



RMCG

MAY 2018

**Greater Shepparton City Council
Review Panel: Solar Farm Permit
Applications**

**Planning Permit Application No:
2017-162, 2017-274, 2017-301 and
2017-344**

Expert Witness Report by Rob Rendell

“agricultural economic impacts”

**For Holding Redlich,
acting for Greater Shepparton Council**

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1 Introduction

- Name and address: Rob Rendell, 135 Mollison Street, Bendigo, Victoria 3550
- Contact details: Phone 0354414821, Mobile 0428 510642, email robr@rmcg.com.au
- The expert's qualifications: B. Eng. (Ag), CPAg
- Experience: A copy of Rob Rendell's CV is attached as Appendix 1.
- A statement identifying the expert's area of expertise to make the report:

Most of Rob Rendell's working life has involved working with irrigation farms and irrigation supply organisations in Northern Victoria. Rob has extensive experience working with individual irrigation farmers in regard to improving farm performance and dealing with a wide variety of farm irrigation-farm related issues. This work has included engagements for farmers in irrigated horticulture, mixed farming and irrigated dairy production. Rob has also worked with farmer-organisations, Water supply authorities and local government throughout Northern Victoria in relation to water supply and irrigated agriculture, particularly in and around Shepparton, Victoria. Rob recently was a lead author in RMCG' *"Basin Plan - GMID socio-economic impact assessment for the GMID Water Leadership Forum (2017)."*

- This report has been prepared by myself with administrative assistance from George Warne and Pamela Mawson within RMCG.
- The instructions for this report are outlined in the attached letter (Appendix 2) from Holding Redlich who are acting for the Greater Shepparton City Council. The instructions refer to a Review Panel Hearing where:

Greater Shepparton City Council was the Responsible Authority for the following planning permit applications proposing solar farms in Greater Shepparton (Planning Permit Applications). The Minister for Planning is now the decision maker and has established a Review Panel which will make recommendations to the Minister as to whether a planning permit should issue for each application:

(i) 2017-162

- (A) Subject Land: 610 Ferguson Road, Tatura East
- (B) Proponent: CleanGen (2017-162)

(ii) 2017-274

- (A) Subject Land: 235 Victoria Road, Tallygaroopna
- (B) Proponent: X-Elio Australia Pty Ltd 2017- 274 and 2017-344

(iii) 2017-301

- (A) Subject Land: 1190 and 1220 Cosgrove Lemnos Road, 260 Tank Corner East Road, 875 Boundary Road and 85 Crooked Lane, Lemnos
- (B) Proponent: Neoen Australia Pty Ltd 2017-301

(iv) 2017-344

- (A) Subject Land: 1090 Lemnos North Road, Congupna
- (B) Proponent: X-Elio Australia Pty Ltd

The specific request from Holding Redlich was:

We seek your opinion on the following matters:

(a) Describe the agricultural quality of each site

(b) Describe the surrounding land uses to the sites

(c) For each site, describe whether the site is strategically identified for agriculture in a state or local policy or strategy.

(d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.

(e) Define the agricultural economic impact region for the sites, describe the cumulative agricultural economic contribution of the sites to that region, and describe the agricultural economic loss if the sites are used for solar farms.

(f) Describe the irrigation channels and their service catchment.

(g) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

In providing your opinion, you should refer to any relevant studies. You must also undertake a site inspection.

- My expert opinion specifically addresses the Panel directions item 27b, which says:

27. The Panel would be particularly interested in:

b. regarding net community benefit:

i. the economic value of agriculture within a defined catchment

ii. how the loss of agricultural land resulting from all four developments would impact the catchment's economy

- I note that the Council assessment of the objection to the proposals include the following issues which relate to my report:
 - Loss of productive agricultural land upon which the solar farm will be constructed
 - Conflict between adjoining agricultural activities and the operation of the solar farm (e.g. setback from property boundaries, creation of a micro climate as a result of the solar farm), which may also lead to a loss of agricultural production on the adjoining land
- The key issue I have considered is the direct loss of productive agricultural land. Where I have relevant expertise, I have briefly commented on the conflict between adjoining agricultural activities and the operation of the solar farm.
- I also note that there are a number of conditions proposed and where relevant to my expertise I have made brief comment.
- There have been no tests or experiments upon which I have relied for the preparation of this report.

