IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	applications by Central Plains Water Trust to: Canterbury Regional Council for resource consents to take and use water from the Waimakariri and Rakaia Rivers and for all associated consents required for the construction and operation of the Central Plains Water Enhancement Scheme Selwyn District Council for resource consents to construct and operate the Central Plains Water Enhancement Scheme
AND	
IN THE MATTER OF	a notice of requirement by Central Plains Water Limited to: Selwyn District Council for the designation of land for works associated with the construction and operation of the Central Plains Water Enhancement Scheme

EVIDENCE OF MICHAEL CAMPBELL COPELAND

For

TE RUNANGA O NGAI TAHU

A. INTRODUCTION

1. My full name is Michael Campbell Copeland. I hold a Bachelor of Science degree in mathematics and a Master of Commerce degree in economics from the University of Canterbury. A summary of my curriculum vitae is attached as Appendix 1.

2. I am a consulting economist of Wellington, and currently I am managing director of Brown, Copeland and Company Limited, a firm of consulting economists which has undertaken a wide range of studies for public and private sector clients in New Zealand and overseas. During the period July 1990 to July 1994, I was also a member of the Commerce Commission and currently I am a lay member of the High Court under the Commerce Act 1986. Prior to establishing Brown, Copeland and Company Limited in 1982, I spent six years at the New Zealand Institute of Economic Research, and three years at the Confederation of British Industry.

3. With respect to the Resource Management Act 1991 (**RMA**), I have prepared evidence for clients covering a number of development projects and policies. A selection of these is listed in my curriculum vitae in Appendix 1.

4. The next section of my evidence considers the relevance of economics to matters under the Resource Management Act (RMA) and some general principles to follow in assessing economic effects. Section C of my evidence addresses aspects of the 'without scheme' scenario, which in my opinion must be clearly understood before it is possible to identify incremental economic costs and benefits that may occur as a consequence of the Central Plains irrigation scheme (the scheme). In Section D, I comment on the level of detail of, and the sources for, the data provided in Mr. Donnelly's evidence. Sections E and F consider Mr. Donnelly's economic impact assessment and cost benefit analysis respectively. Section G addresses the costs of land being designated for works associated with the construction and operation of the scheme. The conclusions of my evidence are contained in Section H.

5. I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it.

6. For reasons explained in my evidence, my conclusions are that:
    - Mr. Donnelly's analysis of the economic effects of the proposed central plains irrigation scheme substantially overstates the project's contribution to community economic wellbeing and the efficient use of resources; and
    - Mr. Donnelly's analysis does not make a compelling case that the proposed scheme will provide net economic benefits of a magnitude sufficient to outweigh any significant non-economic costs of the scheme.

B. ECONOMICS AND THE RMA

Community Economic Wellbeing

7. Part II, section 5(2) of the RMA refers to enabling "*people and communities to provide for their social, **economic** and cultural well being*" (emphasis added) as part of the meaning of "sustainable management" and therefore as part of the purpose of the RMA.

8. As well as indicating the relevance of economic effects in considerations under the RMA, this section also refers to "people **and communities**" (emphasis added) which, in my opinion, highlights that in assessing the effects of a proposal the economic (and social and cultural) effects on the local community must be given some prominence as compared to regional or nationwide effects. This does not mean broader regional or nationwide effects are irrelevant but that, at least in terms of section 5(2), local community effects are especially relevant.

Efficient Use of Resources

9. Part II section 7(b) of the RMA requires that in achieving the purpose of the Act, all persons exercising functions and powers under it "*shall have particular regard to ... the efficient use and development of natural and physical resources*".

10. I believe economists are in agreement that the term 'efficient use' relates to the concept of economic efficiency. However I note that there is disagreement between Dr. Brown (who prepared a statement for inclusion in the S42A Officers' Report) and Mr. Donnelly on the appropriate definition of (economic) efficiency. Dr. Brown in my opinion gives a straightforward and commonsense definition, whereas Mr Donnelly for some reason wishes to restrict the definition to cover only allocative efficiency. I find this surprising and believe Mr. Donnelly is confused and misguided since:

    - There is general acceptance among economists[1] that economic efficiency is made up of three component parts – allocative efficiency, productive (or technical) efficiency and dynamic efficiency. For example, in Commerce Act authorisation cases, where it is necessary to compare the public benefits of a merger or restrictive trade practice with the efficiency losses from reductions in competition each of the three component parts of reduced efficiency will be estimated separately;

[1] And I note that Counsel in his opening for Central Plains Water Trust listed these three components at paragraph 224 and I can only assume he did this because he believed all three were relevant to this application.

