot capture benefits from all forms of users. Accordingly, and provided landscape is valuable to the public, there is a rationale for government intervention to stimulate the supply of features that are deemed to be in the public interest.”¹¹*
- 5.6 Generally, when there are externalities associated with a market the resulting outcome can be sub-optimal¹² with the “monetisable” market selecting to provide too little or too much of the item in question. The application of (planning) regulations can shift this component of the wider market towards the optimal outcome for society.
- 5.7 Figure 5.1 shows an example of how market failure may occur in the presence of negative externalities. In this case the individuals in the (free or commercial) market would choose to supply quantity Q at price P which is point A in the figure, where the marginal social benefits (MSB) equal the marginal private costs (MPC).

⁹ This term is used to identify that component of the overall market in which benefits and costs are fully or predominantly captured through money transactions.

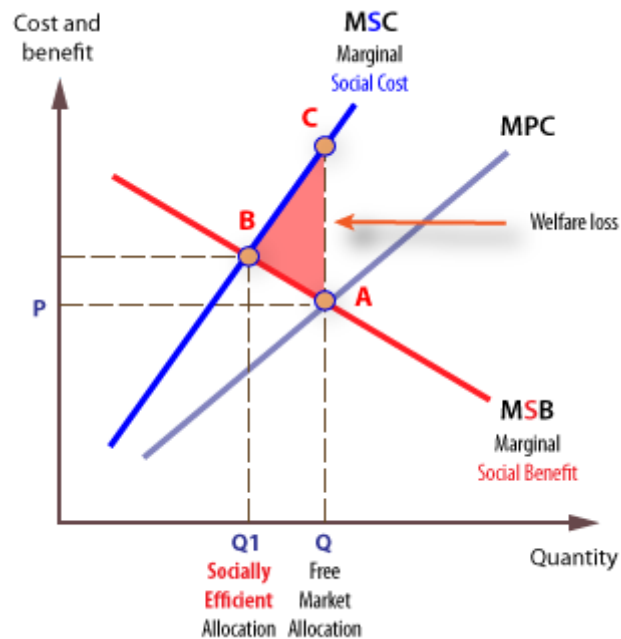
¹⁰ If landscape value was perfectly capitalised in land prices then the market could be relied on to deliver an optimal allocation of landscape but markets do fail

¹¹ *The Economic Valuation of Rural Landscapes*, D Moran, Scottish Agricultural College, 2005.

¹² In the case where a market has associated externalities, the resulting market outcome will be at a point where the marginal social benefit will not equal the marginal social cost (sub-optimal). The market outcome could be changed to produce additional gains to society.

- 5.8 However, the presence of negative externalities means that the market allocation at point A is sub-optimal - in this case, an over provision of the item in question. That is because the community would be better off (i.e. derive greater welfare) if the market was able to produce less of the item (point B), where the marginal social benefits (MSB) equal the marginal social costs (MSC). The red shaded triangle in the figure represents the value of the welfare that would be lost if the market acted freely.

Figure 5.1: Negative Externalities and Market Failure



- 5.9 In the case of land use for farming (and other) purposes a range of externalities commonly exist. In the Mackenzie Basin, farming activity has the potential to affect the landscape values and environmental quality of the Basin. The issue at hand is how best to achieve the objectives of PC13, given there is potential for direct conflict between those objectives – that is, to enable pastoral farming on land in the Mackenzie Basin, and to provide adequate protection of the landscape values and environmental quality.
- 5.10 The conflict arises because some effects from pastoral farming, especially those from intensification based on irrigation, will be detrimental to the landscape values and environmental quality. However, these adverse effects may not automatically ensue from intensification. There may be circumstances where intensification can occur without generating adverse effects on landscape values and environmental quality. From a societal perspective, the optimal outcome would arise where the benefits of additional farming activity can be maximised provided that the adverse effects on landscape values and environmental quality are at a level acceptable to society.