2 Summary of my opinion

I have formed the following opinion:

- a) The relevant economic value of different agricultural enterprises in the region is best seen by comparing gross income per ha, i.e.:

ENTERPRISE	INCOME \$/HA	RELATIVE INCOME
Horticulture	20,000 – 70,000	25 – 90
Dairy	6,000 – 8,000	7 – 10
Irrigated summer cropping maize/lucerne	4,000 – 5,000	5 – 6
Irrigated winter cropping/grazing	1,500 – 2,500	2 – 3
Dryland cropping/grazing	800	1

This demonstrates that dairy and horticulture enterprises are the most critical activities that determine regional income. Irrigated summer cropping maize/Lucerne is also important but is often an adjunct to dairying. Dryland agriculture contribution to the regional agriculture is much less important on land area utilisation basis.

- b) The four sites are currently used for low value agriculture, i.e. irrigated beef cattle grazing, irrigated winter cropping and dryland cropping and grazing. The current contribution to the regional agricultural production of the 4 sites is therefore proportionally relatively small compared to the dairy and horticulture properties in the region.
- c) The potential for high value agricultural production depends primarily on the soil types found on each of the four sites which varies considerably as follows:
- Horticulture
 - i. Tatura (94.5ha) has a mix of “good” soils for “all” horticulture and “good” soils for “some” horticulture (class 2 & 3)
 - ii. Tallygaroopna (95.9ha) has a mix of “fair/good” soils and “fair” soils for some horticulture (class 4)
 - iii. Congupna (160ha) has all fair soils “fair” soils for some horticulture (class 4)
 - iv. Lemnos (482 ha) has a mix of mainly class 4 & 5 soils with a small section of 2 & 3, i.e. most is generally not well suited to horticulture but there is a small area of good soils for horticulture.
 - Dairy
 - i. Only one property (Lemnos) is of sufficient scale to be considered for a dairy
 - ii. The other properties could only be an adjunct to a dairy farm

Therefore, theoretically the 4 sites could increase their agricultural production, particularly the Tatura (horticulture) and Lemnos (dairy) sites but also half of the Tallygaroopna (some limited horticulture) site.

- d) The existing irrigation infrastructure can be described as:
- i. Two properties (Tatura and Tallygaroopna) being of good condition suitable for mixed grazing/cropping
 - ii. One half of the large property (Lemnos) being of excellent condition for mixed cropping/grazing/dairying
 - iii. One property (Congupna) and remainder of large property (Lemnos) having no irrigation infrastructure

None of the properties have irrigation infrastructure that would be applicable if horticulture was adopted.

Generally, irrigation infrastructure has a useful life of 20-30years before replacement, thus the conversion to Solar farms would effectively shorten the current infrastructure life.