- There is nothing in the RMA which suggests only allocative efficiency is relevant. Indeed the concept of ''sustainable management'' is closely aligned with ''using'' resources more efficiently – i.e. improving productive (or technical) efficiency and dynamic efficiency;
- Mr. Donnelly's own analysis of the benefits of the proposed scheme relies heavily on assumed increases in productive efficiency – it is assumed that the scheme will result in not only increased areas of irrigation but farmers having taken on increased debt becoming more productive in their use of resources to enable them to service that debt.

11. These significant differences in understanding about economic efficiency and its appropriate definition in the context of the RMA do not in themselves have a bearing on the methodology adopted by Mr. Donnelly. However it does raise doubts about how Mr. Donnelly interprets his analytical results. This reservation applies to Mr. Donnelly's analyses of both economic impacts and economic efficiency net benefits, issues which I address in the following paragraphs.

C. THE WITHOUT SCENARIO

12. In assessing the economic effects of the proposed scheme it is necessary to compare two forward looking scenarios – what will happen if the proposed scheme is implemented and what will happen without the proposed scheme being implemented. I have stressed that both of these scenarios are forward looking since the without scheme scenario is not simply the status quo. In other words to assess the effects of the scheme we must compare 'with' versus 'without', not 'after' versus 'before'.

13. Mr. Donnelly apparently is of the opinion that economic impact analysis should involve an 'after' versus 'before' assessment, whereas a cost benefit analysis should be a 'with' versus 'without' assessment.[2] I disagree and believe both an economic impact analysis and a cost benefit analysis must be 'with' versus 'without' assessments if they are to provide any sort of meaningful measures of improvements in economic wellbeing as a consequence of the proposal under investigation. To credit to the scheme impacts that

[2] See Donnelly Response to S42A Officers' Report, paragraph 15.

will occur in the future even without it must be to overstate the impacts as a consequence of the scheme.

14. In my opinion neither Mr. Donnelly's economic impact assessment nor his cost benefit analysis of the scheme are proper 'with' versus 'without' scheme analyses. This is because Mr. Donnelly does not properly articulate aspects of the 'without' scheme scenario. In particular, Mr. Donnelly fails to take account of:
    - Improvements in on-farm productivity, likely to occur over time even without the proposed scheme; and
    - The economic impacts and net economic benefits from alternative irrigation schemes able to use water from the Waimakariri and Rakaia Rivers only if the proposed Central Plains scheme does not go ahead.

    As a consequence both Mr. Donnelly's economic impact assessment and cost benefit analysis significantly overstate the economic impacts and economic efficiency benefits of the scheme.

15. With respect to on-farm productivity improvements, Mr. Donnelly (and Mr. Macfarlane) assume considerable increases in on-farm productivity will occur in the future with the scheme over and above those resulting from the availability of surface water for irrigation. By way of example, the net returns they assume for dairying under irrigation is $4,413 per hectare (ha) with the scheme and $2,645 per ha without the scheme[3] but with continued groundwater supplied irrigation.[4] Therefore this 67% increase in productivity is not as a consequence of the supply of irrigation water but because of other 'scheme induced' factors not specified in Mr. Donnelly's evidence.

16. Mr. Macfarlane's basis for assuming this dramatic increase in productivity over and above the effects of irrigation per se, appears to be covered in paragraph 50 of his evidence in chief, where he states:

    > *"I have worked on the assumption that the new irrigated land will be operated at the top end of performance levels. My decision to use that performance is based on the fact that:*
    > *(a) Farmers taking on the debt levels inherent in this structure will need to be top operators, either existing or new farmers with higher equity.*
    > *(b) Technological gains are difficult to budget on, being an unknown quantity, but always occur in practice to "leverage" irrigation availability.*

[3] Figures taken from Donnelly's evidence in chief, Appendix 2.
[4] Only a small amount of this improvement in productivity is explained by savings in electricity and other costs associated with groundwater supply. The predominant factor is an assumed increase in milk yield, accounting for $1,554 out of $1,768 per ha improvement in productivity.

(c) New higher profit crop options are equally difficult to budget in advance, but can be accounted for by assuming top profitability of existing known crops.
(d) Lower performing farmers and those averse to risk will either not take up shares or will sell to those who will."

