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

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BRIEF OF EVIDENCE OF CHARLES NICHOLAS TAYLOR

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QUALIFICATIONS AND EXPERIENCE

1. My name is Charles Nicholas Taylor of Rangiora, and I am a principal of Taylor Baines and Associates. I have been a consultant and researcher in the field of applied social research and social assessment for 26 years, working on a wide range of projects for both the public and private sectors. I was a senior research officer at the Centre for Resource Management at Lincoln College before starting my own consulting firm.

2. I have a BA from the University of Otago (1972), an MSc in resource management from University of Canterbury and Lincoln College (1976) and a PhD in sociology from the University of Canterbury (1981).

3. I am a member of the International Association for Impact Assessment, and have served on various committees of this organisation, the New Zealand Association for Impact Assessment, the Rural Sociological Society, and the Resource Management Law Association, am a Senior Adjunct, Department of Sociology, University of Canterbury, on the Advisory Board, Social Science Research Centre, University of Canterbury and on the Social Science Committee of the Royal Society of New Zealand.

4. My research and consulting work has involved a wide range of projects including developing concepts and methods in the field of social assessment, publishing the third edition of the text *Social Assessment: theory, process and techniques* in 2004, and leading social assessment training courses in a number of countries. I have also conducted extensive research in New Zealand on the effects of facilities on their host communities, social aspects of irrigation development, social and economic aspects of tourism development, and the process of resource community formation and change. I have presented evidence at numerous hearings before Local Authorities and the Environment Court regarding applications for resource consents. I have read the Code of Conduct for Expert Witnesses contained in the Environment Court's practice note and have abided by it in the preparation of my evidence.

5. Founded in 1989 as an independent research provider and consulting firm, Taylor Baines and Associates undertakes social science research and social assessments, and provides consultancy services and training in social assessment methods. The social science focus of our firm has been applied frequently in relation to natural resource management,

exploring relationships between communities and their environment. Our firm has specific experience relating to rural development issues, the planning of large scale projects in New Zealand, and social changes resulting from irrigation, having conducted several studies of the social aspects of irrigation development as outlined in more detail below.

SCOPE OF THE EVIDENCE

6. I was asked by Central Plains Water Trust ("CPW") to prepare evidence on the social impacts of its proposed irrigation scheme ("the Scheme") as described in detail by Cliff Tipler and Walter Lewthwaite. This evidence is based on a social impact report prepared by Taylor Baines for CPW.

7. It is generally accepted that irrigation has the potential to transform both farming systems and the landscape, bringing greater security to farmers and economic, social and environmental benefits that flow throughout the region. Indeed, these are primary reasons for the major investment involved, and also a rationale for the environmental changes including social impacts, expected with a scheme such as CPW has proposed.

8. I have approached my assessment of the social effects of the Scheme with a view to assisting the Commissioners in determining whether or not allocation of water to it and the associated effects from developing and operating the Scheme, are consistent with the sustainable management of resources in a way or at a rate that enables people and communities to provide for their social well-being (as provided for in section 2 and section 5 of the Resource Management Act 1991 ("the Act")).

9. My evidence therefore provides:

    (a) a short description of the background to and approach of the social assessment, which has taken place in a number of stages;

    (b) a description of the likely effects of the Scheme, drawing on a detailed description of the social environment available in the full social assessment report; and

    (c) discussion of possibilities for mitigating each group of effects.

10. The discussion of social effects is broken broadly into:

    (a) planning effects;

    (b) construction effects;

(c) operational effects;

(d) recreation effects; and

(e) land use change effects.

11. By way of summary, in my opinion, for the reasons set out below, the CPW Scheme will bring social benefits to Selwyn District and the wider region but these benefits are ameliorated to some extent by the changes that have already taken place in the District in recent years, partly as a result of irrigation already in place. Furthermore, the Scheme will cause social impacts for specific groups of people and communities, highly significant for some, in its construction and operation. I have provided information on these effects to help the Commissioners weigh up the effects, and the possibilities for mitigating them, against the benefits of the Scheme. Broadly, I conclude that mitigation and management is required for this Scheme to contribute positively to the social and economic wellbeing of the widest range of people.

BACKGROUND AND APPROACH TO THE SOCIAL ASSESSMENT

12. In the feasibility stage of the CPW project in 2001, a social assessment was undertaken to scope the major social issues, with a focus then on land-use changes as many details of the necessary headworks were still to be finalised. Indeed at that point the proposed dam and reservoir was in the nearby Wairiri Valley not the Waianiwaniwa Valley.

13. Subsequently, constrained by funding for undertaking a comprehensive social assessment for the Water Consent application and the Notice of Requirement and Application for Land Use Consent, CPW funded a small desk study that provided some updating of the earlier feasibility study but were unable to fund a proposed full social assessment of the project then. The main updating at that point was to use 2001 instead of 1996 census data.

14. Consequently, Diane Buchan of Corydon Consultants Ltd prepared for the Selwyn District Council an extensive critique of the work to date. Her concerns centred around the need for a more detailed profile of affected people and communities, a thorough examination of the full range of social effects for the particular proposal as submitted to councils, and mitigation of any social effects identified. She concluded that the social assessment to date is “far from thorough” and that “a more rigorous social impact

assessment should be undertaken". The scope of work for the assessment reported in our technical report responded to this criticism and has covered systematically the issues identified by Ms Buchan.

15. The key components in the social assessment were to:

    (a) prepare a detailed description of the social environment;

    (b) develop a scenario of likely social change in the Scheme area as a result of irrigation; and

    (c) analyse and project social effects for different phases of the project and identify mitigation/enhancement strategies for any significant effects.

16. The detailed description of the social environment, informed by scoping of issues and effects, included profiling of affected communities and detailed description of the social environment and social trends. The description covered the following areas:

    (a) the Central Plains Scheme Command Area;

    (b) the headrace and intakes areas;

    (c) the upper Waimakariri and tunnel area;

    (d) the reservoir and adjacent area;

    (e) Coalgate and Glentunnel;

    (f) Hororata, Sheffield, Springfield, Kirwee, Te Pirita, Dunsandel, Darfield and Rolleston.

17. The description utilised existing data sets such as census data at mesh-block level, and data gathered from field interviews. The existing social profile based on 2001 census data was updated in view of the current project parameters with 2006 census data, and additional secondary data and field interviews. Analysis of data about the current farmer population and associated land use changes and social trends from census data (including longitudinal analysis 1981-2006), farmer interviews and secondary data sources to profile the proposed irrigation areas. Analysis was conducted on the approximate Scheme area using the nearest mesh-block boundaries. Description of the recreation environment utilised an extensive review of available research and recreation studies, including a review of web sites and tourist operator brochures.

18. The assessment of effects and identification of possibilities for mitigation included key informant interviews and discussions with particular interest groups, to detail social issues, effects and mitigation proposals, with a total of 31 face-to-face and telephone interviews, plus informal discussions with construction sector and other contacts. These interviews were in addition to those conducted in 2001 for the feasibility study. A scenario of land-use change was based on comparative case data from extensive ex post research on irrigation communities in the Canterbury region. Analysis of recreation impacts included considering proposed flow regimes and their hydrographic implications for recreation users.

PLANNING EFFECTS

19. Planning and seeking resource consents for CPW has involved progressive specification of the project's parameters and its potential environmental effects from the early feasibility studies through to this hearing. As the process unfolded information was available to the public, potentially affected persons, communities, and relevant stakeholder groups using a number of methods, including press releases, community and stakeholder meetings, face-to-face meetings and the release of technical documentation.

20. This information has enabled the local public, stakeholder groups and communities to consider or speculate on what the potential effects might be for them. In the latter case, people make judgements about the potential future situation with the development based on their values and preferences, and according to the information they have received.

21. Where clear information is lacking about some aspect of the proposed development during the planning phase there is uncertainty in people's minds about their future. Individual and collective impacts we noted include:

    (a) fear among residents and service providers about the physical safety of the future living and working environment, especially among those downstream of the reservoir dam and those adjacent to major canals;

    (b) reduction in sense of community coherence due to people taking sides over the development, and associated increased levels of tension within communities - evident especially in conflict and

relationship-avoidance behaviour, and sometimes open argument;

(c) intra family conflict about how to respond to the proposal;

(d) decline in attachment to place and community;

(e) psychological stress, loss of direction, personal insecurity, and depression (e.g. at possibility of loss of one's life's work). In some cases this has been manifested as disturbed sleep, lack of motivation to work on farm maintenance, etc;

(f) frustration at not being able to make informed decisions about the future, about being 'in limbo', or having their lives 'put on hold' by others. This is making it difficult to decide if and when to sell up and relocate outside the Scheme area;

(g) frustration at loss of control over, and delays in farm and property development decision-making due to a requirement to have work approved by CPW as the requiring authority;

(h) concern about any changes in the local real estate market and activity, including buyer uncertainty (risk avoidance) and any associated difficulties in selling property;

(i) concern about potential financial loss due to inability to proceed with proposed subdivision/s, and any delayed sales;

(j) postponement of planned property or farm development and maintenance;

(k) uncertainty among land holders about their legal property rights due to being in the designated area;

(l) frustration and anger among those who stand to lose property and/or homes about lack of personalised communication (and perceived lack of respect) by CPW officers;

(m) frustration and anger at perceived lack of specific Scheme information;

(n) expenditure of time and money on seeking answers, attending meetings, making submissions, and getting legal advice.

22. The experience of stress due to planning uncertainty is particularly relevant in areas where people are likely to be displaced from their homes, lose productive farm land, and/or experience significant change in their immediate living environment, effects I discuss in more detail below. However, as I indicate, the changes and impacts that some local people anticipate may or may not come to pass depending on the final project design, and particularly the impact avoidance, management, and mitigation measures put in place. The stress of uncertainty will be relieved for some when the project status becomes more certain, when the details are finalised and resource consents are granted and conditions set (if granted) and, ultimately, when the project infrastructure is in place.

23. At the wider level, it is useful to note that societal debates about the future use of Canterbury surface and ground water, irrigation and intensification evoked by the proposal are not necessarily negative in nature. There is a degree of social conflict in the adversarial nature of the current planning process as people take stands on the project. The process does, however, also create many opportunities for public debate and finding constructive ways of moving forward and resolving difficult issues.