- 5.11 In theory, such externalities can be resolved and incorporated into a market as a result of negotiations between the parties that are affected.¹³ However in practice there are usually far too many stakeholders¹⁴ and relatively high transaction costs associated with landscape and environmental externalities, which suggests that the negotiation of this theoretical solution would be likely to fail. This means it is rare for environmental externality issues to be resolved among private parties.
- 5.12 The key externality in this case is the wider public good associated with the outstanding natural landscape¹⁵ and environmental quality. These public good benefits are not necessarily considered by the individual owners or operators of farm land. More importantly, even when they are recognised and considered, the significance of these values in their decision-making may not be the same as that attributed by the wider community. Accordingly, economic theory holds that individual owners are likely to choose an outcome (such as a level of management) for areas including or affecting natural landscape heritage that is less than optimal from the community's point of view.
- 5.13 The application of (planning) regulations is generally used to maintain or enhance these externality benefits. In the case of landscape assets, regulations typically place limits on the extent of change possible for such assets, including higher levels of scrutiny on proposed changes¹⁶. Limits are placed on sites with potential to affect landscapes with the rationale to manage public goods which can maximise externality benefits that do not overly impinge on the private benefits of the land owner(s).
- 5.14 The costs and benefits associated with landscape values and the natural environment are typically difficult to quantify, most particularly because they do not relate to a measurable financial cost or a market value. Many of the key benefits of landscape are intangible, so that the value of such benefits is also intangible. This means that protecting such values, while enabling productive farm activity, represents a complex balancing act for local and central government authorities and community groups, as well as for direct users of the land.
- 5.15 The application of planning regulations to a market can also generate costs, to both the owners of the land affected by plan provisions, and to the wider community. The potential costs of PC13 include compliance costs around consent applications, and reduced or lost farm output and income opportunity for farm owners and operators, with consequent effects on the district and regional economy.

¹³ Coase theory suggests that stakeholders should be able to negotiate to an optimal point.

¹⁴ Many of the stakeholders receive small benefits, which means that they are unlikely to be able to join negotiations on the provision of heritage.

¹⁵ These include use values (especially indirect use from viewing landscapes), and non-use values (option values from opportunity to derive use values; bequest values to provide use and non-use values for future generations; and existence values, from knowledge of its existence irrespective of opportunity for use).

¹⁶ Referred to as 'command-and-control' policies in economic literature.

- 5.16 At the same time, ineffective planning regulations can result in costs to the economy, and to the wider community. In relation to PC13, adverse effects which reduced the value of the natural landscape and environmental qualities would represent a cost – or loss of value – to the District and wider New Zealand communities because New Zealand's natural landscape and environment are valued amenities. There would also be a likely impact on the tourism sector – through reduction in the attractiveness of the tourism product, for Mackenzie District, and more widely for Canterbury and New Zealand as destinations.
- 5.17 Because of this, it is important to consider the benefits of landscape and environmental management - which include both public and private benefits – relative to the costs – including those which accrue to property owners, but which also include wider effects on the economy. This is in order to understand whether the proposed provisions will produce a net positive outcome for the community.
- 5.18 It is also important to consider the nature of costs and benefits carefully. A reduction in or failure to achieve a positive effect can generally be termed a cost, while an increase in or achieving that positive effect can be termed a benefit. Conversely, a reduction in or avoidance of an adverse effect can be termed a benefit, while an increase in or failure to avoid an adverse effect can be termed a cost. While this may seem self-evident, it is important in situations such as this when much of the cost arising from PC13 is opportunity cost, or restricted ability to achieve a positive effect (higher farm production), while much of the benefit arising from PC13 will be from avoiding an adverse effect (reduction in landscape and natural environment values).

Relevant Benefits and Costs

- 5.19 The direct costs of PC13 to the farming sector are predominantly opportunity costs. These are in the form of a lower level of farm production and income than would be the case if the limitations applied by PC13 were not in place. The costs do not equate simply with the additional farm output which would be possible, because achieving that higher level of production and returns would incur some costs, both in capital costs for equipment such as irrigators and livestock (especially for dairy conversion), as well as in farm operating costs.
- 5.20 These opportunity costs would accrue to those farms in the Mackenzie Basin sub-zone, for which intensification would otherwise be financially viable, and which do not have a consent for the irrigation which would enable such intensification. They are predominantly private costs.
- 5.21 The standard approach to identify the opportunity costs of foregone farm output is to compare the levels of farm production with irrigation

and without irrigation. In many instances, irrigation of farm land would enable dairy farming, on the basis that with irrigation dairy farming and dairy support represent the highest and best use of the land. The direct and flow-on effects of dairy farming compared with other farming is quite well documented, including for Mackenzie District. G V Butcher (2009¹⁷) in an assessment in relation to a proposal to abstract water, estimated that every hectare of land which was irrigated would generate \$4,000 to \$4,600 per year of gross revenue, \$1,600 to \$1,950 in total value added, and \$500 to \$700 per year in household income. NZIER¹⁸ (2014) estimated gross revenue from irrigated dairy farming in Canterbury of \$11,593 per ha, assuming a pay-out of \$6.59 per kg. At the current dairy pay-out of around \$4 per kg, this would equate to around \$7,400 per ha. While the additional revenue per ha from irrigation will vary from location to location, and between different farming type (for example, dairying vs dairy support vs irrigated cropping and finishing) it is clear that irrigation and pastoral intensification does generate considerable additional farm income.