17. This explanation highlights the uncertainty associated with the economic benefit estimates used in Mr. Donnelly's analyses but does nothing to indicate why, without the scheme, dairy farmers currently using groundwater for irrigation would not aspire to be *"at the top end of performance levels"* and *"to "leverage" irrigation availability"*. In my experience, high debt levels are not necessarily the key driver to increased productivity in business, and indeed the reverse may be true. Farmers, who are not stretched to the limit by high debt, may be more likely to be in a position to embrace new technologies and farming practices to lift productivity and maximise profits.

18. As will become clear later in my evidence this assumption about significantly lower productivity levels for groundwater irrigated dairy farms without the scheme as compared to surface water irrigated dairy farms with the scheme has a dramatic effect on the results of Mr Donnelly's cost benefit analysis. In Section F below I estimate that assuming dairy farm productivity levels under irrigation are the same with and without the scheme leads to a halving of the estimated internal rate of return (IRR) and the net present value (NPV) of net economic benefits becoming substantially negative at a 10% discount rate.

19. With respect to alternative irrigation schemes using water from the Waimakiriri and Rakaia Rivers, Dr Brown and Mr Butcher have raised the issue of the opportunity cost of water in their statements of evidence. I accept that to quantitatively take into account, in an economic analysis of the Central Plains scheme, the net economic benefits forgone from a displaced alternative scheme or schemes will be difficult because of the absence of data on revenues and costs of alternative schemes. However the important point is that if such alternatives exist and I understand from the evidence of Dr. Brown they do, then there is likely to be a considerable overstatement of the economic effects of the scheme – both with respect to the economic impact analysis and the cost benefit analysis. Quite obviously, if alternative schemes can use the water to irrigate areas not currently irrigated then there is additional output, incomes and jobs, on-farm and off-farm, and these impacts need to be deducted from those estimated for the Central

Plains scheme to determine any net additional impacts of the scheme. To not do so is to have a 'without scheme' scenario or counterfactual which incorrectly assumes the continuation of the status quo.

20. In paragraph 9.33 of his evidence in chief Mr. Donnelly says:

> *"It (his cost benefit analysis of the Central Plains scheme) has not been tested against any competing projects that may wish to use the water for irrigation and/or other purposes (e.g. hydro electricity generation). Without such comparisons it is impossible to say definitely that the proposed scheme is the best use of society's resources, including the water to be abstracted."*

I agree with this statement insofar as "best" means the most efficient use of society's resources.[5]

21. However Mr Donnelly goes on to contradict this statement in paragraph 3.34 by concluding

> *"... the proposed scheme is likely to optimise the net gain to society from use of the proposed water resources."*

22. This reversal is based upon his opinions that:
    - Transferability of water permits will address any potential problem of water being allocated to inefficient uses via the RMA process;
    - Hydro electricity generation will generally have an inferior return to irrigation schemes;
    - There are no known mutually exclusive irrigation uses on the subject land;
    - Large schemes are better than small schemes because they may have economies of scale or even when a number of smaller schemes are more efficient than a large scheme the smaller schemes may not utilize all of the available water.

However these statements do not eliminate alternative uses for the water, which may or may not be more desirable from the perspective of economic wellbeing and the efficient use of resources. Even if the Central Plains scheme is the most beneficial in terms of economic wellbeing and the efficient use of resources, the existence of alternative uses for the water must mean that the magnitude of the benefits identified in Mr Donnelly's evidence is overstated.

[5] Best beyond economic efficiency would have regard to environmental, social and cultural effects as well and assessing this would require more than just testing quantitative cost benefit analysis results against those for competing projects.

23. Only if there will be unlimited supplies of water in Canterbury in the future such that all competing uses (including in-stream uses) could be accommodated would it be appropriate to assume a zero opportunity cost of water. It is my understanding that this is not likely to be the case. If surplus supplies of water are available from elsewhere (e.g. the West Coast) then the minimum of the cost of supply and the value in the next best alternative use becomes the opportunity cost. I believe very few if any economists would agree with Mr. Donnelly when he says[6]:

> *"water is indisputably a free good although at times in specific locations it will have scarcity value. This is a reflection of the opportunity cost of capital rather than water being a scarce environmental commodity per se."*

D. DATA AND INFORMATION LIMITATIONS

24. Mr. Donnelly's evidence provides only limited detail on the assumptions he has made in undertaking his analysis. In particular I am very surprised to see that a spreadsheet showing the assumed costs and benefits over the 35 year analysis period is not included at least as an appendix to his evidence. This would have made it much easier for the Hearing Committee (and other submitters) to check the accuracy of his analysis, assess the reasonableness of his assumptions and test the sensitivity of results to key assumptions. In Appendix 2 of my evidence I attach such a spreadsheet, which I have constructed on the basis of the data and information presented in Mr. Donnelly's and Mr. Macfarlane's evidence. I discuss the results of my re-analysis and Mr. Donnelly's results in Section F below.