CONSTRUCTION PHASE EFFECTS

Construction of the dam and reservoir

24. The area most affected by construction is the Waianiwaniwa Valley (the reservoir area). This attractive valley lies between the Big Ben Range and the township of Coalgate. The main access into the Valley is from either Sheffield or Coalgate townships. Several small, gravel roads lead into the Valley from the east and west. Residents in the Valley identify with both Coalgate and Sheffield townships. Darfield is the main service centre with its secondary school, rural stores, supermarket, vets, medical centre, library and public pool. A Sheffield school bus travels the upper Valley taking children to and from the primary school, and others go onto the high school in Darfield.

25. There are 17 residences in the Valley with a population of about 45, most of whom are permanent residents. The majority of residents are farming families, with sheep and beef, crops, deer and forestry the main activities. Whilst some households are 5th generation there are also those who have moved into the Valley in recent years. At least one family lives outside the Valley but farms there on a daily basis. A number of the farmers own

farmland outside of the Valley, which they farm in conjunction with their Waianiwaniwa farms. This farming practice allows them to fatten stock in the wetter winter months and then return them by road to the Waianiwaniwa Valley in spring. A small amount of farm subdivision has occurred whereby owners live on lifestyle blocks and commute to either Darfield or Christchurch for work. Several farmers rent out spare houses. Some city families come out in the weekends and holidays to enjoy a rural lifestyle on their 50 acre blocks of farm land. At least one landowner has proposals for subdivision for small farms or lifestyle blocks. Two properties are located on or near former coal mines.

26. CPW indicates that creation of the dam, intake tunnel, storage reservoir, and new roads in the Valley will directly affect 29 landowners. The particular land parcels affected include parts of farm businesses, plantations, former coal mines, homes, farm buildings, and a rifle range. In addition, the construction of the dam and intake tunnel, and the creation of the reservoir will require the closure of Malvern Hills and Auchenflower roads, which are the main access roads into the Valley from the south, east and north (ie which are used to access Coalgate/SH77, Darfield, and Sheffield and beyond). The closure of these roads is expected to take place at the beginning of the construction.

27. The 15 affected houses identified in the valley include (status as in May 2007):

    (a) 11 houses to be flooded by the proposed reservoir, of which 7 are full-time owner-occupied family homes, 2 are rented out and occupied, 1 is a family weekend residence, and 1 is a recently vacated rental property;

    (b) 2 full-time owner-occupied family homes within 300 metres of the lake high water mark;

    (c) 1 full-time owner occupied family home which would be lost to the dam construction;

    (d) 1 full-time owner-occupied family home which lies in the path of a proposed replacement road.

28. Of the occupied dwellings, eight are associated with the operation of farm businesses in the Valley, and six are rural residences. Between them,

there are approximately 45 full or part-time residents. The affected residences are indicated in Figure 1 (attached).

29. Approximately 1,200 ha of agricultural land will also be lost from 11 farms. Five will lose a major proportion of their land, and many of the remainder will lose flat areas that are crucial to their farming operations - placing the future viability of their farms and the livelihoods of their owners in doubt.

30. Local farmers anticipate that at some point there will be an adjustment of the farm boundaries - taking into account the land that remains after the lake area is acquired by CPW - with the creation of new properties. In this process, which is yet to be discussed among them or with CPW, some who are presently farming locally are expected to sell out to their neighbours (or others) and relocate out of the valley, while others will be able to stay and continue farming if they have sufficient suitable land. Among the latter, some may continue to live in the Valley, necessitating in some instances the relocation or rebuilding of their dwellings.

31. The effects of loss of homes and farm property to the construction could be profound for those households affected, and for those who remain in the Valley, including negative effects on health and wellbeing for some, especially those forced to abandon homes and properties that may have been in the family for several generations, loss of sense of place, and for some, the stress of being forced to make unplanned decisions about future life course - including relocation, and finding replacement homes and properties.

32. Family and community impacts could include loss or significant change in the local community through reduction in the number of residents and reduction in social networks, loss of communication with once near neighbours, and potential conflict over farm reconfigurations. In addition, departure of Valley residents or changes in travel patterns could result in loss of social capital from the rural communities of the Central Plains.

33. For those who remain there will be negative effects on the quality of the living environment (including dust, noise, vibration, visual disturbance of the landscape), reduction in transport amenity, increased travel times, and potential increased hazard exposure (e.g. road dangers). Negative cultural impacts for the wider Canterbury community could arise through the loss of cultural, historic, and natural heritage in the Valley.

34. Economic impacts could be positive for those who are unopposed to leaving the area or who relinquish farm land and are well compensated for their properties, or those who retain property and experience any increased property values. The economic effects could be negative for those facing, among other things, reduced farm viability, increased costs (e.g. for transportation), or reduced property values that are not fully compensated. The impact on the operative coal mine in Bush Gully is not clear.

35. Loss of use of Malvern Hills Rd, Auchenflower Rd, and the eastern section of Waianiwaniwa Rd will remove access to most of the properties in the Valley. CPW proposes to create new access roads in the project construction phase. In addition, existing roads will need to be upgraded early on in the construction programme in order to maintain public road access to the north, east and south, especially for those who continue to live in the Valley during the construction period and subsequently. At present these roads are unsealed, narrow, steep and winding in some sections, subject to closure in winter, and particularly unsuitable for stock trucks, school buses, and daily commuting.

36. Since properties will continue to be farmed and people will continue to live at the northern end of the Valley, any replacement roads will need to be constructed and the proposed upgrades to the remaining roads completed prior to closure of Malvern Hills Rd and Auchenflower Rd. Otherwise, CPW will need to keep the northern section of Malvern Hills Road open until the alternative access roads are completed.

37. With respect to the new road construction, especially along the northwestern fringes of the proposed reservoir, local people interviewed during fieldwork expressed concern about the potential for damage to property, and disruption to farming activities and to their daily lives from noise, dust, earthmoving etc, and the additional work and stress this would cause.

38. CPW have indicated that the owners and occupiers of properties and dwellings taken for the Scheme construction in the Waianiwaniwa Valley would be properly compensated. No detailed discussion of compensation has occurred to date between CPW and the landowners, although the Assessment of Environmental Effects ("AEE") notes local concerns and issues relating to the process of arriving at compensation. Local residents interviewed for the social assessment have indicated that such

compensation should also include consideration for psychological stress, farm, household and social disruption, and loss of amenity.

Noise, dust and construction traffic

39. The bio-physical changes to the environment caused by construction activities can have potential social consequences. The actual or perceived physical impacts on people and communities from the construction of the project could include noise, vibration, and dust emissions from excavation, earthmoving and tunnelling activities and construction-related vehicles (including worker transport) using public roads, resulting in reduced quality of the local living environment, increased hazard exposure and potentially human and animal health problems. There is also likely to be visual and landscape intrusion from construction activities, especially excavation and earthmoving activities, resulting in reduced environmental amenity or aesthetic quality during the construction period.

40. These effects, albeit temporary, could be experienced by, but not necessarily limited to, the immediate neighbourhoods of the various project sites and transport routes. These neighbourhoods include rural towns (especially Coalgate, Sheffield, Darfield and Hororata), and rural farming areas, especially those adjacent to the Scheme intakes, headrace and distribution canals, dam, reservoir, tunnel, and any associated activities such as borrow pits. In addition, those living adjacent to haulage and public roads used for the construction could be affected. The particular anticipated effects were noted by local residents and groups in submissions and fieldwork interviews.

41. Residents of Coalgate and those living along the headrace alignment respectively have noted the potential for impacts from dust during construction of the proposed Waianiwaniwa dam and headrace canals. Dust, windborne debris and emissions generated by construction activities could have a range of consequences for people located downwind of construction sites and adjacent to materials haulage routes, including temporary reduction in the liveability of the environment, especially reduction in visual amenity, air quality, and the general attractiveness of the area as a place to live, work and recreate. Negative effects on human health are possible from dust and emissions from motorised equipment, in particular on respiratory heath and eyesight, especially among those already experiencing such health problems. Potential economic costs and possible reduction in material wellbeing could arise through increased

work in household cleaning and maintenance, potential damage to property and equipment, damage to livestock health, damage to pasture and crops, reduction in the saleability of property, and reduced patronage for localised river-based tourism activities. There may also be temporarily increased road danger due to reduced visibility from dust.

42. Planning for the project has identified possible actions for dust avoidance, suppression, monitoring and effects mitigation which CPW intends to incorporate in a Dust Management Plan to be drafted prior to construction commencing. This document, among other things, will cover areas which are likely to be sensitive to the effects of dust (e.g. houses, facilities, crops, utilities, orchards) and identification of specific measures to mitigate the effects of dust on these sites. In preparation of its dust management plan, CPW should address issues raised by potentially affected people, and liaise with communities and health providers to seek their input into the plan details, including proposals for mitigating dust and emissions, monitoring, remedial measures, and procedures for liaising over air quality problems and complaints.

43. Noise is another effect that has a social dimension. Depending on its level, type, and pattern of occurrence, noise, blasts, and/or vibration from construction activities could have negative impacts on people located in the vicinity of construction sites and transport routes. Possible sources of noise and/or vibration include, pile driving, the operation of excavation, tunnelling, earthmoving, and vibrating compacting equipment, firing of explosives and heavy project traffic on public roads.

44. The perceived and potential impacts on people from such noise include negative impacts on health and wellbeing, especially psychological and physical stress due to fright (e.g. from unanticipated sudden loud noises and vibrations), disturbance to sleep, and disturbance to relaxation - this also applies to animals. There can be temporary reduction in the quality/amenity of the living and working environment, such as loss of existing quiet or tranquil rural atmosphere, masking of natural sounds, disturbance to classroom learning activities, disturbance to domestic activities, and in severe cases, interference with social interaction and communication. Economic loss can arise through damage to homes and other buildings from earth vibrations, stress, reduced saleability of properties, possible temporary displacement from homes, and negative effects on farm stock, and cultural loss can arise through damage to historic buildings and sites.

45. Potentially affected are residents of the valley, Coalgate and those on the headrace canal route. Their concerns particularly relate to the proposed evening, night time and weekend working schedule. Construction of the water distribution network will be a moving activity so that no one residence or noise sensitive area would be exposed to construction activities for more than several weeks. However, the dam construction is at a stationary site and will take place over most of the construction period, potentially exposing adjacent residents to noise over a longer period.

46. Noise is considered in detail in the assessment of potential noise and vibration effects as covered by Dr Stephen Chiles in his evidence. From the technical reporting to date, it appears that there is definite potential for construction noise and vibration to cause negative social impacts for those living, working, and/or recreating near some sites and construction activities. Those living at or near Coalgate could be most affected. Likewise those living along the main construction traffic routes (e.g. SH77) could be affected by the noise of heavy construction vehicles.