- 5.22 Irrigation is also associated with considerable additional operating costs. The NZIER study identified that gross farm working expenses on irrigated Canterbury dairy farms are approximately \$2,100 per ha (64%) higher than for non-irrigated farms, while for arable farming costs per ha are \$444 (31%) higher on irrigated farms¹⁹.
- 5.23 A consequent effect of higher farm production and profitability will be an increase in the value of the farm land on which that production can occur. This means there is a potential opportunity cost of PC13 in respect of foregone capital or equity gain.
- 5.24 The maximum total direct opportunity cost for the Mackenzie Basin economy, and the District economy, would depend on the area of potentially irrigable land (that is, land for which irrigation is both financially and technically feasible and for which sufficient water resources would be available) and the use which would be made of that land.
- 5.25 At this stage, there is no definitive information available on the net additional area of such potentially irrigable land, over and above that for which consent to intensify has already been granted. This means that it is not possible to provide an overall assessment of the potential opportunity cost, in terms of foregone output, implications for the Mackenzie Basin and district economies, and so on.
- 5.26 This is to be expected, because such assessment would need to be based on an overall inventory of the net additional land area for which irrigation and intensification would be feasible and able to be consented under the proposed PC13 provisions, as compared with the

¹⁷ Upper Waitaki-Mackenzie Irrigation – Economic Impact Assessment. Butcher Partners Ltd.

¹⁸ Value of irrigation in New Zealand: an economy wide assessment. NZIER and AgFirst Consultants November 2014.

¹⁹ NZIER Table 7, p22; Table 9, p24

land area on which irrigation and intensification would be feasible and able to be consented under operative provisions. This would need to be done on a site by site (ie farm by farm) basis, because the circumstances will vary among farms, as to the land areas with potential, and the feasibility of intensification in combination with other farm operations. It would also need some assessment of the likely effects of the landscape and other environmental protection provisions on the land area on which intensification is able to occur.

- 5.27 PC13 would also impose costs for acquiring consents for irrigation and other intensification practices, which would apply to farms seeking consent, whether or not they were successful.

District-wide effects

- 5.28 The direct opportunity costs to farms would also mean opportunity costs for the Mackenzie District economy, and community. This is because higher levels of farm output typically flow through an economy – higher levels of output mean both greater income to farmers, and also higher levels of farm expenditure (including capital expenditure) to achieve that income, which generally means greater throughput to those farm servicing businesses which service the farming sector, as well as those other business which serve the farm servicing businesses. These effects are termed the indirect effects of increased farm output.
- 5.29 The additional activity on farms and the layers of businesses which serve them also typically flows on as higher profits, wages and salaries to those employed directly or indirectly. Higher incomes generally mean higher household expenditure, which further increases the output of other businesses, and incomes for their workforce. This is termed the induced effect.
- 5.30 The total effect on the economy is typically measured in terms of direct and total (direct + indirect + induced) output, value added (the measure closest to GDP) and income. It is also measured in terms of the employment which is generated. These effects are a consequence of the normal operation of the economy. They are not special effects associated with an increase in output – rather, they are the effects of the same processes as occur currently in the economy, albeit at a larger scale.
- 5.31 Not all of these effects will accrue to the Mackenzie district economy. In smaller and less comprehensive economies such as Mackenzie, a substantial share of farm and other spending on goods and services will “leak” out of the local economy, and be directed to towns and cities outside of the district. The extent of this leakage is influenced by the number and range of goods and services which may be accessed from local suppliers.