25. In Mr. Donnelly's and Mr. Macfarlane's evidence there appears to be ongoing uncertainty as to the capital costs of the scheme, whilst elsewhere there are references to the fact that the scheme costs are at the upper end of farmers' affordability scale and uptake of the scheme by farmers will require a significantly lower cost of funds than current market rates.[7] This uncertainty over the scheme's capital costs flows through into the assumed build up in scheme benefits and the ultimate level of uptake by farmers.

[6] Mr. Donnelly's Response to S42A Officers' Report, paragraph 22, first bullet point.
[7] See for example, Mr. Donnelly's evidence in chief paragraph 6.2, Mr. Donnelly's Response to the S42A Officers' Report paragraph 23, Mr. Macfarlane's evidence in chief paragraphs 21, 25, 26, 35, and 41 and Mr. Macfarlane's Response to S42A Officers' Report paragraphs 25, 26 and 33.

These three factors – scheme capital costs, build up in scheme benefits and ultimate level of uptake are important factors in determining the economic efficiency of the scheme and therefore the Hearing Committee needs to take them into account in interpreting Mr. Donnelly's results. Mr Donnelly appears to accept that the capital cost is almost certain to vary significantly from any estimate provided, but he believes he has covered this by testing the sensitivity of his cost benefit analysis results by examining the impact of a 20% increase in scheme capital costs. However there is no indication as to why a 20% increase in capital costs is an appropriate upper bound. Also in terms of scheme viability and resource use efficiency this increase in capital costs needs to be combined with a lower speed of benefits build up and ultimate level of uptake.

26. Also I note the interchange between Dr. Brown and Mr. Butcher on the one hand and Mr. Donnelly and Mr. Macfarlane on the other with respect to the decisions faced by farmers on whether to buy into the scheme. No information appears to have been provided by the applicant on the decision points at the farm level as to switching to scheme supply where farmers already have access to groundwater supply. In the absence of such analysis I agree with Dr. Brown and Mr. Butcher that there must be little likelihood in farmers with existing access to groundwater buying into the scheme for what appear to be minimal cost savings. This has implications for not only the benefits presumed to come from direct supply by the scheme but also the benefits assumed to accrue as a consequence of released groundwater supplies.

E. DONNELLY'S ECONOMIC IMPACT ASSESSMENT

27. As stated above, Mr. Donnelly's economic impact analysis substantially overstates the incremental or net impacts of the scheme because he takes no account of alternative uses of the water, which I understand not to be in unlimited supply. The key point is that other uses of the water will result in construction and operational on-farm and off-farm impacts, including further processing of farm outputs.

28. However in addition to this the Hearing Committee should be aware of the general limitations of economic impact analysis in considering the weight to be given to such impacts (in terms of ''economic wellbeing'' and the ''efficient use of natural and physical resources'') as compared to other effects. As indicators of levels of economic activity, economic impacts in terms of expenditure, incomes and employment are not in

themselves measures of improvements in economic welfare or economic wellbeing. With respect to increased levels of expenditure, greater business revenues or turnover only equate to increases in economic welfare or economic wellbeing to the extent profitability has increased. Usually profits are only a small percentage (e.g. in the range of 5% to 10%) of total turnover. In the case of project induced incomes and employment there are only increases in economic welfare and economic wellbeing to the extent incomes and employment are higher than otherwise would be the case.