47. Planning for the project has included identification of possible noise avoidance and mitigation measures, including options for restricting the hours of construction work around sensitive areas such as residences and settlements. CPW intends to incorporate such measures into a Noise Management Plan to be drafted prior to construction commencing. In addition to any further technical work required this plan should include consultation with potentially affected people and communities, to seek their input into decisions on proposed operating hours, the identification of any buildings that could be significantly affected by vibration and/or blasting, project noise performance standards, decisions on the type and placement of any noise barriers and buffer zones (where required), procedures for advising local people of sudden noise events such as blasting, and procedures for dealing with excessive noise events, complaints, and identified negative effects on welling.

48. Road traffic and temporary and related structures generated by the Scheme construction could have consequences for people sharing roads in the Central Plains area with project-related vehicles, as well as for people and communities located alongside favoured transport routes. Possible sources of impact include heavy and other vehicles travelling back and forward to construction sites via public roads; disruption to traffic due to temporary crossings, road closures, and detours; severance of existing roads, especially in the Waianiwaniwa Valley; loss of, or disruption

to, access to public recreation sites; and construction traffic noise as discussed.

49. Perceived potential impacts on people from increased local traffic and road disruption were noted in public submissions and during the social assessment fieldwork. They include temporary negative impacts on health and wellbeing among commuters and other road users due to increased traffic, delays, and fears about more road accidents. Reduction in the quality of the living and working environment could include temporary negative effects due to detours, delays, quality of local roads and related structures, and increased risk to personal health and safety (from accidents and any delays in accessing urgent medical assistance or emergency services), as well as reduced access to public recreational sites, and temporary and permanent loss of established travel routes. Potential consequences of these effects include economic loss, through increased travel costs, social severance due to the loss of existing travel routes (affecting all the residents of and visitors to the Waianiwaniwa Valley), and disruption to farm management and access (including decreased ability to move farm stock on local roads). Temporary negative community impacts could arise through any disruption to school bus routes and disruption to community activities such as sport, and institutional impacts could arise through increased workloads for road and transport maintenance and regulators, and possible increased road-related Council rates.

50. In particular, residents of the Waianiwaniwa Valley are particularly concerned about major disruption to and ultimate closure of Malvern Hills Road and Auchenflower Road (which provide access to Coalgate, Darfield, and Sheffield), and the potential disruption to farm access and stock movement. The sequencing of property acquisition, road closures, provision of alternative new roads, and construction activities in the Valley is not clear to residents.

51. Effects on transport and associated infrastructure are reported on by Andrew Whaley in his evidence. This analysis indicates that the vast majority of heavy traffic movements will take place within the Waianiwaniwa Valley where construction and dam materials are expected to be sourced and concrete batching facilities located. There is considerable potential to utilise spare local capacity for construction activity. Furthermore, CPW intend to draft a Traffic Management Plan prior to construction commencing. This document, among other things, is

expected to cover likely transport routes, hazard management and signage, stock movement, crossings and maintenance of access, the management of temporary road closures and establishment of detours, vehicle specifications and performance, and traffic and road safety monitoring. Because of the potential for a range of social impacts, it is vital that there be local community input into the development of the Traffic Plan, especially by schools and transport operators.

52. The headrace and other canal construction will take place along a number of corridors which have been included in the proposed designation. The Notice of Requirement indicates that the headrace, and the Waimakariri and Rakaia river intakes will affect 61 landowners, many of whom are farmers - including Scheme shareholders and non-shareholders. The establishment and operation of construction access ways, temporary onsite support facilities, temporary haulage tracks, and construction-related activities over such properties could have a significant but short-term effect on the operation of some farm businesses. This could entail additional work in stock and property maintenance, and impose economic costs on the property holder. Prior to construction commencing, potentially affected property owners should be consulted about the day to day avoidance and management of construction affects outside of the area acquired by CPW for the development.

Construction workforce effects

53. CPW has indicated that the construction would take approximately three years and involve a workforce of "less than 200, with 100 being a realistic estimate" for the dam and perhaps double that for the whole Scheme. The construction work would be undertaken by a number of specialist contractors, for example, for dam construction, tunnel boring, river intake works and canals, and water races. CPW anticipates that, for the construction of a large proportion of the works, regional subcontractors and labour will have the necessary skills and resources. For the tunnelling work a core of specialised and experienced tunnellers and supervisors will need to be recruited from outside the region. The tunnel boring could require a peak workforce of 90-100 on a 24 hour, seven day shift system. The largest site, from a workforce point of view, would be the Waianiwaniwa Valley - for the dam construction and tunnel boring.

54. Studies of large scale development projects[1] indicate that a significant number of the social impacts on host communities are caused by the arrival of a large group of project workers who take up residence in the area for the period of the construction. Such new arrivals can create a rapid and considerable demand for local accommodation and services, including childcare, education, health, welfare, recreation, public transport, and a range of personal and commercial services. These effects of construction workforces can be both positive and negative for existing communities and for different sections of these communities.

55. Analysis of data from other projects, including recent research for proposed developments in Canterbury and North Otago[2], indicates that New Zealand project workers are willing to commute for approximately one hour each way for work - generally equivalent to 70-80 km - depending on the attractiveness of the job. On the basis of willingness to commute daily, the potential labour catchment area for this project would extend beyond the Christchurch Labour Market Area[3] to include significant parts of Ashburton District, including Ashburton itself. For instance, in 2001, Ashburton District had 675 residents who worked in the construction sector.

56. There is a very strong likelihood, therefore, that the vast bulk of the approximately 200 construction workers required would come from, and be already resident in the labour market area, and thus would not require on-site accommodation and accompanying services. Furthermore, our fieldwork studies indicate that there is little if any spare housing, especially rental housing, or spare tourist accommodation, in the Central Plans area. Specialist workers who need to move to Canterbury for the project are therefore likely to look to Christchurch and its immediate environs for accommodation, rather than to the rural communities of the Central Plains.

57. Commuting by the project workers can be expected to generate additional traffic on roads between the project area/s and Christchurch urban area, in addition to that directly associated with construction activities, as discussed below.

[1] Including the Huntly thermal power project and other energy developments in the 1970s and 80s.
[2] Meridian Energy's "Project Aqua" and Holcim NZ Ltd's proposed Weston Cement Development and the operation of the Macraes Flat gold mine in Waitaki District.
[3] Research by Newall & Perry on travel to work patterns shows that the Central Plains falls within the Christchurch Labour Market Area, which includes Christchurch City, Selwyn District, Waimakariri District, and part of Hurunui District. In 2001, there were just over 191,000 people in the Christchurch labour market area workforce - 153,000 of whom were resident in Christchurch City. Among the latter, 9,613 were engaged in the construction sector, representing a considerable pool of skills from which contractors for CPW scheme construction could draw.

58. With approximately 200 workers required for up to three years, the Scheme construction will create considerable direct employment and income, for residents of greater Christchurch and communities within easy commuting distance of the various sites. Some residents of the Central Plains area could gain employment on the project, and those benefits flow into the local economy and communities. In addition, local business would benefit through provision of goods and services to construction workforce (e.g. food, fuel, etc), which would create additional local employment. Provision of goods and services to the construction itself (e.g. vehicle maintenance, materials, etc) will create additional off-site employment, especially among Christchurch firms. Some local contractors and business could also directly benefit as project subcontractors or service providers. These off site economic effects are discussed by Mr Philip Donnelly in his evidence.

EFFECTS OF SCHEME OPERATION

Effects on amenity

59. Once constructed, the Scheme infrastructure for irrigation water abstraction, storage, distribution, and disposal will be a permanent feature of the Central Plains landscape. Many of these structures will be visible to local residents and visitors to the Central Plains area, and, in many cases, accessible from public roads.

60. There are a number of ways in which the Scheme's infrastructure, operation, and maintenance could directly or indirectly impact on people of the Central Plains area and beyond. As noted from interviews, the submissions, and examination of other developments, these effects on the socio-economic environment could be negative for some individuals, households, groups and communities, and positive for others.

61. A number of submitters and those interviewed during our fieldwork expressed concern about permanent changes to the appearance of their local living environment, recreational places, and the Central Plains landscape. These possible changes are mainly associated in people's minds with the introduction of new and visually intrusive/obstructive structures, the removal of shelterbelts on the Plains to make way for large scale irrigation equipment (also associated with loss of privacy and increased wind exposure), and a major change to the aesthetics of the Waianiwaniwa Valley. Residents of Coalgate are especially concerned

about any loss of their existing pastoral outlook and the potential visual and psychological impact of having the proposed dam nearby.

62. As discussed by Mr Glasson in his evidence, many of the main Scheme structures will be visible in the landscape, especially in the early years of the Scheme's operation when the intakes, canals and dam will be raw looking and have high impact, thus affecting the natural character. Depending on the viewing place, the headrace canal could be an incongruous element cutting across the grain of the landscape. Residents of Coalgate are especially likely to experience a loss of existing amenity during this period. However with various landscape enhancement measures proposed, Mr Glasson believes that the appearance of the various structures will soften with time and they will become more integrated into the landscape, and potentially accepted as part of it, thus having less long-term social effect. Given the public concern over possible long-term landscape change, it is important that CPW seek community input into the design of mitigation and enhancement measures and plans for landscape effects.

63. In addition to landscape changes, possible longer term changes in climate and air quality could negatively impact the attractiveness and people's enjoyment of the area, especially in the Waianiwaniwa Valley. Interviewees and submitters have expressed concern that the Scheme could increase the amount and frequency of fog/mist on the Central Plains and in the Valley, which would reduce the quality of the living and working environment, reduce vistas and road visibility, and potentially cause health problems, especially for those whose respiratory function is already compromised.

64. Among residents of Waianiwaniwa Valley and Coalgate there is particular concern that the operation of the reservoir will generate unacceptable odours, especially during the early years of the reservoir's operation. In the longer term, some have noted that when the bed of the reservoir is exposed, vegetation (especially weeds) could become re-established, perpetuating a cycle of rotting and odours. In addition, there are concerns that when such draw down occurs, the reservoir margins will dry out causing local dust storms/clouds. Where such dust is considerable and intrusive, it will reduce the quality of the local living environment in the summer months when people spend more time outside, require additional cleaning work by local householders, and possibly reduce the recreational amenity of the reservoir, if it is usable in the low-water period.