- 5.32 Within Mackenzie Basin, the small size and limited range of services offered in the towns of Twizel and Tekapo means that leakage is relatively substantial. While a share of the leakage from the Mackenzie Basin area will be captured by Fairlie, there is still substantial leakage out to Timaru, Ashburton and Christchurch. Such leakage also applies to the indirect and induced effects of farm production.
- 5.33 These are the main opportunity costs for farming from PC13, and they are for the most part quantifiable, as they arise from additional farm output which is measurable in volume and \$ terms, as are the flow on effects for output, value added and incomes, while employment is quantified in terms of work hours and person (equivalents) employed.
- 5.34 A key point is that intensification enabled by irrigation is likely to enable a substantial increase in farm output and farm income, with consequent effects on the value of the affected farm land, as well as flow on effects throughout the Mackenzie District and Canterbury region economies. Another key point is that these effects are well documented, which means that the opportunity cost of foregoing the opportunity to intensify farm land can be readily identified, and that can be done on the basis of an individual property, as well as in aggregate for a wider area. This capability is important in regard to the effectiveness and efficiency of the PC13 provisions.
- 5.35 As noted below, the same types of effect on the economy and employment arise from increases (or decreases) in other sectors, including the tourism sector.

Benefits from Landscape Values

- 5.36 A primary purpose of PC13 is to increase the protection of landscape values in the Mackenzie Basin, and protect the natural environment from inappropriate subdivision, development and use. It follows that avoiding such reduction or loss of value from any lessening of the quality of the landscape, represents the benefit anticipated from PC13. This benefit broadly equates with avoiding the cost of such reduction in landscape value.
- 5.37 Landscapes, especially outstanding natural landscapes, provide a mix of values to the New Zealand community, as well as visitors from overseas. The existence of such values is recognised in statute, as well as in regional and district planning documents throughout New Zealand. While landscapes offer a range of values, and are valued by different people in different ways, a useful basis for summarising and understanding these values is the Total Economic Value or TEV framework.
- 5.38 TEV is a holistic framework that considers all relevant value categories that contribute to overall value, in this case of outstanding natural landscapes and environmental values of Mackenzie District. This approach distinguishes active use values from passive use values,

and identifies five specific types of value. Conceptually, these capture the full range of values from landscapes, and other features of the environment.

- 5.39 The TEV of landscapes includes:
- a. Active Use values, comprising:
 - direct use values
 - indirect use values, and
 - option values
 - b. Passive Use values, comprising:
 - bequest values, and
 - existence values.
- 5.40 The main component of active use value of natural landscapes is the indirect use value, which is obtained mainly through observing/appreciating the landscapes. These represent indirect use values because they can be derived by people without reducing the value for another user. This distinguishes them from direct use values.
- 5.41 Both direct and indirect use values have an associated further value, which is option value - the benefit from retaining the current values for future use. The components of the benefit are largely/entirely the same as those making up current direct and indirect use. The difference is in the longevity of the value, and the mix of beneficiaries.
- 5.42 Of the passive use values, bequest value is that derived from knowing landscape and related values will be available to be enjoyed by future generations. This means that much of the bequest value is based on the same types of future direct and indirect use values.
- 5.43 Existence value is that derived from knowing that the potential to use landscapes will continue into the future, irrespective of the level of current or future “use” by people. This is on the same basis as an individual deriving some value from knowing that polar bears exist, even though that individual may never expect to directly experience it.
- 5.44 In welfare economics, “value” is an expression of preference for what people are prepared to give up in order to obtain something else directly or through a trade-off. Welfare economics assumes that human preferences are the only source of economic value (Parks & Gowdy, 2012) and this value may be expressed by defining benefits in terms of willingness-to-pay for a service or good and willingness to accept compensation for the loss of a service or good (Parks & Gowdy, 2012).
- 5.45 In this regard, it is useful to differentiate between landscape evaluation which applies some scoring, rating or evaluation assessment to a landscape, and assignment of monetary values to express the values

derived from a landscape in dollar terms. However, deriving reliable estimates of the quantum of value derived from landscapes, either in general or for specific landscapes, is problematic.