29. Certainly governments (national, regional and district) seek to attract and retain businesses and events to enhance, or maintain, levels of economic activity. However the economic welfare enhancing benefits of increased levels of economic activity relate to one or more of:
    - Increased economies of scale. Businesses and public sector agencies are able to provide increased amounts of outputs with lower unit costs, hence increasing profitability or lowering prices;
    - Increased competition. Increases in the demand for goods and services allows a greater number of providers of goods and services to enter markets and there are efficiency benefits from increased levels of competition;
    - Reduced unemployment and underemployment[8] of resources. To the extent resources (including labour) would be otherwise unemployed or underemployed, increases in economic activity can bring efficiency benefits when there is a reduction in unemployment and underemployment. The extent of such gains is of course a function of the extent of underutilized resources within the local economy at the time and the match of resource requirements of a project and those resources unemployed or underemployed within the local economy. For example I would note the very low levels of unemployment nationally and regionally at the present time and the high participation ratio for the labour force in Canterbury[9]; and
    - Increased quality of central government provided services. Sometimes the quality of services provided by central government such as education and health care are a function of population levels and the quality of such services in a community can be increased if increased economic activity maintains or enhances population levels.

[8] Underemployment differs from unemployment in that resources are employed but not at their maximum worth; e.g. in the case of labour, it can be employed at a higher skill and/or productivity level, reflected in higher wage rates.

[9] The Canterbury Transport Regional Implementation Plan 2008 – 2038; Amended Version (Environment Canterbury, November 2007) states: *"Canterbury's unemployment rate has hit record lows. In June 2007 3.1% of the population was unemployed, compared with a national average of 3.7%"*. I actually believe this is a misinterpretation of the data in that it should express the unemployment rate as a percentage of the work force, rather than the population as a whole. The Plan also states: *"Labour force participation in Canterbury shared the second highest rate in the country sitting at 70.6% in June 2007 compared with the national figure of 68.5%".*

30. It is reasonable to presume that any increases in economic activity (i.e. expenditures, incomes and employment) as a consequence of the Central Plains scheme will give rise to one or more of these four welfare enhancing economic benefits. However it is important to emphasise that:

    (a) Such benefits need to be measured net of any such benefits which in the counterfactual or 'without Central Plains scheme scenario' will occur anyway as a consequence of alternative uses of the water and other resources required for the scheme;

    (b) Such benefits in terms of improvements in community economic wellbeing and the efficient use of resources are only a fraction of the values implied by Mr Donnelly's measures of increased output, GDP and employment; and

    (c) It is these welfare enhancing benefits and not the much larger gross economic impact figures produced by Mr Donnelly in his evidence which need to be compared with the economic and non economic costs of the proposed scheme when deciding whether it is a wise use of resources.

F. DONNELLY'S COST BENEFIT ANALYSIS

Assumptions

31. Mr Donnelly has undertaken a cost benefit analysis of the proposed Central Plains scheme and estimated the scheme's net present value (NPV) at a 10% discount rate and the scheme's internal rate of return (IRR). The benefits and costs data, which Mr Donnelly uses, come from Mr Macfarlane's evidence. The key benefit assumptions Mr Donnelly appears to use are summarised in Table 1 below:

Table 1: Benefits Data Used in Donnelly Cost Benefit Analysis.

	Livestock (Dry)	Mixed (Irrigated)	Dairy (Irrigated)	Mixed L/S (Part Irrigated)	Finishing (Irrigated)	Arable & Processing (Irrigated)	Total
Area (ha)							
- Without	55,250*	8,000	22,000	-	-	-	85,250*
-With	-	-	46,500	20,500*	3,000	15,250	85,250*
EBIT ($/ha)							
- Without	127	834	2,645	-	-	-	
-With	-	-	4,413	844	667	2,232	

*Includes 10,250 ha of 'associated' area.

Source: Taken from Appendix 2 of Mr Donnelly's evidence.

32. Multiplying the earnings before interest and tax (EBIT) per ha figures by the areas give total net revenue figures with and without the scheme and the difference between these gives total incremental benefits of $186.7 million per annum at full scheme uptake (see Appendix 2, Table 2 of this evidence). This is only slightly higher than the $186 million figure given by Mr. Macfarlane in his evidence at paragraph 10 and therefore appears to be consistent with the figure used in Mr. Donnelly's analysis, even though this is not shown in his evidence. According to Mr. Donnelly benefits will commence in year 3 and full benefits will be reached by year 8 (see Mr. Donnelly's evidence paragraph 7.13).

33. Mr. Macfarlane (paragraphs 12 and 18 of his evidence) identifies the total marginal capital costs of the scheme at $1,261 million. He estimates off-farm capital costs for the 60,000 ha (see Mr. Donnelly's evidence paragraph 7.6) to be irrigated by the scheme at $6,826 per ha (see Mr. Macfarlane's evidence paragraph 51) or a total of $410 million. This expenditure is to be incurred over years 1 to 3 (see Mr. Donnelly's evidence paragraph 7.13).