65. Technical studies show that there is potential for hydrogen sulphide, a malodorous gas generated by rotting vegetation, to be produced by the reservoir, as occurred at the Opuha Dam. This could especially happen during periods of rapid draw down. The smell of the released gas could reduce the quality of the living environment for local residents, and reduce the area's attractiveness to visitors at certain times. Such odour would be minimised by clearing vegetation from the Valley floor prior to the filling of the reservoir, and by drawing down water from the upper layers of the reservoir, rather than the colder bottom layers where hydrogen sulphide is produced.

66. Proposed Scheme operations and management plans should therefore include provisions for monitoring and actively managing reservoir-related dust and odour, along with procedures for recording and responding to complaints.

67. Operation of the Scheme will introduce additional noise, including that of pumping stations, and the sound of water falling through drop structures, which could be disturbing to nearby residents. The noise assessment, as discussed by Stephen Chiles, suggests that to avoid and mitigate such noise, and to meet the District Council noise standards, pumping stations will be enclosed in suitable noise abating buildings or enclosures while drop structures will be located away from residences. Some localised daytime noise, similar to that which already occurs in the area, is likely to occur during periods when the headrace and other canals are being cleaned using mechanical equipment.

68. Some submitters and people interviewed are concerned that the recreational use of the reservoir will introduce new and unwanted noise into the tranquil rural environment, particularly through the use of power boats and jet skis. There may be little that can be done to mitigate such noise other than to ban power boats and jet skis from the reservoir. However, this could reduce the recreational value of the reservoir to some potential user groups, including some residents of the Central Plains.

RISK

69. There is a considerable amount of anxiety among Coalgate's and other local residents about the dangers posed by a breach or overtopping of the proposed Waianiwaniwa dam. Likewise others in the district have concerns about the consequences of a breach in the headrace. While

there is a technically low likelihood of dam or headrace failure, if it occurs it could result in massive flooding of Coalgate, other settlements, and/or the surrounding countryside, causing damage to homes and farm property, damage to local infrastructure, injury, and loss of life.

70. The assessment of the risks to the proposed dam has indicated the annual probability of various types of failure (with the dam constructed to internationally accepted standards) as discussed by Richard Davidson. The assessed risk is very low. However, psychological studies show that while the technical likelihood of a catastrophic unforeseen event such as a dam failure might be extremely low, some people will continue to experience fear and uncertainty about the dam due to the perceived scale of the consequences. In risk perception studies this has been termed the 'dread' risk.

71. A number of individuals, families, and groups have noted that there could be an increased risk of loss of life from drowning (in the intake structures, reservoir, canals, headrace, or water races), including drowning of in-stream users due to unexpected discharges of water.

72. Rural people are very aware of the dangers that on and off-farm waterways, water races, ditches, ponds, and troughs (however small) present to children. Awareness of such dangers has been promoted in rural areas. Consequently there are particular concerns among local parents and schools about the future safety of their children around the Scheme waterways. In human terms, even one death by drowning or serious incident would be completely unacceptable to the community and the Scheme owners.

73. The evidence of Walter Lewthwaite indicates a number of measures such as fencing the canals using standard farm fences (security fences will not be put in place). No specific safety measures are proposed for the canals. Piping of the distribution water was seen by those interviewed as a safer option than having many kilometres of open water races, and the proposal to replace the upper Waimakariri intake race with a tunnel was considered a significant improvement in the Scheme's design. Trees in the reservoir area should be removed prior to flooding, removing the likelihood of boats running into submerged stumps and logs. Outlet towers in the reservoirs should be guarded by protective barrages, and warning signs put in place. The design and length of the Upper Waimakariri and Rakaia River intakes

is such that they would enable a kayaker who enters the long diversion channel to exit safely in plenty of time and without difficulty.

74. There is some potential for a kayaker to be drawn into the Lower Waimakariri intake and become trapped against the 'trash rack' that covers the intake. Consequently CPW plans to install an additional safety barrier - in the form of inclined bars that would lift large objects, kayaks, and people out of the water rather than trapping them against a submerged grille. The risks to river anglers and other riparian zone users from unexpected maintenance discharges could be reduced by advanced publication of CPW's programme for sediment pond flushing.

75. Given the level of community concern about the perceived risks to public and personal safety as outlined above, it is strongly recommended that in the preparation of its Health and Safety Plan CPW should address risks to the public, property and infrastructure arising from the operation of the Scheme and its infrastructure and include procedures for identifying, monitoring, and managing threats to public safety, and providing emergency warnings for emergency and maintenance water discharges. Preparation of the Plan and the design of any warning systems should be done in consultation with local communities and recreation groups and give due consideration to matters of insurance and community recovery from emergencies and incidents.

Effects on the roading network

76. A number of interviewees and submitters have expressed concerns about permanent change to the roading network, resulting in inconvenience, loss of current freedom of movement, and additional transport costs.

77. Permanent changes to the roading network are most likely to occur in the Waianiwaniwa Valley. Those who remain in the Valley after the lake is created, especially on the western side, will face longer road journeys to Christchurch and local townships. For example, a journey from the Waianiwaniwa Valley to Glendale (where some have second farms) will be twice as long by road than at present, and driving stock by local roads out onto the plains could become unviable. In addition to the inconvenience and extra time involved in taking alternative or new routes, residents of the valley will incur on-going additional costs. As I have noted, CPW should consult with local residents over the planning for any new roads and access ways.

78. Elsewhere, there are not expected to be any road severances or closures, and only minor alterations to road alignments. In some cases, road alignments and intersections will be improved due to road works that were put in place for the project construction.

79. Some local people have suggested that there could be a loss of access to farm properties due to the establishment of the canals and water races. However, the traffic evidence has indicated that property access will be retained through the provision of crossings/bridges, and that all existing access ways to public recreational spots (e.g. the Waimakariri Gorge bridge area) will be retained.

80. A number of local residents have noted that changes in land use under irrigation, especially to dairy farming, will increase the amount of traffic on rural roads in the Central Plains. They particularly note that there will be more milk tankers, rural transport of various kinds, and more farm worker vehicles, which together could increase the chance of road accidents, cause delays and inconvenience for existing road users, and generate more noise for those living along favoured routes.

81. However, a long term local transport operator noted that there are also likely to be fewer stock trucks than at present, and that nowadays professional drivers are well trained, closely monitored in terms of speed and safety, and have low accident rates. According to the traffic assessment there is sufficient capacity in the existing road network to absorb any likely farming-related increase in local traffic without reducing the level of service. Nevertheless, during the expected expansion of dairy farming in the district the dairy industry will need to pay particular attention to the safe operation of tankers in rural townships and in relation to school bus schedules and operations.

Surface and groundwater effects

82. Submissions and interviews reveal a range of community and public comments and concerns about the long term quality and quantity of surface and groundwater in the Central Plains area and downstream.

83. These include:

(a) the consequences for people's health and the environment of potentially reduced surface and groundwater quality due to more intensive land use and human settlement in the Scheme area - causing possible increased nitrate and other farm runoff to surface water, nitrate etc leaching to groundwater, and contamination from cows and septic tanks; and

(b) the consequences for people's living and working environments and management of Scheme bywashes and discharges to downstream water bodies - giving rise to a possible wetter environment on the lower plains and in the Ellesmere area, and localised flooding/ponding.

84. At the same time, people note various possible positive social and economic effects of changes in ground and surface water, for example, aquifer recharge and increased groundwater levels, resulting in greater water security for farmers and other water users downstream, and reduced local competition for groundwater resources; and increased flow in the Selwyn River, its tributaries and other lowland streams, resulting in a healthier and more attractive environment, and more recreational opportunity downstream.

85. Technical analysis of potential changes in ground and surface water quantity and quality is available in the evidence of Mr Tipler, Mr Weir and Dr Bright. In particular they note that there is likely to be some improvement in surface and groundwater levels below the Scheme area, few farms affected by wetter conditions and only a minor effect on nitrate levels in either ground or surface water.

86. To avoid the possible negative effects to the environment and people of water pollution from Scheme operation and intensified land use, CPW propose to introduce an Environmental Management System ("EMS") incorporating a Sustainability Protocol and farming practices within binding farm management plans for those participating as shareholders in the Scheme, as set out in the evidence of Ms Clare Mulcock.. The EMS is expected to address, among other things, fertiliser use practices and standards, stocking levels, stock management near waterways, and riparian zone/strip protection. In addition, features have been designed into the Scheme to reduce bywash effects, such as the incorporation of

wetlands to filter sediment prior to bywash discharge to rivers. While these proposed mitigations may help avoid or reduce the potential impacts on water quality, and thence to people, CPW will need to monitor the issue of possible flooding of low lying areas outside the Scheme area, any damage to people's environments (including health) and property that might result, and how such impacts might be compensated for and/or actively avoided or mitigated in the design and operation of the Scheme.

Social equity

87. The development and operation of the Central Plains Scheme will have different impacts on different sections of the population. Those who stand to be significantly negatively affected will not necessarily be the same people who are likely to benefit directly from having improved access to irrigation water. The issue of the social equity of the Scheme seems especially to be foremost in the minds of those who stand to suffer negative impacts on their material wellbeing and livelihoods, quality of their physical living environment, and health and wellbeing, and among those who are concerned about the effects on local communities and their development.

88. For some, the equity issue centres on private capturing of the benefits of a public or societal asset (i.e. the water in the rivers). In particular, the CPW shareholders and Scheme promoters are seen as advancing a project in the name of the wider common good (i.e. the development of the Canterbury and national economy) when they consider most of its benefits will flow to a limited number of shareholding landowners (who will also benefit from an increase in their property values) and those with whom they do business. This issue is addressed further by Mr Philip Donnelly in the economic impact assessment and cost benefit analysis.

89. The landholders of the Waianiwaniwa Valley, especially those who are not Scheme shareholders on the Plains, stand to gain no direct benefits from the CPW Scheme (such as access to irrigation water), and furthermore, could suffer substantial negative, even devastating, social, psychological, and economic impacts through the loss of their land, homes, farm buildings, roads, community, air quality, and way of life, for which they expect to be offered only the statutory minimum compensation. And for them these impacts will not be offset by the creation of a reservoir that might be useable for recreation, or by any jobs that might be created during the construction or subsequently. The social inequity of this

situation is seen as being further reinforced by CPW becoming a requiring authority, thus limiting the local landowners' and residents' rights to maintain their landownership and use rights, and to limiting their financial compensation to that available under the auspices of the Public Works Act.