- 5.46 There are several reasons for this:
- a. . One is the difficulty in having people attach any numeric to their appreciation of the landscape values.
 - b. A second and related difficulty lies in further expressing any numeric in dollar terms. There are methods such as stated preference and revealed preference which may be applied through research within the community to derive estimates of willingness to pay. These can provide a broad approximation of value in dollar terms.
 - c. A third issue is the difficulty in such research into valuation to cope with the sheer volume of landscape or other environmental features. It is generally easier to assign a willingness to pay or similar value to a single feature, or a small group of features. In this case, the whole of the Mackenzie basin is deemed to be an ONL, yet within that wide landscape individuals may perceive that there are many individual landscapes, including because they may not be able to view the entire landscape at one time.
 - d. Fourth, research to establish landscape values, especially in quantitative terms, is characteristically difficult and time consuming, and often requires detailed surveying among the population. Because of the cost of such primary research, it is common to use transfer pricing – that is, to use research findings from studies elsewhere in the country or overseas, and assign the assessed willingness to pay or similar measure from those other research to equivalent or comparable features in a study area.
- 5.47 To my knowledge, there has been as yet no systematic economic valuation of New Zealand landscapes, either generally or for specific locations such as Mackenzie Basin. This includes research to assign monetary values to landscapes.

Potential Costs from Loss of Landscape Values

- 5.48 Nevertheless, some aspects of the value of landscapes, or more accurately the costs associated with their loss, may be estimated in quantitative and monetary terms. This is particularly in relation to the potential effects on tourism in the Mackenzie Basin.
- 5.49 There is reasonably robust information on tourism activity in Mackenzie District, including expenditure estimates from MBIE.

Research (eg Taylor Baines 2015²⁰) shows that the landscape values and features of the biophysical environment are important drawcards for visitors to the Mackenzie district, and especially the Mackenzie Basin. The value of tourism and the contribution of the tourism sector to the economy is discussed in Section 4 above.

- 5.50 However, while we may be reasonably certain that the landscape is important for tourism, it is more difficult to estimate what proportion of Mackenzie District visitors are attracted to come because of the landscapes, and the proportions who would not visit otherwise, or who would visit less frequently and/or for shorter periods if the natural landscape was less attractive and/or other environmental values were less.
- 5.51 Moreover, only a proportion of the landscape values are represented by tourism earnings, and are captured by tourism's role in the economy. That is, the value of the natural landscapes cannot be equated with the value of tourism to the Mackenzie economy.
- 5.52 This means that while from an economic perspective we are able to show the value of pastoral farming to the economy and of tourism to the economy, it is problematic to go the next step and try to estimate the potential for the effects of farm intensification on landscape values to then flow on as a change in visitor numbers to Mackenzie, and as an impact on the tourism sector.
- 5.53 While the possible impact on the tourism sector of a loss of landscape values would capture a substantial amount of the cost for Mackenzie's economic activity, it would be nevertheless very difficult to quantify this effect, even in terms of visitor numbers and expenditure levels. This is because while there is a clear causal nexus between landscapes and visitor numbers to Mackenzie, the ability to reliably quantify that effect is problematic. There is no information to show the proportions of tourists for whom a visit to the Mackenzie Basin is incidental to their travel between Christchurch and central Otago, for example.
- 5.54 The attractions of the Mackenzie Basin are commonly only one component of the total attractions which draw visitors to the South Island and to New Zealand. This means that the benefits to tourism of the Mackenzie landscape are likely to extend beyond the district economy. As a consequence, the value of landscape attributes to the tourism sector are likely to be not fully reflected in the value of tourism activity within the Basin or in the district.
- 5.55 Moreover, the sensitivity of visitor numbers to Mackenzie Basin's landscape quality is not known. For example, even if it is assumed that all of the visitors to the Mackenzie District were attracted there only by the landscape values, it is not possible to reliably estimate the reduction in visitors for any given reduction in the landscape values.

²⁰ Upper Waitaki Limit Setting Process – Socio-economic profile of the Waitaki catchment. Taylor Baines and Associates and Harris Consulting, 2015.

That is, even if we could assume the scale of the causal effect in the positive direction (“*tourists visit only because of the landscape*”) it is not possible to reliably estimate the effect in the other direction – as in, would a loss of 10% in the landscape values generate a reduction of 10% in visitor numbers ?

- 5.56 In any case, the possible impact on the value of tourism activity would represent only a part of the total cost arising from a reduction in landscape values. Most of the cost / loss of value would accrue to the community at large in terms of the indirect use, option, bequest and existence values considered above.