34. This leaves $1,261 million less $410 million, or $851 million for capital costs incurred on-farm. These costs are incurred over years 2 to 6 (Mr. Donnelly's evidence paragraph 7.13) but 'associated capital expenditure' equal to $550 per ha (Mr. Macfarlane's evidence paragraph 51) by 60,000 ha, or $33 million will be spent over years 2 to 9 (Mr. Donnelly's evidence paragraph 7.13). Therefore over years 2 to 6 the total on-farm capital expenditure is only $818 million ($851 million less $33 million).

35. The three components of capital costs – off-farm capital costs, on-farm capital costs and associated capital costs – have been spread linearly[10] over the respective time periods stated by Mr. Donnelly at paragraph 7.13 of his evidence. This is shown in Table 1 of Appendix 2 to my evidence. Also growth in benefits is assumed to occur linearly from year 3 up until year 8 when full project benefits are assumed by Mr. Donnelly to occur. This profile of benefits is also set out in Table 1 of Appendix 2 to my evidence.

Base Case Results

36. On the basis of these data and assumptions a base case internal rate of return (IRR) for the project is estimated at 12.7%. This compares with Mr. Donnelly's estimate of 14.4% in paragraph 9.22 of his evidence. (Note: In paragraph 9.33, fourth dot point he refers to an IRR of 15.7% but I assume this is a typographical error.) The corresponding net present value (NPV) for the scheme is estimated in my analysis as $241.9 million. This compares with Mr. Donnelly's estimate of $375 million (see Mr. Donnelly's evidence paragraph 9.20). The reasons for Mr. Donnelly's higher IRR and NPV estimates are unknown. The same data have been used in my analysis as Mr. Donnelly says have been used in his, although I have had to make some assumptions about the time profile of capital costs and the initial build up of benefits over the years Mr. Donnelly specifies. However I doubt that this alone accounts for the 1.7% difference in the IRR estimates since any change in the profile of costs I would expect to be largely offset by an approximately corresponding change in the profile of benefits build-up.

37. As discussed below in the section on sensitivity testing the IRR and NPV for the scheme are especially sensitive to the assumption that the returns to dairy farming with the scheme will be much higher (Mr. Donnelly and Mr. Macfarlane assume EBIT per ha will be

[10] I.e. equal amounts in each year. In the absence of any information to the contrary provided by either Mr. Donnelly or Mr. Macfarlane this seems an appropriate assumption to make.

67% higher) than on irrigated land without the scheme. In my opinion these two experts have provided no reasonable justification for this assumption and without such an assumption the base case IRR for the scheme would reduce to 6.6% and the NPV at a 10% discount rate is -$272.2 million.

38. Also I would note that in my analysis I have made no specific allowance for operations and maintenance (O&M) costs. Whilst on-farm O&M costs could be expected to be included within the calculation of EBIT, I am unsure whether this is the case with respect to off-farm O&M costs. I have assumed that the irrigation charges of $71 per ha referred to in paragraph 58 of Mr Macfarlane's evidence will cover off-farm O&M costs.

Sensitivity Analysis

39. I have also undertaken a number of individual sensitivity tests to the base case analysis to examine the sensitivity of results to key assumptions. As noted above combinations of changes in assumptions are likely to be more relevant. For example, if scheme capital costs are higher, this may delay the time when full scheme benefits are reached and possibly reduce the ultimate uptake of the scheme and consequently scheme benefits at full development. Also if farm output prices are lower, we might expect the time when full scheme benefits are achieved to be delayed and a reduction in the ultimate uptake of the scheme.

40. Reducing the assumed output product prices by 20% reduces the IRR for the scheme from 12.7% to 8.0% and the NPV at a 10% discount rate falls to -$167.3 million. Reducing the scheme uptake by 20% reduces the IRR from 12.7% to 11.6%[11] and the NPV at a 10% discount rate falls to $125.5 million. Raising scheme capital costs by 20% lowers the IRR from 12.7% to 10.5% and the NPV at a 10% discount rate falls to $57.1 million. Delaying the build up in project benefits so that full benefits are reached over a 12 year period (i.e. linear growth from year 3 to year 14 inclusive) instead of the 6 year period assumed by Mr. Donnelly (i.e. from year 3 to year 8 inclusive) reduces the IRR from 12.7% to 9.7% and the NPV at a 10% discount rate to -$26.4 million. Not assuming that 15,000 ha of additional groundwater irrigation is made possible on land adjacent to the scheme[12] reduces the IRR from 12.7% to 10.9% and the NPV at a 10% discount rate to $71.8 million.