- e) The properties lie within three economic catchments, i.e.:
- i. Local Shepparton/Mooroopna/Tatura region which correlates generally to the Shepparton and Central Goulburn Irrigation districts which comprise 250,000ha using nearly 400,000ML per annum on approx. 100,000ha leaving 150,000 dryland which mostly has access to irrigation water supply system. A mix of horticulture, dairy, mixed irrigation, and dryland agriculture is practised within the region. The land area of horticulture in this region (including Cobram) has been around 11,000ha since the year 2,000 and is unlikely to increase significantly in the near future. The value of Horticulture in the region has been increasing as the industry has changed from canning fruit to fresh fruit. Dairy production has decreased by around 1/3 since the year 2,000.
 - ii. The GMID irrigation area which comprises the irrigation supply system covering over 800,000ha using 1,250,000ML on approximately 1/3 of the land, i.e. 300,000ha. The irrigated area has declined over the last 20 years from 500,000ha and using 2,000,000ML. The water use within the GMID is now reduced to about 60% from 20 years ago and is likely to further reduce. The reduction has occurred primarily in the dairy and mixed irrigation industry, whereas horticulture has slightly increased its water use. The current modernisation program still provides water supply to the majority of the 500,000ha and thus there is a large area (over 200,000ha) of irrigable land which is dryland. The total gross value of agricultural production in the area is approx. \$2.1billion comprising roughly 1/3 for each of dairy, horticulture and dryland.
 - iii. The Southern Murray Darling Basin region (includes GMID, Riverland SA, Sunraysia NSW/Vic, Murray Irrigation NSW and Murrumbidgee Irrigation NSW) is critical to the Shepparton region as water can be traded practically anywhere within these regions. As the available water typically varies from 3,300GL to 5,300GL in any one year, there is a mix of enterprises that have managed to develop throughout the region. Because of trade and buyback associated with the Basin Plan the amount of water used overall has reduced significantly and has affected GMID more than most. Despite this some regions have either maintained (Riverland SA) or increased their water use, e.g. almonds in Sunraysia. Some areas have been able to offset the reduction, e.g. Murrumbidgee has converted rice to higher value cotton.
- f) The Hume Regional Growth Plan – clause 11.12-5 has identified an area of “strategic agricultural land” which includes the Shepparton Irrigation and the Central Goulburn irrigation districts which the four sites reside. However, the productivity of the land classified as “strategic” is very much a function of the soil type and depends upon the availability of water for irrigation.
- g) The Campaspe, Greater Shepparton and Moira Regional Land use Strategy – final report October 2008 prepared by Parsons Brinckerhoff in association with RMCG provides considerable background information on agricultural land use and identified “the importance of securing the region’s long term water sources (that, in itself, relies on securing the agricultural base)”. Since that report, the available water in the region has nearly halved which means that considerable land previously irrigated is now dryland. The report also mapped the land suitable for irrigation which indicates a large area of suitable soils for high value agriculture, many of which are not now irrigated.
- h) Water not land is limiting production in the region and will continue to do so into the future. Both within the local region, the GMID and within the wider southern Basin, there is plenty of land for all of the potential enterprises including horticulture and dairy. If the sites were to become solar panels then the water that is required for these sites to reach their maximum potential agricultural production, would still be available for use within the region as it currently is. Therefore, the actual loss of agricultural production is not either the current production levels or the potential irrigated agricultural production levels. Rather the loss is limited to the equivalent value of dryland production.

- i) The loss of agricultural production is therefore considered to be equivalent to 832.4ha of dryland production producing \$800/ha of gross income. This is approx. \$666,000 of gross farm income annually. This typically would require up to 2 labor units. This represents about 0.55% of the dryland area in the Shepparton and Central Goulburn dryland areas.
- j) The 4 sites all lie within the modernised GMW irrigation supply and drainage system. This system covers a larger area that is required for the water available and currently has significant areas of dryland mixed with irrigated lands. The critical factor for maximising the use of this system is maintaining water within the region as this determines the total land area irrigated. The removal of land for solar farms is not the determinant of how much land or water is used for irrigation in the region.
- k) In terms of setbacks and impacts on surrounding agriculture and my expertise I note that:
- i. I know of no potential impact of the proposed solar farm operation on adjoining grazing or rural residential properties that would require additional controls beyond the fencing controls listed.
 - ii. Any evaluation of the change in micro-climate that may or may not occur as a result of the solar farms should consider that:
 - Pasture/crop production is practised across the GMID with relatively similar productivity per ML despite there being a considerable range in temperatures and seasonal conditions
 - Existing changes in land use (e.g. dryland with bare cultivated soils in summer, irrigated pasture and tree crops) all produce currently a wide range of micro-climate conditions which are not considered unacceptable to adjoining landholders.
 - iii. I do not have any expertise in considering the impact of changes in micro climate on adjoining horticulture properties nor of any potential insect impact.

3 General discussion regarding irrigated agriculture in the region

In order to assess the economic value of agriculture within a defined catchment and how the loss of agricultural land would impact the catchments economy I have prepared some general discussion in which to frame my response.

