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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EVIDENCE IN REPLY
MARK MABIN

AUGUST 2008

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Qualifications and experience

1. My full name is Mark Charles Grace Mabin, and the basis on which I am preparing this brief is set out in my previous evidence for this hearing.

Scope of Evidence

2. I have prepared this evidence to address matters raised by the Commissioners, and in the supplementary Officer reports.

3. The topics I address are:

   3.1 Area of land irrigated and likely to be irrigated by the CPWES

   3.2 Results of CPWES shareholder survey

4. I have previously discussed issues related to irrigation areas in supplementary evidence presented in response to Commissioners' Minute No. 4. This evidence in reply updates that previous supplementary evidence.

5. A survey of CWPES shareholders was carried out in order to refine estimates of currently irrigated land, and to assess well reliability issues.

6. In preparing this evidence I have relied upon data obtained from the ECan Consents Database, and the ECan web GIS at: http://www.ecan.govt.nz/ECanMapping/viewer.htm

7. I have also relied on analyses of the ECan Consents Database and CWPES shareholder survey data provided to me by Mr S. Douglass of URS New Zealand.

CURRENTLY IRRIGATED LAND IN THE CPWES COMMAND AREA

8. Issues relating to the area of irrigated land within the CWPES command area have been raised by the Commissioners. I have previously given a preliminary interpretation of the available data in my supplementary evidence in response to Commissioners' Minute # 4. Mr Fietje has also addressed these matters in his Supplementary Report at paragraphs 62 to 70. He is largely in agreement with the figures I provided in my supplementary evidence.

9. The data I presented at that time was preliminary in that we were still clarifying our understanding of the ECan consents database, and were also processing returns from a survey of CPWES shareholders. This work is complete, and I now present a final version of our estimates. As you will see,

it is very similar to estimates derived independently by ECan staff as reported by Mr Fietje. In addition, there are only small changes from the information I previously presented.

10. In order to estimate the area of land currently irrigated within the CWPES command area I have worked through the following questions:

    10.1 What is the area of land within the scheme boundary?

    10.2 What are the current land uses within this area?

    10.3 How much of this land is potentially irrigable?

    10.4 How much land is owned by CPWES shareholders, and how much of this land is potentially irrigable?

    10.5 How much land is currently irrigated, and from what source (surface or ground water)?

    10.6 How reliable is groundwater as a source of water for irrigation?

11. While these questions can be clearly stated, in most cases developing reliable answers is not a simple exercise. Possible approaches to answering these questions include:

    11.1 Accessing databases such as:

        (i) ECan Web GIS

        (ii) ECan consents database

        (iii) Agribase and LCDB2 database (Agriquality)

    11.2 Survey landowners

    11.3 Map from suitable aerial photography or satellite imagery

    11.4 Field survey

    Each approach has its advantages and disadvantages. I have undertaken elements of approaches 11.1(i), 11.1(ii) and 11.2.

CPWES Command area and Existing Land Use

12. The total CPWES area is relatively simple to determine from GIS databases. Taking the area of all land parcels inside the Scheme boundary, the total area of land is 101,408 ha.

13. The bulk of this land is rural farmland. The proportion of other landuses has been estimated from interrogating the ECan web GIS system. This has a land parcels layer that identifies each land parcel, its area, and land use. The land use data is derived from the Ratings Valuations Database and it shows landuse in two codes as follows:

13.1 *Category Code.* This alpha character consists of up to four characters that identify amongst other things, the highest/best or most probable land use (for example: arable, dairying, pastoral, horticultural, lifestyle, forestry).

13.2 *Land Use Code.* This numeric character consists of two numerals that identify the current dominant land use on the land parcel (for example: primary industry, utility services, industrial, commercial, residential).

A report was supplied by ECan that gives a breakdown of the meaning of each of these alphanumeric codes. From this farmland could be differentiated from other land use types as shown in Table 1.