[11] Under this scenario it is assumed that as well as scheme benefits on-farm and associated capital costs are scaled back, but off-farm capital costs are not.
[12] As a consequence of existing groundwater users, giving up their consents in favour of the scheme and new groundwater consents being granted to farmers outside the scheme.

Finally assuming dairy returns on irrigated land with the scheme are the same as dairy returns on irrigated land without the scheme reduces the IRR from 12.7% to 6.6% and the NPV at a 10% discount rate to -$272.2 million. The cash flows associated with each of these sensitivity tests are set out in Table 1 of Appendix 2 to my evidence.

41. A combination of higher scheme capital costs, lower scheme uptake and delayed scheme full benefits yields an IRR of 7.5% and an NPV at a 10% discount rate of -$250.5 million. A combination of lower output prices, lower scheme uptake and delayed scheme full benefits yields an IRR of 5.6% and an NPV at a 10% discount rate of -$341.1 million. In addition if, as I believe is more reasonable, dairy returns per ha with the scheme are assumed to be the same as without the scheme but with groundwater irrigation, then the IRR for each of these combinations of changed assumptions will reduce considerably (3.3% and 1.8% respectively) and the NPVs at a 10% discount rate would become even more negative (-$567.1 million and -$546.6 million respectively).

42. Finally it is important to note that the cost benefit analyses undertaken by Mr. Donnelly and that which I have re-created have taken no account whatsoever of alternative uses for the water. This could be incorporated quantitatively by adopting an opportunity cost for the water used which equated to forgone net economic benefits from alternative uses (or the costs of supply from areas where water can be assumed to be in unconstrained supply). Alternatively the Hearing Committee needs to discount any economic benefits identified as being associated with the scheme to the extent that economic benefits could be secured via alternative uses of the water, which the scheme requires. Whilst it may never be possible for a hearing committee (or a Court) to be able to identify the most efficient use of water among competing schemes, the fact that competing uses exist is in my opinion a relevant factor for consideration. This is because claimed increases in export earnings, gross domestic product (GDP), rates of economic growth, expenditure, wages and salaries, employment, rates of return and NPVs will all be overstated if the economic effects of competing uses are ignored.

G. THE COSTS OF DESIGNATING LAND

43. It is my understanding that Central Plains Water Limited (CPWL) as a requiring authority is able to designate land it requires for the scheme. This will have a negative economic effect on land owners affected prior to, during and after the scheme's construction in

that their ability to use their land for some uses will be restricted. In my opinion this is a relevant economic cost to take into account in considering the impacts on community economic wellbeing and resource use efficiency. However there is no data or information on this in the evidence of Mr. Macfarlane and Mr. Donnelly.[13]

H. CONCLUSIONS

44. Community economic wellbeing and the efficient use of natural and physical resources are relevant considerations under the RMA.

45. Mr. Donnelly's assessment of the economic effects of the proposed Central Plains Irrigation Scheme substantially overstates its potential contribution to community economic wellbeing and the efficient use of resources because:
    - Economic impacts quantified in terms of increased expenditure, GDP and employment are not in themselves measures of improvements in economic welfare or economic efficiency;
    - Mr. Donnelly's analysis assumes dramatic increases in on-farm productivity as a consequence of the scheme for land already irrigated from groundwater sources;
    - Mr. Donnelly's analysis takes no account of competing uses for resources, including water from the Waimakariri and Rakaia rivers; and
    - Mr. Donnelly's analysis takes no specific account of the economic costs for land required to be designated for the proposed scheme's works.

46. Relatively small changes to key assumptions of the cost benefit analysis for the scheme result in negative net present values and low economic internal rates of return.

47. Mr. Donnelly's analysis does not make a compelling case that net economic benefits from the project will be sufficient to outweigh any significant non-economic costs.

M C Copeland
24 April 2008

[13] It might be argued that land required to be designated for scheme works has its costs included within the off-farm scheme cost estimates. However it is not possible to ascertain that this is the case from the evidence of either Mr. Macfarlane or Mr. Donnelly. Nor is it clear if such land costs have been included, that they are an adequate proxy for the value of lost economic benefits as a consequence of designations.