90. Likewise, those who live in the townships, especially Coalgate, who do not participate directly in the local agricultural sector see themselves as having to cope with the negative effects of the construction on their lives without receiving compensation, and as being required to adjust to a reduced level of amenity and increased level of risk in their living environment in the long term. Outside the Central Plains area, in the long term, some landowners and residents to the east and southeast of SH1 are likely to encounter ground and surface water problems yet gain few direct benefits from the CPW Scheme, while other landowners in the area will benefit from higher water tables. Recreationalists from throughout the Canterbury region whose sport or activity depends on high and variable flows in the two main rivers also see themselves as likely to be net losers as discussed below.

91. In terms of social equity, therefore, those who will gain economically from the project are, for the most part, not the same people as those who see themselves as standing to experience significant negative social effects. This fact is giving rise in the community to a sense of a looming social injustice. Without a resolution of these issues, the long-term consequence could be community polarisation, social conflict, and a significant loss of social cohesion, especially in the early years of the Scheme. Over time these effects should diminish. Mitigation options include the full range of mitigation and compensation options proposed for affected people, as well as an ongoing community liaison mechanism that I will discuss.

EFFECTS ON RECREATION

The Waimakariri River

92. It is generally accepted that outdoor recreation is a crucial element of a balanced and healthy lifestyle for many New Zealanders and visiting tourists. It also helps maintain an effective workforce because of its restorative effects and provides opportunities for commercial recreation and tourism development. As discussed in the SIA Technical report, a majority of New Zealanders participate in water-based outdoor recreation and a significant part of their activity is based in and around rivers and

associated water bodies. Rivers and other freshwater bodies are also very important to the development of New Zealand's international tourism industry.

93. A description of the recreation environment is provided in the SIA technical report. Unfortunately, there has been no recent Canterbury-wide survey of the recreational use of its rivers and associated river bodies; but some considerable and useful information is available from a variety of more specific surveys and other research reports conducted over recent decades. Much of this work has been conducted to enable better management of freshwater recreational resources for the residents of, and visitors to, the South Island's largest city, Christchurch, and its hinterland. The two significant general findings of this research are that Christchurch and mid-Canterbury residents use nearby rivers and freshwater bodies for a wide variety of passive and active recreational activities and the Waimakariri and Rakaia Rivers, among other Canterbury rivers, are nationally important for tourism.

94. Because of its proximity to Christchurch, and a number of smaller settlements, the Waimakariri River and its riparian zones are sought-after for a wide range of recreational activities. These include: salmon angling, trout angling, estuarine fishing, jet boating, picnicking, walking, swimming, whitebaiting, power boating, water skiing, jet skiing, yachting, canoeing, rafting, bird watching, mountain biking, hunting, river crossing training and sight-seeing. Indeed, the Waimakariri River has the highest recreational usage of any South Island river.[4]

95. Most of the river's use is for a half day or less. Some of this activity is organised by clubs and societies, but much activity is informal and casual in nature involving individuals, peer and family groups. The recreational use of the Waimakariri River is also linked to its high to moderate amenity or scenic value.

96. The Waimakariri River is by far the most popular catchment in Canterbury and is the most heavily fished river in the South Island. The National River Angling Survey[5] assigned *regional status* to the river's trout fishery and *national status* to its salmon fishery. The Gorge to the sea is exceptionally important to anglers and surveys suggest that the area from the SH1 bridge to the sea is the most heavily used part of the river for angling.

[4] Jellyman et al (1987).
[5] Teirney et al (1987).

Recreational whitebaiting is the most important water-based activity on the lower mainstem and lower tributaries during spring.

97. The Waimakariri River is also the most popular river in Canterbury for jet boating and the most heavily boated river in New Zealand. The Gorge, with its rocks and rapids, downstream to the Old Road Bridge, with its shingle braids, offers easy boating suitable for beginners and families. The New Zealand Jet Boat River Racing Association also uses the Waimakariri River extensively for its activities.

98. The Waimakariri River provides opportunities for relatively easy but interesting kayak trips. The Gorge trip is regarded as one of the best whitewater trips in the South Island. It is the variability of the river's unimpeded flow which attracts and challenges kayakers. The currents are strong, but not violent or dangerous, making the river ideal for training and for novice paddlers. Christchurch is home to over 600 members of canoe and kayak clubs and thousands of individual paddlers - at least 100 of these paddle the Waimakariri once per week in various parts of the river during the week as well as during weekends, which are the most popular times.

99. Picnicking occurs informally in many places along the river below the Gorge but the most popular spot is at the Waimakariri Gorge which has an access road to the river and for that reason is also popular with anglers, kayakers, campers, swimmers, jet boaters, walkers, dog owners and sightseers. The latter also use the historic Gorge Bridge to get views into the lower Gorge and downstream.

100. The Waimakariri River is also used for recreation events. These include three kayaking events held in December, February and May, run in the Gorge and lower river, which attract several hundred participants in total. The Annual Rangers Salmon Fishing Competition at the Waimakariri Mouth is in March.

101. The Coast to Coast multi-sport race in February is the best known of all the events on the river. The Waimakariri Gorge Bridge area is used as a transition point from paddling to cycle racing. The Coast to Coast attracts about 800 competitors each year as well as many support people and spectators who often congregate in the Gorge Bridge area.

102. The Waimakariri River is also used for commercial recreation and tourism. Two jet boating companies operate trips on this river. The larger operation

operates every day and in 2004 this company carried some 20,000 passengers.[6] The jet boat operators offer short jet boat rides in the Gorge and braided sections of the river but also sell longer trips in various combinations of jet boating, Unimog 4 wheel driving, horse trekking, heli-jet riding and riding on the Tranz Scenic train. Sharkcat Seafaris runs fishing cruises including half and full day salmon fishing on the Waimakariri River.

103. In 2005, recognising the recreation potential of the river and its environs, Environment Canterbury established the Waimakariri River Regional Park. The McLean's Forest and Kaiapoi Island stages are now open, and, in time, other stages of the Park will be established to enable more intensive management of the river and its riparian zones for recreation.

The Rakaia River

104. The Rakaia River and its landscape are sought-after for a large array of recreational activities. The river is used for: salmon angling, trout angling, other fishing, whitebaiting, jet boating, kayaking, rafting, walking, picnicking, camping, photography/scenic painting, bird watching, off-road driving/trail biking, sightseeing, waterfowl/upland game/rabbit/ and hare shooting, chamois/deer hunting, swimming, stone collecting and shooting targets.[7]

105. Recreationists gain major satisfaction from pursuing their activities in an unmodified natural environment. The Gorge to the river mouth has the greatest concentration of activities occurring. The river's proximity to Christchurch, Ashburton and other North Canterbury towns is a significant reason for its popularity.

106. The significance of the river's fishery and wild and scenic values was the reason the National Water (Rakaia River) Conservation Order 1988 was granted. The National River Angling Surveys[8] have assessed the Rakaia River as being a *nationally significant* salmon fishery and a *regionally significant* trout fishery. It is one of the best salmon fisheries in New Zealand with consistently the largest salmon runs between November and late March. The Rakaia also supports a small, primarily recreational, whitebait fishery.

[6] Relph (2007), page 134.
[7] Saville-Smith (1983).
[8] Teirney et al (1987).

107. The Rakaia River provides opportunities for kayakers wanting relatively easy but interesting trips with grade 2 conditions. Some groups paddle the run from the Gorge Bridge to the Highway 1 Bridge.

108. The Rakaia River is also used for recreation events. These include jet boat racing in spring and autumn, the occasional kayak race and the very popular Rakaia Salmon Fishing Competition which is held at the end of February.

OTHER WATER BODIES AND THEIR RIPARIAN ZONES IN THE COMMAND AREA

109. There is little detailed information on the recreational use and value of the other rivers, streams and freshwater bodies, and their riparian areas, likely to be influenced by the Scheme. Many of these, with one or two exceptions, are lowland rivers and estuarine environments between the Waimakariri and Rakaia Rivers and downstream of the areas proposed to be irrigated. These are the Waianiwaniwa, Hororata, Hawkins, Selwyn, LII and Irwell Rivers, Harts Creek and Te Waihora/Lake Ellesmere.

110. Fish and Game believe that the Waianiwaniwa River is likely to be of local significance as a sports fishery, and with the Hororata and Hawkins Rivers these provide interesting water for a few local anglers and specialists. The LII, which flows into the northern part of Te Waihora/Lake Ellesmere, provides fishing opportunities for brown trout and hunting for waterfowl. The Irwell River is subject to low flows and is a degraded fishery. On occasion it can still provide good fishing and is important to the brown trout cycle locally. Harts Creek is a good fly fishing stream, especially towards the mouth where it runs into Te Waihora/Lake Ellesmere. The Harts Creek Wildlife Management Reserve and refuge lies on the western margins of Te Waihora/Lake Ellesmere, within 40 minutes drive of Christchurch. Dr Greg Burrell, Mr Paul Kennedy, Dr Richard Allibone and Dr Gordon Glova have provided evidence regarding ecological and fishery values in these streams and the Lake.

111. The Selwyn River contains good numbers of brown trout in the lower reaches and was in the past recognised as a very good fishing stream. From headwaters in the foothills above Whitecliffs, the river winds across the Canterbury Plains and then enters Te Waihora/Lake Ellesmere. The middle reaches are used casually for hunting rabbits, hares, duck, quail and pheasants, the latter three in season. The lower reaches are popular

swimming, camping, picnicking and hunting destinations. The Selwyn River mouth on Te Waihora /Lake Ellesmere is highly favoured for duck and Canada Goose hunting.

112. Te Waihora/Lake Ellesmere - New Zealand's fifth largest lake - is ranked as an outstanding national wetland. It sustains important recreational whitebait, flounder and brown trout fisheries and is also home to New Zealand's largest commercial eel fishery. The lake is an important fishery/mahinga kai for Ngai Tahu and local runanga. It is the most popular North Canterbury waterfowl hunting area because the lake, its inflowing tributaries, ponds, drains and wetlands on adjacent lands sustain large numbers of ducks, geese and swans. Its hunting values are of national significance. Additionally, a large section of the Christchurch to Little River Railtrail is situated alongside the Eastern fringe of the lake.