The majority of the information in this chapter is based upon various pieces of work that RMCG have undertaken over many years in the region. The most relevant documents are “Basin Plan – GMID socio-economic impact assessment” October 2016, a more recent RMCG update of that report, a summary of which is included as Appendix 3, and an older report – “The Campaspe, Greater Shepparton and Moira Regional Land use Strategy – final report” October 2008 prepared by Parsons Brinckerhoff in association with RMCG

3.1 GEOGRAPHICAL LOCATION AND RAINFALL

FOUR PROPERTIES ARE IN THE GMID

The four properties (610 Ferguson Road Tatura- East, 235 Victoria Road Tallygaroopna, 1190, Cosgrove-Lemnos Road, Lemnos and 1090, Lemnos Road, Congupna) are all located within the Greater Shepparton Council area and are all connected via earthen channels and drainage canals to the irrigation supply and farm-drainage systems operated by Goulburn Murray Water (a Victorian Government Corporation). The gravity supply scheme servicing the four properties is within the greater Goulburn Murray irrigation District (The GMID).

The Goulburn-Murray Irrigation District (GMID) system is the largest irrigation system in Victoria and is within the Southern Connected Murray Darling Basin (sMDB). It covers 9,950 square kilometres and accounts for more than 70 per cent of water stored in Victoria and almost 90 per cent of water used in irrigation across the State. The four properties discussed in this report are all within the Shepparton and Central Goulburn Irrigation Areas, two of the six gravity-supplied administrative areas within the GMID that lie between Shepparton and Swan Hill in Victoria