APPENDIX 1

CURRICULUM VITAE OF MICHAEL CAMPBELL COPELAND

DATE OF BIRTH	3 October 1950
NATIONALITY	New Zealand
EDUCATIONAL QUALIFICATIONS	Bachelor of Science (Mathematics) 1971 Master of Commerce (Economics) 1972
PRESENT POSITIONS	
(Since 1982)	Economic Consultant, Brown, Copeland & Co Ltd
(Since 2001)	Lay Member of the High Court under the Commerce Act 1986
(Since 2003)	Director, Wellington Rugby Board
PREVIOUS EXPERIENCE	
1978-82	NZ Institute of Economic Research Contracts Manager/Senior Economist
1975-78	Confederation of British Industry Industrial Economist
1972-75	NZ Institute of Economic Research Research Economist
1990-94	Member, Commerce Commission
2001-06	West Coast Regional Council Trustee, West Coast Development Trust

GEOGRAPHICAL EXPERIENCE

New Zealand

Australia

Asia (India, Indonesia, Kazakhstan, Malaysia, Nepal, Pakistan, People's Republic of China, Philippines, Tajikistan, Sri Lanka, Uzbekistan)

South Pacific (Cook Islands, Fiji, Tokelau, Tonga, Vanuatu, Western Samoa)

United Kingdom

AREAS OF PRIMARY EXPERTISE

Agriculture and Resource Use Economics (including Resource Management Act)

Commercial Law and Economics (including Commerce Act)

Development Programme Management

Energy Economics

Industry Economics

Transport Economics

SECTORAL COVERAGE

Agriculture	Aluminium	Airports	Aviation
Electricity	Fertiliser	Flood Control	Forestry
Natural Gas	Pharmaceuticals	Public Transport	Rail
Road Transport	Sea Ports	Tourism	Utilities

RESOURCE MANAGEMENT ACT SPECIFIC PROJECTS

- A new supermarket in Dunedin;
- A power station development on the Rangitaiki River;
- Port storage facilities at Westport;
- The proposed Clifford Bay ferry terminal;
- The proposed pipeline and related facilities to utilise water from the Waikato River for metropolitan Auckland;
- A container terminal expansion by the Ports of Auckland;
- The designation of the Transmission Gully motorway route;
- The proposed Variation No. 8 to the Wellington City District Plan covering height and other controls on development of the airspace above the Wellington railway yards;
- A proposed Town Centre Zone within the Kapiti Coast District;
- Wellington City Council's heritage preservation policy;
- Solid Energy's proposed West Coast Coal Terminal at Granity;
- The proposed Waimakariri Employment Park;
- The designation of land for a proposed motorway extension in the Hawke's Bay;
- The Hastings District Council's Ocean Outfall;
- A proposed new shopping and entertainment centre in Upper Hutt;
- New regional correctional facilities in Northland, South Auckland, Waikato and Otago;

- Proposed controls on wake generation by vessels travelling within the waterways of the Marlborough Sounds;
- Southern Capital's proposed new township at Pegasus Bay, north of Christchurch;
- Renewal of water resource consents for the Tongariro Power Development Scheme;
- The imposition of land use restrictions within noise contours surrounding Christchurch International Airport;
- The expansion of the Whangaripo Quarry in Rodney District;
- A proposed five star hotel development for Wanaka;
- Holcim's proposed new cement plant near Weston in the Waitaki District;
- TrustPower's proposed new wind farm at Mahinerangi in Central Otago;
- TrustPower's proposed new Arnold hydroelectric power scheme on the West Coast;
- McCallum Bros and Sea Tow Limited's appeal before the Environment Court regarding extraction of sand from the Mangawhai-Pakiri embayment north of Auckland;
- The development of the Symonds Hill pit at Winstones' Hunua Quarry;
- The rezoning of land for residential development at Peninsula Bay, Wanaka;
- The rezoning of land for more intensive residential development at Peka Peka on the Kapiti Coast;
- A gondola development for the Treble Cone skifield;
- The extraction of gravel from the bed of the Shotover River;
- The proposed Hilton hotel development on Wellington's Queen's Wharf;
- Land use restrictions in relation to the Runway Extension Protection Areas for Christchurch International Airport;

- A new residential and commercial development by Apple Fields at Belfast on the outskirts of Christchurch;
- A proposed business park development on land at Paraparaumu Airport; and
- The proposed redevelopment of Wellington's Overseas Passenger Terminal.