EFFECTS OF TAKES ON RECREATIONAL USE AND VALUES

113. Our assessment of effects of water takes on the recreation environment relates to the description of the Scheme laid out in the AEE and is guided by the information that water takes from the Waimakariri and Rakaia Rivers in a typical year will be mainly during spring (beginning in October), summer, and autumn (ending in April on the Rakaia and May on the Waimakariri). During these periods there will be reduced water flows in both rivers and a stabilisation in the flow regime of the Waimakariri River below the Scheme water intakes.

114. The nature of the data available on recreational participation in and on the affected water bodies means that it is only possible to make a series of qualitative statements about likely impacts on recreation. Some guidance is available from past river recreation impact analyses.[9] Submissions made to the Selwyn District Council and Environment Canterbury on the Scheme and the interviews with residents of the areas affected have also contributed. The recreation research literature is of value, pointing to the need to examine the impacts on opportunities for participation in recreation and the experiences that may be gained from such participation.[10]

115. The assessment rests on the assumption that freshwater-based outdoor recreation, whether for New Zealanders or international tourists, depends

[9] Of particular importance in this regard is the work conducted in 2003 on the Recreation Effects of Project Aqua proposed for the Waitaki River (Boffa Miskell and Rob Greenaway & Associates, 2003).
[10] For example, in Backlund, 2005; Bricker and Kerstetter, 2000; Hammitt Backlund, and Bixler, 2006; Herrick and McDonald, 1992; Hynes and Hanley, 2006; Karwacki, 2003; Kyle, Bricker, Graffe and Wickham, 2004; Sutherland, 1982.

fundamentally on the *actual* and *perceived* quality of the river and riparian environment. This includes clean water, high quality fish and wildlife habitat, functioning natural ecosystems and aesthetically pleasing landscapes to which many recreationists become very strongly attached. It also depends on easy access to waterways and riparian zones, often close to population centres, which meet the resource demands of a diverse array of activities and people having varying skill levels

116. Reduced flows have the potential to negatively affect the recreational participation and experience of anglers, kayakers, jet boaters and other users. Any modification of the Waimakariri and Rakaia Rivers could change the river experience of anglers and fishing habitat in the mainstem and braids. The effects of water takes on fish habitat and stocks are discussed by Drs Glova and Burrell. Lower water levels may also increase impacts on the river bed itself, caused by 4-wheel drive vehicles gaining greater access to the river, which is likely in turn to affect negatively fishing experiences and habitat. If water takes reduce the number of braids in some flow ranges, this could increase the level of conflict between jet boaters, kayakers and anglers.

117. Reduced flows will negatively impact on jet-boaters and kayakers when and if:

    (a) the extent and depth of the water is reduced in the range of flows in which CPW can exercise its water take;

    (b) flows are in their preferred ranges for users less frequently;

    (c) the number of navigable braids decreases in any flow ranges;

    (d) obstructions to navigation appear more frequently.

118. Less variable and lower flows, particularly in the Waimakariri River, will reduce the challenge of the current ever-changing and unpredictable nature of the river environment. This unpredictability makes a significant contribution to the overall recreational experience especially for those who have a higher level of specialisation. Such challenges are difficult to provide using artificial alternatives. Mr Tipler describes in detail the changes in river flow and the degree of variability that will occur after Scheme implementation.

119. Interviewees and other commentators suggest that the Scheme will lead inevitably to an intensification of land use involving dairy production. They

express fears of increased effluent run-off and pollution leading to the degradation of water quality downstream of the irrigation scheme, affecting in-stream values, water quality for swimming, picnicking, drinking, and the health of fish and wildlife stocks upon which much recreation depends. While one may be able to catch fish, some fishers may consider eating them is unhealthy because in social terms perceived effects are important in driving behaviour. Mr Tipler and Mr Kennedy address this issue and consider the effects can be mitigated by appropriate farming practices and stream management techniques such as riparian planting.

Construction phase effects

120. The effects on recreation of the construction phase of the Scheme will be mainly short lived. The construction of the intake and by-wash structures, inlet and headrace canals, reservoir and related infrastructure could affect in-stream habitat of a large number of water bodies. This has the potential, if not managed properly, to negatively impact sports fisheries and therefore the fishing experience in the short term.

121. The size of the Scheme will demand a considerable workforce. While it is anticipated that contractors and their staff will be based in Christchurch and commute to the various construction sites, if some choose to live locally, the available accommodation in the district will be at a premium. Depending on what contractors choose to do, travellers could find it difficult to find accommodation in the immediate district at times during the construction phase.

122. Of greater significance will be the negative impacts on the recreational aspects of visual amenity of large scale landscape modification, but these impacts will lessen with time.

123. The filling of the reservoir will lead to the loss of recreational sites in the Waianiwaniwa Valley including the Malvern Rifle Club's shooting range, and places currently used by weekend visitors for walking, cycling, running and 4-wheel driving. Losses of this nature will be deeply felt by some recreationists.

Effects of structures, stilling basins and river training works

124. The addition of intake structures and stilling basins in the river environment will be interpreted negatively by many recreationists. The Waimakariri and Rakaia Rivers are valued highly for their relatively

unmodified natural landscapes and such structures and basins will negatively affect some recreational amenity values.

125. River training works, including the building of weirs and bulldozers operating in the river for about 10 times a year, will also negatively affect recreational amenity values and have the potential to interrupt recreational activity and enjoyment, particularly at times of peak recreational activity.

126. The infrastructure of the irrigation scheme (structures, basins, river training) has the potential to impede access to valued recreational areas. Submitters and interviewees argue that access to rivers could be impeded in a number of ways. The extensive canal network could make getting to the rivers on formed and unformed roads more difficult, an issue that is exacerbated at present as the placement of bridges over canals is still largely undecided. However the evidence of Mr Whaley indicates that CPWL will maintain or replace existing river access routes. The water intake areas, stilling basins and related in-stream infrastructure could all interrupt access. The designation of areas of the river and riverbanks of the Rakaia, Waimakariri and Kowai could also affect jetboaters', kayakers', rafters', anglers' and hunters' access more generally. Jet boaters in particular are concerned about the possibility of their access to the Woodstock river access point on the north bank of the river in the lower gorge being negatively affected. However the Scheme has no proposal for doing any works on the north bank of the river in the Woodstock area.

127. Similar concerns are expressed about the potential negative impacts on recreational safety of the Scheme's infrastructure. These include concerns about:

(a) safety around intake areas;

(b) safe access for recreational use;

(c) danger to the health of recreational users of contaminated water in sites downstream of the irrigation area;

(d) the potential for drownings to occur in the extensive network of unfenced canals;

(e) the downstream dangers of any sudden discharges of large volumes of water as a result of the routine flushing of stilling basins and emergency discharges.

Impacts of reservoir operations

128. The recreational potential of the reservoir, once filled, will vary as described by Mr Tipler. In typical years, use in the months January to July is likely to be limited due to the incremental draining and then refilling of the lake. The early part of this period corresponds with the peak of water-based recreational activity in Canterbury. This variability will make it difficult for boating and fishing. In dry years these problems will be dramatically exacerbated by the very significant draw-down on the reservoir's capacity, but in wet years variability in lake level will be small and this could facilitate more recreational use.

129. Residents are concerned about the drying out of the exposed lake bed and potential for dust storms, foul odours and insect infestations, particularly in dry years. These would also affect recreational users of the lake and its environs. Residents also indicated that the lake is unneeded for local recreation as the upper Selwyn River currently meets locals' needs for swimming and fishing, and local schools use Lake Lyndon, Lake Coleridge and the district's rivers for kayaking and other water activities.

130. This assessment does not deal with the impact of future recreation opportunities that may be developed in association with the Scheme but are not yet identified. An initial analysis of recreational opportunities in the proposed reservoir has been made by CPW but these have not been advanced because the Trust and Company intend that they will generally be private promotions. So I can only note that there may be opportunities and recommend that they be developed.

Mitigation of recreation effects

131. Any proposals for mitigating the impacts of the Scheme on the recreation environment must acknowledge the considerable recreational importance of the Waimakariri and Rakaia Rivers, and many of the other waterbodies and riparian zones discussed above for residents of Christchurch and North/Central Canterbury, and the visitors to the region. The Scheme will have a strong influence on key waterways in the recreational hinterland of the South Island's biggest city. Not all outcomes from changes to the recreation environment will be negative for all users and outcomes will depend on management strategies. Therefore, once embarked upon, the Scheme's managers will inevitably be drawn into recreation policy, planning and management roles. CPW should engage in a recreation

management planning process from the start of detailed design work to make the greatest recreational use practical of the reservoir, and manage the reservoir, canals and related sites and activities, and river flows, in ways that limit negative recreational impacts and where possible enhance recreational opportunities.

132. This plan should be based on community and interest group consultation, be adequately resourced financially on an ongoing basis, and be implemented, monitored and up-dated by permanently employed recreation staff, part of whose job will be to liaise with water-based and other recreationists, and local and regional agencies with interests in recreational development. CPW could either employ such staff itself or provide the Selwyn District Council with funding to support the employment of such staff. Specific mitigating elements of that recreation management process should include:

    (a) a safety plan for the river-based structures and associated activities, reservoir and canals;

    (b) a recreation access plan designed to overcome any limitations on access identified;

    (c) the management of water takes from the Waimakariri and Rakaia rivers and subsequent flow regimes in ways least likely to disrupt recreation for instream users;

    (d) attention to the design, location and management of instream infrastructure in ways which will make them as unobtrusive as possible;

    (e) the design and management of river training activities so that they are as unobtrusive as possible, timed appropriately to minimise recreational impacts, and notified to recreationists adequately;

    (f) attention to the design, landscaping and management of the reservoir and canals in ways which will enhance recreation. Attention should be paid to: access *around* the reservoir and along the canals for cyclists and walkers, access *to* the reservoir for anglers and boaters, and facilities for picnicking. Drinking water and toilet facilities should also be provided;

    (g) farm management designed to minimise nutrient runoff so that downstream water quality is safe for recreational activities;

(h) riparian management (including appropriate planting) in, and downstream of, the Scheme area designed to improve environmental quality for recreationists;

(i) the replacement of recreational facilities lost as a direct result of the Scheme, including the Malvern Rifle Club's shooting range;

(j) any others that emerge as a result of the recreation management planning process.

LAND USE CHANGE

Land use trends and future uses

133. Irrigation transforms farming systems, landscapes and the people and communities who live there. A strong base of comparative research[11] supports this supposition and development of a likely scenario of social change for the CPW Scheme as provided in our technical report.