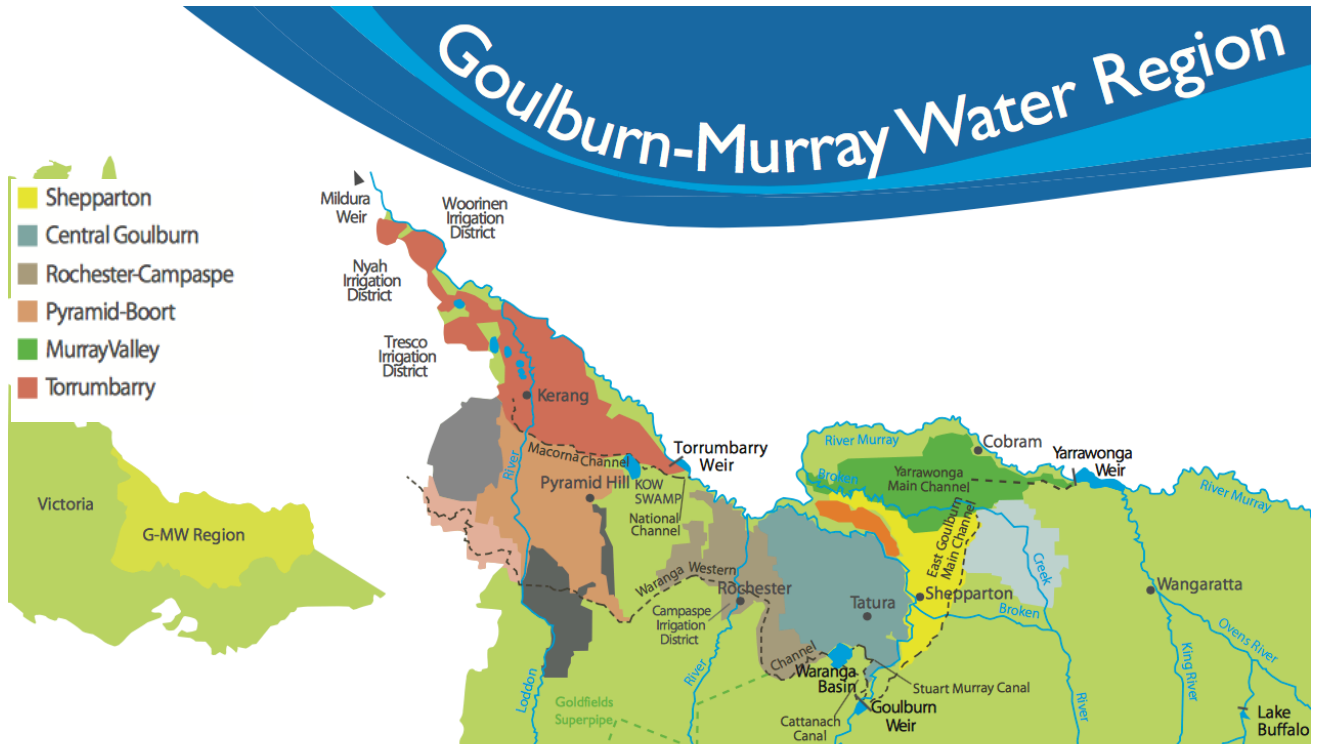


Figure 3-1: Irrigation areas in the GMID

GMID OPERATES WITHIN THE SOUTHERN CATCHMENT OF THE MURRAY DARLING BASIN

The GMID is one of the irrigation areas within the Southern Catchment of the Murray Darling Basin as shown below.



Figure 3-2: Irrigation districts in the Southern Murray Darling Basin (Complexia) showing key irrigation areas in SA, Victoria and NSW

Irrigation water supplied and distributed throughout the sMDB is able to be transferred within and outside irrigation districts. Water is increasingly traded between farms, districts and states enabling irrigators from Shepparton, Griffith (NSW), Deniliquin (NSW), Mildura and Berri (SA) to trade water entitlements and allocations with each other to meet the long term, annual and immediate needs of their irrigated farms. The viability and success of an irrigation farm at Shepparton is no longer linked to the allocation to an individual property, or even the whole irrigation district- but rather to a competitive market from all water-users throughout the Connected Southern Murray Darling basin.

THE REGION'S RAINFALL

The four properties are all located within 30km of Shepparton. The Commonwealth BOM records indicate the annual average rainfall in Shepparton is 441.6mm (Tatura 477mm). This rainfall suits dry land grazing and rain-fed cropping but is severely deficient for sustaining irrigated horticulture, intensive feed production (dairy-pasture) and other intensive agriculture supported by supplementary irrigation.

3.2 IRRIGATION WATER AVAILABILITY

WATER WAS ALLOCATED TO LAND

When irrigation was introduced to the GMID entitlements were granted to properties within the designated irrigation area. The water was allocated to specific parts of the land. This tied to irrigated production to the land and continued up until the 1990s.

WATER TRADING REDUCED THE WATER USED IN GMID

The advent of water trading in the 1990s has reduced the area of irrigated agriculture and production in the GMID as more and more farmers from outside the district and even irrigators interstate have developed irrigation enterprises and secured water entitlements and annual allocations from entitlement owners within the GMID. The wine industry boom around the turn of the century and the more recent cotton and almond industry expansions have driven much of the water trade.

THE BASIN PLAN AND WATER RECOVERY

Since 2000, State and Federal Governments have instigated a number of programs of 'water recovery' in order to increase water available to restore environmental flows. These programs have included the direct purchase of irrigation-water entitlements from irrigation-farmers and co-investment in water savings initiatives designed to return water to governments and to maintain on-farm irrigation performance (with less water). The largest of these programs has been the Murray Darling Basin Plan which has now recovered more than 2000GL or approximately 20% of all water entitlements previously held by irrigators throughout the Murray Darling Basin (more than 80% from the sMDB). The proportion of water entitlement recovery from the GMID now exceeds 30% of the total number of water entitlements available and exclusively held by irrigators in the GMID and Shepparton irrigation-region prior to 2005.

CHANGING WATER USE BY SECTOR OVER TIME

The RMCG October 2016 report which I co-authored examined the changing water use within the southern basin and is shown in Figure 3-3.



Figure 3-3: Water use by sector over time across Southern Connected Basin

THE AVAILABLE WATER AND DEMAND

The total available water within the Southern Connected Basin varies considerably with climate scenarios as shown in the table below for the last 12 years.