Context for Assessing Costs and Benefits of PC13

- 5.57 Taking into account the nature of benefits and costs associated with PC13, and the substantial difficulties in ability to quantify these to a suitably robust level, in my view such comparison needs to be done carefully and at a level which reflects the nature and scale of such costs and benefits.
- 5.58 In particular, in my view it is of limited value to seek to assess these costs and benefits at the aggregate or Mackenzie Basin-wide level, as a basis for comparison. This is because the main opportunity cost of foregone farm production will be specific to both the particular land on which intensification might otherwise occur, and to the detail of the proposal for intensification. At the same time, the potential costs of intensification in terms of reduction in landscape and other environmental values will also be sensitive to the location and detail of the plan for intensification.
- 5.59 This means that while information on the scale and importance of the farming sector in the Mackenzie Basin, and corresponding information on the tourism sector (as discussed above in Section 4) is very useful for establishing context, and as background for assessing location-specific benefits and costs as proposals arise, it is less useful for assessing the benefits and costs of PC13 at the whole-of-subzone level.

6. PC13 Provisions

- 6.1 In this section, I consider the provisions of proposed PC13 from an economic perspective, in regard to the policies and rules which relate to pastoral intensification. I focus on Policy 3B1, Policy 3B7 (c) and (d) and Policy 3B13; and on Rules 15A.1 to 15A.3.
- 6.2 I also consider the implications of the PC13 without the proposed controls on pastoral intensification, recognising the existing controls on pastoral intensification under the Operative Mackenzie District Plan;

and restrictions imposed on intensification through Plan Change 5 to the Canterbury Land and Water Regional Plan.

- 6.3 I have considered each provision by itself and the combination of provision, with regard to economic processes through which likely effects will arise, and to the implications for efficiency and effectiveness.

Proposed PC13 Provisions

- 6.4 Plan objectives, policies and rules help set the conditions within which economic and social activities must operate. For any business, including pastoral farming, such plan provisions apply in conjunction with market conditions, financial requirements, other statutory requirements (such as employment and safety laws), social conditions, and environmental conditions (including weather and climate). They affect and guide decision-making and actions by business operators.
- 6.5 Proposed PC13 will affect in particular decisions by farm operators within the Mackenzie Basin sub-zone as to farm investment and operational practices, as they are affected by opportunities for pastoral intensification. For those farm operations which do not have consent for irrigation and intensification obtained prior to 14 November 2015 (as per Policy 3B13.3), the provisions will affect the land area of pastoral intensification which may be achievable on each farm, and the economics of such intensification (especially the likely additional returns from the intensified land relative to the costs of intensification including irrigation, and consenting costs). Both will affect farm operators' decisions on whether to seek consent for intensification, and over what area of land.
- 6.6 The economics of intensification will vary from farm to farm, because the area of land which is technically feasible to intensify will vary, as will specific costs, and likely returns, which will depend on how the intensified area may be integrated with established farm operations. Moreover, the amount of land on each farm which may be intensified and also comply with the provisions of PC13 is not known for certain. This is because that area will depend on the nature of the specific proposal for each farm, and the configuration of both irrigation systems and intensified land, in particular.
- 6.7 Because the returns from intensified pastoral land are greater than those for non-irrigated land, there is generally a financial incentive for farm operators to intensify. The extent of such intensification on each farm will depend generally on the technical feasibility and net returns, and I would expect farm operators to seek a configuration which maximised their net return from intensification. In the majority of instances, I would expect that the size of the net return would be directly related to the area of land intensified – the larger the area intensified, the greater the net return - although this will not necessarily be the case for every farm operation. Because pastoral intensification

will generally lead to higher farm returns (operating, and with consequent positive impact on land value) I would expect (other things being equal) that pastoral farmers would seek to maximise their net returns (at the total farm level) from intensification. That would generally mean that farm operators would seek to maximise the extent (land area) of pastoral intensification, and seek consent accordingly.

- 6.8 I would assume that decisions on consent applications made by Council would adhere to the purpose of PC13, which is to provide greater protection for landscape and other environmental values in the sub-zone from inappropriate subdivision, development and use.
- 6.9 Farm operator decisions on intensification will generally be made on a farm by farm basis, unless there are financial and other advantages of combined action by groups of farms (such as shared costs of water reticulation from a source to two or more farms). Decisions by Council on granting of consents would also generally be made on a farm by farm basis, although cumulative effects on the valued characteristics of the Basin (such as from two or more farms affecting the same landscape of specific area) would obviously be taken into account.