Table 1: Land Uses in the CPWES Command Area

	AREA (ha)	%
Farming	*78,631*	*77.5%*
Lifestyle rural	2,136	2.1%
Lifestyle residential	5,234	5.2%
Lifestyle total	*7,370*	*7.3%*
Rural un classified	*542*	*0.5%*
TOTAL FARMLAND	*86,543*	*85.3%*
ADJUSTED TOTAL FARMLAND AREA*	**90,000**	**89 %**
Rivers	7,218	7.1%
Roads	2,072	2.0%
Residential	442	0.4%
Utilities	42	0.0%
Industrial	40	0.0%
Transport	10	0.0%
Recreation, Reserves, etc	361	0.4%
Commercial	11	0.0%
Vacant	298	0.3%
TOTAL NON-FARMLAND	*10,495*	*10.3%*
ADJUSTED TOTAL NON-FARMLAND AREA*	**11,400**	**11%**
Unclassified		
<1 ha	28	
1 - 4.9 ha	149	
5 - 9.9 ha	57	
>10 ha	3,900	
TOTAL UNCLASSIFIED	*4,369*	*4.3%*
TOTAL	**101,408**	**100.0%**

* Assumes all unclassified land parcels 5 ha or larger are farmland.

14. The accuracy of these estimates depends upon the validity of the land use data collected for the Ratings Valuation Database. We have not made an assessment of this.

Irrigable Land Area

15. I will now address estimates of the area of land potentially irrigable, and the land area currently irrigated. Summary data is presented in Table 2.

16. Not all of the farmland will be irrigable due to land occupied by lanes, shelter belts, sheds, houses, water races etc. Mr Macfarlane estimates these landuses will occupy about 10 % of the farm land area. Thus, the total potentially irrigable land in the Scheme area is calculated to be 90,000 – 9000 = 81,000 ha.

CPWES Shareholders' land

17. CPWES shareholders own 65,574 ha within the scheme area. This has been compiled from the list of Scheme shareholders that own land within the Scheme boundary as identified on the Selwyn District Council rate payer database. Assuming 10 % of this area is non-irrigable, there are 59,017 ha of potentially irrigable land owned by CPWES Shareholders. This is very close to the 60,000 ha estimate that has been used in evidence by CPWES.

Currently irrigated land

18. The area of land currently irrigated has been estimated from the ECan consents database. However, it should be noted that this database cannot be directly interrogated to give an answer to the question: "How much land is irrigated?" It is necessary to interpret the database information in order to arrive at an estimate of how much land is irrigated, and it is quite possible to arrive at different answers to this question.

19. ECan's estimate of the area of land currently irrigated is: 48,716 ha, comprising 39,828 ha irrigated from groundwater and 8,888 ha from surface water.

20. URS have taken much the same data, and including all consent applications that are currently being considered or reviewed, we estimate that the area of land now irrigated, or likely to be irrigated in the near future is 45,732 ha comprising 39,712 ha irrigated from groundwater and 6,020 ha from surface water.

21. The only substantive difference between the ECan and URS estimates relates to the area irrigated by surface water consents, where ECan estimates some 2,868 ha more than URS. This arises from a small number of consents that URS considers should not be counted as they are either double-ups with groundwater consents, do not have priority over CPWES, or are outside the scheme area. Taking into account these 2,673 ha, the difference between the ECan and URS surface water take irrigation areas is only 195 ha, and the difference between the URS and ECan total irrigated areas is only 160 ha.

22. We therefore conclude there is effectively no difference between the ECan and URS estimates of the area of land currently irrigated or likely to be irrigated in the near future. This data is summarised in Table 2.

Table 2: Irrigated land area in CPWES command area

	CPWES Shareholders	Non-CWPES Shareholders	Total (URS estimate)	Total (ECan estimate)
Total farmland	65,574	24,426	~90,000	
Total irrigable farmland	59,017	21,983	~81,000	
ECan consents database				
Groundwater consents	26,316	13,396	39,712	39,828
Surface water consents	2,420	3,600	6,020	8,888
Total	28,736	16,596	45,732	48,716
Shareholder survey				
Water take consents	21,539 + 6,600			
Total	28,139			

23. These data in Table 2 derived from the ECan database should be treated as indications of the potential maximum area of irrigated land and the actual area is likely to be less. This arises from such factors as the nature of the consent data which is as recorded at the time the application was granted and reflects projected well performance and land area to be irrigated. The land area to be irrigated may be the total farm area, rather than the actual area of land to be irrigated within the farm. It does not take into account how reliable the well is, or whether the full well pumping capacity was installed or the full land used for irrigation in each year.