CLIMATE SCENARIOS, WATER ALLOCATION AND USE AND PRICE - POST 2006

Climate Scenario	Allocation level	Frequency (last 12 yrs)	Total water allocated (GL)*		Price (\$/ML)		Comment
			Actual	projected	Actual	projected	
Very Wet 10/11, 11/12, 12/13	Victorian Low security water available, 100% NSW GS	3	6,200	5,300	20-50	50	Carryover increased
Wet 13/14,16/17	90% NSW General Security	2	5,400	5,000	65	70	Rice expands
Average 14/15,17/18	55% NSW General Security	2	4,300	4,000	125	130	Rice sits on allocation
Dry 09/10,15/16	30% NSW General Security	2	3,500	3,300	150-208	210	Small rice crop as it sells to dairy/cotton
Drought 06/07, 07/08, 08/09	10% NSW GS, 80% NSW HS, and 50% Vic/SA high security	3	2,100	1,700	300-680	600	Horticulture minimises and cotton/dairy sell mostly, rice fails

The "actual" refers to what happened in those particular years, whereas the "projected" refers to what would happen if those years were repeated today.

A NEW EQUILIBRIUM

The SCB is subject to considerable variation in in-flows and water availability between years, with peaks above 5,300 GL/yr and lows of 2,000GL/yr. As a result, high-value horticulture cannot establish a monopoly position, as it relies on a highly secure supply and so is constrained to a scale defined by the total volume available in dry or drought seasons. A rich mix of irrigated sectors has therefore become established, with the available water in any year shared between the sectors dependent on their willingness-to-pay and their ability to accept an insecure water product. This creates a complex dynamic equilibrium between users depending on the climate scenario. Water use within the GMID acts within this dynamic equilibrium.

THE ESTIMATED ENTERPRISE WATER USE WITHIN THIS EQUILIBRIUM

Horticulture (excluding almonds) has continued to slowly increase its water use over the last 50 years from 600GL in 1970 to around 800GL in 15/16 and is likely to continue to slowly increase to 900GL in the foreseeable future.

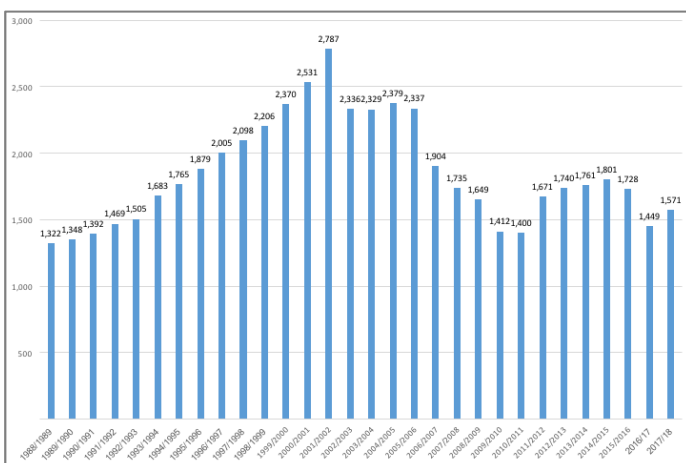
Almonds water use has increased from almost nothing in year 2,000 to over 400GL in 15/16 and is predicted to increase to use over 600GL in the foreseeable future. However ultimately there is a limit to the potential expansion of almonds and this limit will be tested in the next major drought when on current trends, there will only be just sufficient water available for horticulture and almonds.

Since the year 2010, Cotton has replaced some rice use in the Murrumbidgee region and currently uses 450GL which is expected to increase to up to 700GL in the foreseeable future.

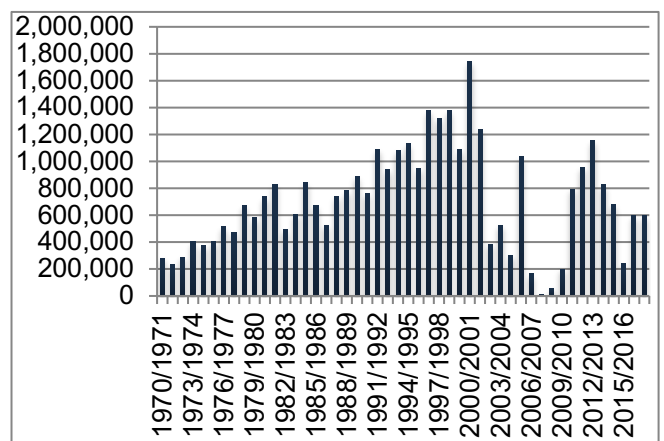
Dairy on the other hand has reduced its production (and hence water use) as shown in the graph for GMID attached. Dairy is estimated to use 1000GL currently in the southern basin but is expected to reduce to 900GL on average in the foreseeable future as horticulture/almonds continues its expansion.