Efficiency and Effectiveness

- 6.10 An important consideration in these processes is the efficiency and effectiveness of the PC13 provisions, from the economic perspective. There is a substantial literature on concepts of efficiency and on concepts of effectiveness. Efficiency generally relates to the processes through which objectives or desired outcomes are achieved, especially the relative size of the benefits and the costs of an outcome. That is, an action may be efficient if it is done in a cost-effective manner. Effectiveness generally relates to the extent to which objectives or desired outcomes are achieved. That is, an action may be considered effective if it achieves a high percentage of the maximum possible desired outcome.
- 6.11 Having regard to the objectives of proposed PC13, the twin broad sets of objectives may be characterised as on the one hand to provide the greater protection sought for outstanding natural landscapes and other environmental features, and on the other to enable pastoral farming (while achieving objectives on the management and protection of the natural environment). In theory, the optimal outcome would be one in which the relevant environmental enhancement and protection objectives were all achieved, while at the same time the sustainable returns from pastoral farming could be maximised. This would generally equate with maximising the land area able to be intensified without reduction in the quality and value of the Basin's environmental characteristics.
- 6.12 On that basis, the effectiveness of the PC13 provisions may be assessed in terms of how much of the district's outstanding natural landscapes and other features would be adequately protected,

together with how much of the land which is suitable for pastoral intensification would be able to be intensified.

6.13 The efficiency of the PC13 provisions may be assessed in terms of the cost effectiveness of achieving the necessary protection for landscapes and environmental features. A significant cost is the opportunity cost of foregone farm production, while other costs relate to the time, resources and money expended to obtain a consent to intensify. Where opportunity and other costs are able to be minimised for a given level of protection of landscape and other values, then that may be seen as being consistent with efficiency.

6.14 I have considered the provisions of PC13 in these terms.

Efficiency of Process

6.15 Particular costs relate to different stages of the process. The obvious first stage is investigation where a farm may examine the opportunity to intensify, within the bounds of the Plan provisions for landscape and environmental protection. This stage is most likely to be undertaken (cost) effectively where there is certainty as to the provisions themselves, the geographic areas to which they apply, and the basis for decision-making on consents. These are inter-related.

6.16 The PC13 provisions need to offer certainty as to the geographic areas – and therefore the parts of each farm – to which the provisions apply. In my understanding, and assuming clear and precise definition of the geographical extent of the defined types of area, there is reasonable certainty as to the geographic extent of Sites of Natural Significance, and the Scenic Viewing Areas and Scenic Grasslands (including tussock grasslands) which are adjacent to and within the foreground of views from State Highways and the tourist roads - on which intensification is to be avoided (Policy 3B13).

6.17 Similarly, there is certainty as to the Farm Base Areas and other sites for which irrigation consent was granted prior to 14 November 2015 and the effects on the outstanding natural landscape have been addressed through the regional consenting process (Policy 3B13(c)) on which intensification is permitted. In the same way, there is certainty for the balance of the land “elsewhere” within the Mackenzie Basin, for which intensification is a discretionary activity (Policy 3B13(d)).

6.18 This geographic certainty is important in regard to the possible feasibility of intensification, including where it may and may not occur, and the possible configuration of the necessary irrigation structures.

6.19 There is also reasonable certainty as to the definition of activities including irrigation and intensification to which the PC13 provisions apply.

- 6.20 There is also apparent certainty as to the Plan provisions against which pastoral intensification may be assessed as a discretionary activity. There is less certainty as to how the methods by which a farm's proposal to intensify will be assessed, according to the Plan provisions.

Efficiency of scale

- 6.21 I consider that the proposed scale at which PC13 will be applied is also relatively efficient. The provisions, including for intensification on the balance of the Basin outside the Sites of Natural Significance, Scenic Viewing Areas and Scenic Grasslands to be assessed on a discretionary basis, clearly mean that the proposed plan change will be applied at a farm level, and at a site-specific level within farms – for example, if two or more discrete areas are proposed for intensification. In my understanding, the sensitivity of ONLs to development is location-specific, in that the development giving rise to effects is site-specific. This means that assessment of effects must be correspondingly site-specific. The landscape affected by development will typically extend beyond the development site, and in many cases beyond the farm itself.
- 6.22 On this basis, the scale at which assessment will occur can also be considered efficient.