SURVEY OF CPWES SHAREHOLDERS

24. CPWES Shareholders were surveyed by The Field Connection Ltd in July 2008. The survey was of those CPWES shareholders (141 out of a total of 356 shareholders) who owned resource consents to take groundwater or surface water within the Scheme area. The questionnaire sought information on:

    - Area of land owned;
    - Irrigated land area;
    - Present land use;
    - Consent data;
    - Well performance/reliability; and
    - Intention whether or not to access Scheme water.

25. Of the 141 owners of water take consents, replies were received from 128 who represented 103 individuals or companies who owned the consents. Of these 103 owners, 84 owned one resource consent, 17 owned two consents, one owned three consents, and one owned seven consents.

26. From our interpretation of the ECan database, we estimated that CPWES shareholders would own 28,736 ha of currently irrigated land (26,316 ha from groundwater and 2,420 ha from surface water).

27. The survey returns that we were able to match with known consent data (101 of the 103 total) showed 21,539 ha irrigated by shareholders. A further 6,600 ha of irrigation land was also reported, however these could not be unequivocally associated with particular consents, but if included would bring the total area irrigated by CWPES shareholders to 28,139, which is close to the total area we estimated from the ECan database. The survey did not ask shareholders to differentiate between their surface and groundwater consents.

Well Performance

28. An important issue for groundwater users is the reliability or performance of their well, and this can not be determined from the ECan consents database. Reliability will be a significant constraint on the amount of irrigated land estimated from the ECan database.

29. The shareholder survey asked three questions about well performance as follows:

29.1 Has your irrigation system been affected by a reduction in well performance over the last two years? 61/103 (59%) answered YES

29.2 Have declining water levels in your well affected the well's yield over the past two years? 52/103 (50%) answered YES

29.3 Has your well run dry in the past two years, or had water levels that triggered the pump cut-off level? 49/103 (48%) answered YES.

30. This data is shown in Table 3.

Table 3: CWPES Shareholder Well Performance

	Number (% of returns)	**Area affected** (% shareholder groundwater irrigation area)
Reduced well performance	61 (59 %)	14,833 ha (69 %)
Declining groundwater levels	52 (50 %)	12,482 ha (58 %)
Well run dry or pump cut-out triggered	49 (48 %)	11,073 ha (51 %)
Resulting in:		
Reduced rate of take or reduced irrigation area	28 (27 %)	7,361 ha (34 %)
Lowered pump/new well	4 (4 %)	719 ha
Lost irrigation days	23 (22 %)	~49 days per season

31. These data shows the significant proportion of CPWES Shareholders who have experienced reliability problems with their groundwater irrigation supply, and the significant area of land affected by these issues.

32. If these survey results were to be treated as a sample of all groundwater irrigation users in the Scheme area, there is likely to be ~27,400 ha of currently irrigated land that is affected by poorly performing wells.

Shareholders' Intentions to Use CPWES Water

33. The survey asked CPWES Shareholders whether they intended to use the water purchased by their shareholdings. The responses were:

- 99 (96 %) indicated their intention was to take up scheme water;
- 2 (2 %) indicated they would not take up scheme water; and
- 2 (2 %) indicated they did not know.

34. Those that answered yes were further asked to identify whether their decision was based on one or more of three possible reasons as follows (respondents

were asked to identify all reasons that influenced their decision, hence the total percentages sum to more than 100 %):

34.1 Cheaper cost of delivering scheme water than pumped groundwater: 86 % indicated yes;

34.2 Scheme water being more reliable than existing groundwater: 72 % indicated yes; and

34.3 Capacity of groundwater supply insufficient to meet needs: 81 % indicated yes.

Two shareholders indicated these three reasons would not influence their decision to take scheme water.

M.C.G. Mabin
29th August 2008