Rice production increased dramatically prior to 2,000 reaching over 1.4mill tonnes. However in recent times the production has halved and now varies according to the climate scenario and allocations and is ranging from 0.2mill tonnes to 1mill tonnes. This is shown in the attached graph. Rice water use now averages 650GL but ranges from 250GL to 1000GL per year. Rice has become the ultimate “flex” crop in terms of water use and will decline further as cotton expands.

Dairy production in the GMID (ML)



SMDB Rice production over time (tonnes) - source Rice-Growers



WATER USE IN THE GMID

Water use in the GMID typically consisted of 3,000GL diversions (with 850GL of losses) in the 1990s and now comprises diversions of 1550GL (with 300GL of losses), i.e. almost a halving of the water diverted into the region. An analysis of water use at the basin scale and by industry since the year 2,000, confirms that of the major irrigated industries found in the GMID that:

- The irrigated grazing and cropping industry has halved its water use in GMID and the SCB
- The dairy industry has nearly halved its water use (80% of the irrigated dairy in the SCB is within the GMID)
- Horticulture in the GMID has continued to grow steadily from 90GL to 130GL and may grow to 140GL in the foreseeable future. This represents about 10% of the water use.

WATER USE WITHIN THE GMID DISTRICTS

The relative water use within the GMID is shown in the table below. This indicates that the Shepparton and the Central Goulburn districts uses about 1/3 of the GMID total water use.

Area	2015/16	2016/17
Shepparton	107,942	85,338
Central Goulburn	278,443	213,175
Rochester	150,514	109,136
Pyramid-Boort	154,543	111,917
Murray Valley	193,616	168,160
Torrumbarry	246,261	220,217
Total	1,131,319	907,941

TRADING OF ENTITLEMENTS FROM THE GMID

A report by Tim Cummins and associates in 2016 highlighted the change in water ownership by irrigators within the GMID had fallen by 40% since June 2001. Although water entitlement ownership does not reflect water usage (as irrigators can purchase and trade-in water), the statistic certainly confirms that the amount of water allocated to irrigation property-owners within the GMID has fallen dramatically.

Table 3-1: Change in water ownership (Tim Cummins & Associates, 2016)

Water owner	Location	High-reliability water share volume (GL)		% change	
		30 June 2001	30 June 2015		
Irrigator	LMW diverters	203	216	6%	
	LMW districts	189	125	-34%	
	GMW diverters	243	164	-32%	
	GMW districts	Torrumbarry	378	234	-38%
		Loddon Valley	230	124	-46%
		Rochester/Campaspe	208	113	-46%
		Central Goulburn	391	237	-39%
	Shepparton	181	117	-35%	
	Murray Valley	259	167	-35%	
	GMID Subtotal	1,648	992	-40%	
Not tied to land	0	175	N/A		
Water corporation	Not tied to land	0	62	N/A	
Environment	Not tied to land	0	605	N/A	
TOTAL		2,283	2,338	2%	

3.3 AREA OF IRRIGATED LAND

WATER NOT LAND LIMITS PRODUCTION

Although the agricultural production of the GMID since its initial development more than 100 years ago has been based on irrigated agriculture, the factor limiting production has not been availability of farmland, but irrigation water availability. Even in the 1980s and 1990s when water use in the GMID was at its maximum, there was still insufficient water to fully irrigate all of the land available. In the late 1990s 500,000 Ha was irrigated with around 2,150GL of water or approx. 4ML/ha on average. A fully irrigated perennial pasture or fruit tree crop would typically use 6-10ML/ha per annum. Thus, within the so called irrigated region of the GMID there was, and still is considerable dryland agriculture.

GMID'S IRRIGATED LAND AREA HAS REDUCED

The 2006/07 Goulburn-Murray Water Plan confirms that more than 500,000 Ha within the GMID was irrigated in an average irrigation season. Based on the water sold out of the region, The April 2013 GMW *Blueprint* confirmed this area irrigated on an average season, had reduced to 300,000ha being irrigated, leaving more than 200,000ha typically *able to irrigate* without irrigation water, leading to a large increase in the area of dry-land (rainfall-only) or non-irrigated agriculture throughout the region.