Effectiveness

- 6.23 In assessing effectiveness, at issue is how much of the ONL and associated environmental attributes are likely to be protected by the PC13 provisions, in combination with related provisions in the Plan. If the value of the landscapes and environmental features will be fully protected, then the PC13 provisions may be viewed as highly effective.
- 6.24 The corollary is PC13's effectiveness in enabling farming activity, including intensification, in locations where it is feasible.
- 6.25 In my view, the proposed provisions in PC13 are likely to be effective, on both aspects. The financial incentives to intensify can generally be expected to encourage farm operators to develop to the maximum land area able to be feasibly intensified, and seek consent to do so. The provisions to protect landscape and other values will act to place an upper limit on intensification, but are unlikely to have impact on opportunities for intensification below that upper limit. Having said that, there may be instances where a farm operator is unable to feasibly intensify a sufficiently large land area, because the restriction on land due to the landscape provisions means it is not feasible to intensify across a smaller land area which is not affected by the provisions.
- 6.26 Because the PC13 provisions will effectively place an upper limit (maximum land area) on the extent of intensification, and do so only on the basis of the protection and associated objectives, it means that

the proposed changes are likely to be effective in respect of both the landscape and related values, and the extent of farmed area.

- 6.27 Finally I note that the extent of intensification is dependent as well on the availability of water and effects on water quality, matters which are addressed through the provisions of the CLWRP Plan Change 5.

7. Conclusions and Implications

- 7.1 In this section I draw my conclusions, particularly in relation to the likely efficiency and effectiveness of PC13, from an economic perspective.
- 7.2 Overall, I consider the PC13 provisions are likely to be both effective and efficient in economic terms. This is especially because the proposed change will apply at an appropriately site-specific scale. The intensification leading to greening effects occurs at specific location and scale. Direct effects on environmental quality are correspondingly likely to be localised, and location-specific. However, effects on landscape values almost inevitably extend much more widely, because a landscape is a visual entity (at least in terms of direct use values) and it covers a much greater area than the intensified land, but will arise from site-specific changes.
- 7.3 Second, PC13 is supported by efficient processes and good information, especially in terms of where change may not occur, and where it can potentially occur; and the provisions against which it will be assessed,
- 7.4 Third, the PC is likely to be effective because it will place an upper limit on intensification, which itself may be assessed through a relatively efficient process.
- 7.5 Fourth, it will apply at an appropriate scale in terms of the entities involved and the nature of the key economic processes - farm owners/operators on one hand in relation to intensification, and Council in relation to protection.
- 7.6 There are costs associated with the PC13 limits on intensification. These will accrue to individual farm operators as opportunity costs (foregone activity, revenue and profit) and to the district economy in terms of economic activity, incomes and employment. Such costs will be in more or less direct proportion to the geographic extent of the land area which is otherwise feasible to develop but for the provisions of PC13. Because pastoral farming is an important component of the district economy, such costs are a significant consideration.
- 7.7 There are also benefits to tourism sector operators directly, and to the Mackenzie Basin and district economy, to the extent that protection of the landscape and other values will sustain a higher level of tourism activity than would otherwise be the case. The scale of such benefit is

not able to be assessed accurately. Nevertheless, it is important to recognise the current and future importance of the tourism sector to the Mackenzie economy.

- 7.8 Having said that, while both the potential opportunity costs to farming and the potential benefits to tourism from PC13 are significant considerations, the issues pertain to more than simple comparison of the relative importance of farming vs tourism in the Mackenzie economy.
- 7.9 The landscape and other attributes of the Mackenzie environment represent important values to the Mackenzie economy and community, and do the same at the regional and national levels. At this point in time, there are no robust estimates of these values which may provide a basis for indicating their monetary value. Nevertheless, there is explicit recognition throughout the settled provisions of the Plan, and through the Court's decision that all of the Basin be defined as an outstanding natural landscape, that the Mackenzie Basin has high landscape values and high other environmental values, which are deserving of a corresponding high level of protection.
- 7.10 This mix of conditions has some important implications for PC13. First, the combination of a physical environment which is very sensitive to human activity and the potential for human activity to affect the values of large natural landscape indicates that a precautionary approach is appropriate. Second, the fact that both development initiatives (as to where they occur) and potential impacts (as to where they arise) are site-specific, and because there is a small number of farm operators each able to affect large land areas, means that decisions are most appropriately made at a site-specific level – that is farm level or within-farm level.
- 7.11 On this basis, I consider that PC13 may be considered both efficient and effective, from an economic perspective.

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15 July 2016