134. The comparative research shows there are community level changes associated with new land uses under irrigation, including changes in demographics, farming systems and the nature of farm work, and the dynamics of rural communities. Furthermore, while positive social benefits are often attributed to irrigation, it is evident that rural areas need to be active in maximising the social benefits and managing social costs.

135. The available research shows successive ownership and land use changes coming in waves after the introduction of irrigation. On the Waitaki Plains, for instance, many established, dry-land, sheep farming families sold their farms and were replaced by younger families. These new farmers modified traditional farming systems with the support of an accessible and regular water supply. They invested heavily in farm improvements, upgrading pasture for cropping and sheep and later for dairying, and building bigger and better homes and farm buildings. The Amuri area later replicated the Waitaki experience with farms there changing ownership and with a substantial shift to dairying.

136. The changes in land use and farming that have taken place in recent years in the CPW command area are described in the profile of farmers and command area above (Section 2.2 of our technical report). It is very

[11] These cases range from the Lower Waitaki River in the 1970's (Houghton, 1980) to the more recent Opuha Dam in South Canterbury (Harris *et al.*, 2006). The social research base includes information from public science funding (Foundation for Research Science and Technology) and research by the Ministry of Agriculture (Ford, 2002), as well as research commissioned by Central Plains Water (Butcher Partners, 2000).

evident that the command area and nearby communities have already changed substantially over the last 20 years as a result of two main factors: conversion to dairying (driven by ground water irrigation) and subdivision of farm land into rural residential and lifestyle blocks.

137. A farmer survey of the command area and interviews with farmers in the area showed they were mainly engaged in mixed livestock and crop production in 2001. They were usually irrigating part of their properties with water from deep bore wells, and most of them indicated they had contingency plans to extend irrigation from that source should the proposed CPW Scheme not proceed. While they acknowledged that the cost of the proposed Scheme may impose an additional financial burden on their farm business, they wanted to decrease the risk to their business from drought conditions.

138. As an indication of future change, dairy conversions in the Selwyn District were already happening apace in 2001 at the time of the CPW feasibility study. The Selwyn District Council granted four dairy shed building consents[12] in 1999, nine in 2000, and 23 in the first eight months of 2001. These changes have continued through to the present time as indicated in Table 1 below, with nearly a trebling of dairy farming in the command area. Furthermore, an increase in cow numbers and area is indicated for the 2007-8 season within the CPW command area to the magnitude of another 3,000 cows, which at the average stocking rate of 3.41 equates to an area of at least 880 hectares, bringing the total to 17,220 ha.

Table 1. Dairy farming in the CPW command area 2001-6[13]

	2000-1 season	**2005-6 Season**
Cows	18,185	55,861
Hectares	5,816	16,336
Cows per hectare	3.24	3.41
Total milk solids (kg)	7 million	20 million
Number of suppliers	No data	56

[12] Dairy shed building consent data provided by Selwyn District Council.
[13] The data from Fonterra derive from 2006 Annual Supply Notification forms for the command area.

139. Another way of examining the increase of dairy farming in the District is to examine the number of dairy farmers and farm workers versus other major farm occupational groups. Data in our technical report shows that over a ten year period there was a marked increase in the dairying occupation 1991-2001 and corresponding fall in the sheep farming occupation. While the cropping related occupations have fluctuated over 10 years the numbers have generally held up. As these data are for the whole district they include areas of dairying around Ellesmere and Greenpark; however, most of the growth in dairying has taken place in the Dunsandel and Te Pirita areas. The effect of this development on communities such as Hororata is noted in our description of the social environment. Although Hororata's population declined by 23% between 1986 and 1996, this trend has been reversed over the last ten years with a sharp 48% increase in the number of residents. As a result the Hororata School doubled its roll from 45 to 94 pupils between 1996 and 2007, an increase directly attributed to the growth in dairying in the area. The school is an important hub for Hororata and enjoys strong community support from established and more recent residents.

140. The dynamic nature of the district without the proposed CPW Scheme is also evident in the characteristics of the population within the command area over 20 years. Table 2 below shows the area experienced very substantial population growth since 1991.

Table 2. Changes in Usually Resident Population 1986-2006[14]

Census Year	**Central Plains**		**New Zealand**	
	Number	**% change over five years**	**Number**	**% change over five years**
1986	2,991		3,263,280	
1991	3,135	4.8	3,373,932	3.4
1996	3,831	22.2	3,618,297	7.2
2001	4,491	17.2	3,737,277	3.3
2006	5,388	20	4,027,947	7.8

[14] Source: Statistics New Zealand.

141. The general model of land-use change under irrigation, and associated changes in farm ownership and demographics will therefore only happen in a partial way in the CPW context. Mr Macfarlane in his evidence confirms this expectation of modest change in his scenario of land-use change used for his analysis of on-farm impacts. He makes the following assumptions about CPW land uses in the operation phase.

142. There are an effective 85,000 ha inside the command area of which 60,000 ha will be irrigated by CPW - approximately half is already in irrigation and half of this area (ie 15,000 ha) will convert from their current irrigation sources and half continue their existing irrigation, resulting in a total of 75,000 ha irrigated in the command area. The other 10,000 ha will be dryland associated with irrigation and therefore an important part of the total mix of land in the area's farming systems.[15] Of the 75, 000 ha irrigated, Macfarlane assumes a full change scenario of:

(a) 46,500 ha dairying;

(b) 15,250 ha intensive cropping;

(c) 10,250 ha mixed livestock, dairy support and cropping;

(d) 3,000 ha intensive stock finishing.

143. The major change in this scenario is towards more irrigated livestock, especially dairy farming and dairy support. As I have discussed, however, the trend to dairying is not new. Indeed, it is likely dairy farm conversion will continue in the meantime without the CPW. There is already going to be an increase in both cow numbers and area for the next season (2007-2008) within the CPW area to the magnitude of another 3,000 cows, which at the average stocking rate of 3.41 equates to an area of at least 880 hectares, bringing the total to 17,220 ha already in dairying. There is likely to be even further change before the CPW Scheme is commissioned.

144. I have therefore concluded that Macfarlane's scenario is likely to represent the maximum area in dairying including current areas. This is because the ability of the Scheme to cater for further development of dairying within its command area is governed by a number of factors. First there is a limited amount of water for each share (equivalent to 100 mm per ha) and dairying on lighter soils requires a minimum of 750 mm or 7.5 shares per ha. These shares are currently spread over a large area comprising

different farming types so the potential to access them is limited. Secondly, soil type is a limiting factor in with a natural tendency for dairying to utilise the lighter free draining soils around Te Pirita opposed to the heavier soils that are better suited to competing uses such as cropping and vegetable production. Thirdly, the level and areas of DDT residues in the soil are unknown.

145. In respect to arable farming, while the area under crop is not expected to increase greatly, the type and intensity of cropping will change. "Commodity" crops such as wheat and barley will most likely reduce and be retained more for crop rotational purposes, as it is very difficult for their irrigated production to compete economically with dry-land crops in the world grain market. More intensive crops will include small seed production, processed vegetable production and some market gardening and horticulture, especially on the smaller properties. Observers noted the importance of nearby processing and transport facilities in Christchurch as well as the large labour pool there in support of crop intensification.

146. Finally, it should be noted that with irrigation, the current trend to subdivide land for lifestyle blocks is likely to slow. However, without options for land-use change under irrigation further subdivision is highly likely in the command area, especially around Darfield and the other townships.

EFFECTS OF LAND USE CHANGE ON SOCIAL CHARACTERISTICS

147. Changes in land use can trigger a local perception that the population base of the district has 'exploded' through the commercial and employment opportunities offered by irrigation, when in fact the growth of the population has been more modest.[16] The growth in population of irrigated areas therefore becomes most significant when compared with the decline in population experienced in non-irrigated rural districts.

148. In the case of CPW, however, as I have pointed out there is already notable population growth in the command area. Therefore the effect of the Scheme over time is more likely to maintain this growth over the early years of the Scheme than to boost it further. This likely continuing growth is based on increased on-farm labour with dairying and other forms of crop intensification. Ongoing growth in population in the command area should continue for at least another 10 years after commissioning, with generally

[15] Harris et al (2006) confirm the importance of the economic benefit to these associated lands from the experience at Opuha.
[16] For instance, between1981 and 2001 the population of the Lower Waitaki area in North Otago increased by 15.4 per cent, compared with the overall New Zealand growth rate of 18.9 per cent.

positive implications for the vitality of the town of Darfield, small rural communities such as Hororata and Dunsandel, and social services.

149. The Scheme will bring more farmers, including farm managers and share farmers, and farm workers, into the command area. The number of dairy farmers and farm workers will increase noticeably in the command area to become the largest component of the overall farmers and farm worker group. An ongoing increase in the number of farmers and farm workers will maintain the agriculture sector as the main source of employment in the district, despite the continuing influence of lifestylers and part-time farmers.

150. Land use change will also impact on the age structure of the district's population.[17] Dairy farming families are often in their early to middle life cycle and sharemilkers frequently have young children, which suggests a period of demographic change with an increase in the proportion of the population aged 14 years and under and an increase in the working age group (15-64 years). While the average age of farmers will increase over time, it will remain well below the national average because of the continuing, annual influx of new farm workers and share milkers, and the proportion of working-aged people in the command area should remain relatively stable for at least 20 years.

151. As a consequence of increasing population and the proportion of people aged 0-14, declining school rolls are turned around with irrigation, and growing rolls are increased further, especially in the junior classes.[18] As I have noted, an increased school roll and staff numbers can revitalise a community, particularly where the school acts as a focus for educational, recreational and social activities and local identity. This effect is evident in Hororata school in particular, where at least 25 per cent of children are reported as coming from dairying families. Indeed, workers take schooling into account when making decisions about employment and some interview the schools before making a decision to take a job on a farm.

152. Community interviews raised a number of issues about effects on schools. An increased school roll increases staff numbers and funding and also the

[17] Experience in the Lower Waitaki and other areas suggests the number of farmers and farm workers under 30 years of age will increase with the further shift to dairying. In the Amuri area of North Canterbury, for example, Hunt (1998) found that there was an overall rise in the number of younger to mid-life males and that conversely in the same district there was a fall in the 60 years plus age cohort.

[18] Changes in rolls between 1996 and 2005 for the eight schools in the scheme area show that while Hororata (45 to 94), Sheffield (53 to 65), Kirwee (99 to 108), Darfield primary (181 to 246) and Darfield high (650 to729) ,have had increases in the number of their pupils, Dunsandel (131 to 106) and Springfield (37 to 30) have experienced declines. Furthermore, two other schools (Glenroy and Homebush) in the area closed during this ten year period.

opportunity and demand for specialised teaching. Schools will have to cope with a greater turnover of pupils, with more newcomer children, including overseas migrants, and a greater range of literacy and numeracy, with the increased mobility of farm workers causing disrupted learning for children moving from school to school. The dairy industry and schools need to work together to ensure schools help to attract necessary farm workers. In turn the schools benefit from a greater range of skills including business acumen, including people offering themselves for school boards of trustees.

153. Furthermore, a stabilised or even increasing population will have a positive impact on health services, sports and recreation facilities, and other social services, thereby strengthening rural communities.[19] An increased population is likely to continue to attract funding for Malvern health services including support for medical practices and also district nursing services. The facilities and services at Darfield Hospital would be better utilised by an expanded population.

154. More intensive uses of existing land will provide increased employment off-farm in the area of the proposed Scheme. While construction will have a positive short-term effect on the district, in the longer term additional sales for firms in Darfield, and other smaller townships, derived from increased productivity of the agricultural sector, are more important.[20] Cropping and dairying farms will require additional labour, and in the latter case many of the sharemilkers and other workers are likely to come from outside the district. There will also be some loss of employment, however, for shearers and other contractors who provide services to dryland livestock farms.

155. At present there are vet services at Dunsandel, Rakaia and Darfield. These practices are likely to become more specialised in the future. The transport firms will also get more business from dairying but mainly in fertiliser cartage, rather than stock (which is important for sheep/beef producers). With increased cropping, the transport firms will get more work carrying bulk products. Opportunities will be created for firms not directly linked to the agricultural sector (e.g. hospitality services, food stores, service stations and real estate firms) to generate additional

[19] See Taylor et al (2003)

[20] A study of the intra-regional expenditure of Canterbury farmers (Agriculture New Zealand Ltd, 2001) found that about half of overall farm expenditure (working, capital and personal) in Central Canterbury A study of the intra-regional expenditure of Canterbury farmers (Agriculture New Zealand Ltd, 2001) found that about half of overall farm expenditure (working, capital and personal) in Central Canterbury between the Waimakariri and Rakaia rivers and including Banks Peninsula.

turnover in both the construction and operational phases of the Scheme. The creation of jobs through the establishment of additional plants to process the expansion in farm production, will most probably take place around Darfield, or the new industrial areas near Rolleston for larger units. People attracted by employment opportunities in the area may choose to reside in Darfield and other rural townships.

156. Another issue is the capacity of the district to take full advantage of flow-on effects from the new land use activity and changes in population. When opportunities are created for a range of farm work and flow-on employment, workers, contractors and supplies may need to change their skills base to take advantage of these opportunities, or in some cases to survive where demands for previous occupations are reduced. There are already reported shortages of workers in dairying and amongst specialised services, for instance rural transport operators are reporting a loss of highly skilled drivers to the dairy fleet. Some local people may need appropriate training to benefit, for example in dairy farm work, irrigation maintenance and building.

157. Also, in districts such as Malvern where generational farming is a common practice, the process of farm succession provides continuity for farm families. Thus the introduction of irrigation to the district can challenge both traditional farming production systems and community stability as new land uses demand a different set of farming skills and frequently attract farmers with different occupational values and work schedules. On the other hand, as discussed, newcomers to the community may create additional demand for rural services such as primary schools and medical centres, adding to the viability of communities.

158. Districts undergoing irrigation development undergo considerable social change as ‘old’ families move out and are replaced by ‘new’ families. Potential social divisions are created as the first dairy families arrive from outside the district. Dairy farming is often viewed by other farmers as a lower status occupation than traditional sheep and beef farming. It has very different work patterns with a relatively high level of farm workers per farm. The continual migration of share milkers and dairy farm workers can also create feelings of dislocation among long-term residents of the district. In the CPW area many of these changes have already taken place and adaptions been made, with some local people making positive comments about the contribution of newcomers, while others voice disquiet about new values and conflicts of values.

159. The leadership role of long-standing families, who change their own skills base and upgrade their existing production to utilise irrigation, is critical during this interim period. They help to validate new land uses and maintain some sense of stability in the community, and are 'social anchors' for the emerging community.

160. While the average age of the community may become younger, the expectation that youth and enthusiasm will result in a higher rate of participation in community activities may not be fulfilled. The transient nature of sharemilking and dairy farm work means that some families take little part in community activities - often a cause of criticism from more established community members as discussed below.

161. Members of community organisations identified that they often struggle to find sufficient volunteers to ensure their activities continue at a sustainable level, despite the growing population in the area, suggesting newcomers do not always have the time or commitment to contribute. The volunteer fire brigade, sports clubs and so on are struggling for numbers. This problem is common in rural areas where since the agricultural reforms of the 1980s there have been greater demands on the time of farm women and men who formerly provided much of the voluntary labour for community organisations. Many of these people have more than one job. The increasing number of commuter, or lifestyle families, as well as dairy farming, in much of the area of the Scheme, has further restricted the activities of community organisations as these people often have a different sense of place from that of the older farming families.

162. While we heard the view that dairy farmers, sharemilkers and itinerant farm labourers are less likely to participate in community organisations than other people with agricultural occupations, this was countered by reports of increased participation by new families and rejuvenation stemming from new arrivals. To ensure the proposed Scheme enhances social and economic wellbeing, CPW should work with business and employment organisations and agencies, and social service providers, in Selwyn District and Christchurch City, to discuss ways that the economic and social benefits of irrigation and land-use change can be enhanced for the District, and anticipate any social or community issues in a proactive way. In particular, it is necessary to ensure economic development (including employment) agencies and rural supply firms and services, training organisations and schools are fully appraised of the timing and sequencing of the project, likely workforce numbers and other relevant

data. Accurate data on land use and the number of dairy farms should be made available. Incoming workers and families should receive community information including information on opportunities to participate.

COMMUNITY LIAISON MECHANISM

163. CPW has adopted a process of adaptive management and EMS for the Central Plains Scheme. This involves the iterative and progressive identification of potential effects, possible mitigations, refinement of the project concept and design, and the development of project implementation and effects management plans. Since prediction of effects cannot be perfect, especially in a complex and broad scale project such as this, there is no certainty of all of the proposed mitigations being effective in a given situation.

164. Therefore a mechanism is required for ongoing community liaison and stakeholder input throughout the planning and design phase, as well as during the construction and operation of the Scheme. Social monitoring will provide the necessary 'learning' information (or feedback) on the performance of the management plans. CPW should establish a social monitoring programme as part of the broader programme of project effects monitoring. The purpose of the monitoring should be to identify emerging social changes and potential issues for health and well being over the course of the construction and early Scheme operation. This monitoring should be aligned with other project monitoring and encompass use of local knowledge, a complaints recording system, and a response system. The parameters and resourcing of this monitoring should be developed in association with a Community Liaison Committee. Together, monitoring and active community liaison will assist in arriving at effects management plans, mitigation actions, and project management that reflects the needs of the various stakeholders.

165. In order to reduce uncertainty and fear about the potential impacts of the project during the planning, approvals and implementation phases, and ensure that community consultation is effective, CPW should provide summary information sheets, newsletters, and/or briefings to local residents and communities about changes in the design of the Scheme, the potential impacts, and the company's detailed proposals to avoid, mitigate and manage these impacts.

166. For the period of the construction and early operations of the project, CPW should appoint and resource an in-house community and environment liaison officer. And prior to the construction commencing, CPW should establish a Scheme Community Liaison Committee with input from relevant groups and agencies. This Committee should include:

(a) community representatives from among the residents of Hororata, Coalgate/Glentunnel, the Waianiwaniwa Valley, Sheffield, and Darfield;

(b) a community/economic development officer from the Selwyn District Council;

(c) a community health representative;

(d) recreational representatives;

(e) Scheme shareholder representatives; and

(f) the CPW community and environment liaison officer.

The purpose in establishing the Community Liaison Committee would be to create a forum for discussing and dealing with social issues arising from the Scheme construction and operation, and to distribute information. CPW should provide the Liaison Committee with funding for its administration and operation, including information sheets and a Scheme community newsletter.

CONCLUSIONS

167. The CPW Scheme should bring substantial long-term benefits to people and communities of the Scheme area and beyond through land use intensification, changes in farming systems, agricultural services and downstream processing of agricultural products. However, a lot of the social change that might be expected to come with land use intensification has already taken place through recent dairy development in the area. The social changes in the Scheme area, therefore, may not be as substantial as some anticipate. There will also be wider social benefits from the reduction in groundwater use that will occur due to the Scheme's provision of an alternative source of irrigation water.

168. The construction of the Scheme will give a short-term boost to the Canterbury economy. Those who gain employment on the Scheme's

construction, who are mostly expected to come from the Christchurch Urban Area, will particularly benefit.

169. The social and economic benefits of the Scheme and its construction will be offset, however, by short and long-term negative impacts on particular groups. These include significant loss of farmland, homes and property by many of the residents of the Waianiwaniwa Valley, along with a major change in the local community, which will cause considerable social and psychological disruption. Those who remain will have a very different living environment and some will experience the ongoing inconvenience and cost of having to travel further to access service centres and community facilities. There will be significant, but short term disruption to the lives of those living close to the dam and canal construction and alongside major haul roads. Possible reduction of recreational amenity in the Waimakariri River to those whose recreation depends on high and variable flows is a concern. There is an ongoing perceived threat or fear of dam failure, especially for residents of Coalgate, and increased risk of drownings and road accidents in the wider community. Reduced visual and landscape amenity will affect those living in close proximity to the dam, canals, and other major Scheme structures.

170. Those who will gain economically from the project are, for the most part, not the same people who stand to suffer significant negative social effects, generating a sense of social injustice. The long-term consequences could be an increasing economic difference between the Scheme beneficiaries and the rest of the community, with a degree of community polarisation, social conflict, and loss of social cohesion to overcome.

171. The likelihood and intensity of the effects of the Scheme's construction and operation on people and communities, and the overall level of enhanced social well being achieved given the Scheme's benefits and costs, will depend on CPW developing and implementing appropriate management plans, monitoring and mitigation, and codes of practice - with community consultation and input from relevant agencies.

Nick Taylor

Figure 1 Affected residences, Waianiwaniwa Valley