LAND USE WITHIN THE GMID

In 2017 the Victorian Government published a report: *Regional Irrigated Land and Water Use Mapping in the Goulburn Murray Irrigation District, Technical Report* which provides a table of land-use within the total GMID including the Shepparton Irrigation Region (a sub-area within the GMID). This table, combined with an understanding of water availability for irrigation, provides useful context when assessing the agricultural potential of the four properties. The table confirms the continuing dominance of the dairy industry to the Shepparton area (363 farms in the Shepparton Irrigation Area directly engaged in dairy farming and more than 60,000 Ha devoted to dairy and dairy related pasture production.)

Table 3-2: Land use across the water service areas in the GMID

Categories	Murray Valley		Shepparton		Central Goulburn		Rochester		Torrumbarry		Pyramid-Boort		Totals	
	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)	Properties (Number)	Area (ha)
Properties with dairy	264	26,169	103	8,049	363	37,493	155	19,758	204	26,690	53	8,561	1,142	126,720
Associated with dairy	152	12,365	81	3,678	220	11,454	97	7,774	152	11,473	63	7,201	765	53,945
Dairy cattle agistment/fodder	153	11,137	44	3,250	238	14,243	199	13,637	115	11,448	10	1,138	759	54,853
Perennial horticulture	136	4,672	227	6,482	179	5,460	9	981	389	7,086	8	4,448	948	29,129
Annual horticulture	8	794	12	283	28	2,203	25	3,501	37	1,139	5	2,120	115	10,040
Cropping	198	21,607	271	19,792	508	45,845	397	38,118	412	39,154	540	97,258	2,326	261,774
Mixed	76	4,856	292	21,561	471	35,451	201	20,000	505	23,638	95	12,610	1,640	118,116
Grazing non-dairy	456	40,540	99	6,901	113	7,578	47	3,955	418	48,197	132	26,719	1,265	133,890
Intensive animal	2	52	1	74	21	978	6	160	17	2,110	9	1,936	56	5,310
Horses	14	761	31	1,855	42	1,821	8	245	1	8	6	647	102	5,337
Lifestyle	379	5,690	645	5,755	1,454	11,014	734	4,198	760	2,835	140	776	4,112	30,268
Totals	1,838	128,643	1,806	77,680	3,637	173,540	1,878	112,327	3,010	173,778	1,061	163,414	13,230	829,382

What is not shown in the above table is the actual area irrigated. The average application rate for irrigated land I understand has remained at around 4ML/ha, and thus given an annual water use of around 1250GL then it is estimated that the area irrigated is around 300,000ha or 1/3 of the land. This means that there is around 500,000ha of dryland, a 200,000ha increase since the year 2,000.

LAND USE WITHIN SHEPPARTON AND CENTRAL GOULBURN AREAS

Assuming a water use of around 110,000ML for Shepparton and 280,000ML for Central Goulburn then the irrigated area for each district is approx. 27,000ha and 70,000ha respectively or 35-40% of the land. This leaves approx. 150,000ha of dryland in the combined districts.

The horticulture land use in the Goulburn Valley region (including Cobram) has remained steady at around 11,000ha.

RURAL LIFESTYLE AND HOBBY FARMERS ARE INCREASING

One of the consequences of reduction in water use combined with increasing property scale within agriculture has been the corresponding increase in rural lifestyle and hobby farmers within the GMID. When properties sell their water they usually have houses and other infrastructure which is invariably kept and used for rural lifestyle. The land associated is often insufficient to enable a viable dryland farm. The table above identifies over 4,000 lifestyle properties covering 30,000ha.

CONCLUSION ON AVAILABLE LAND

During this period of a reduction in irrigated land, the area of land serviced with an irrigation supply and drainage network has remained largely unchanged. The available water to irrigators in the GMID, and in the Shepparton and Central Goulburn districts has irreversibly declined. In short, the area of land able to utilise irrigation-water is now far greater than the water availability in almost every season-type throughout the GMID, including within the Shepparton and Central Goulburn Irrigation areas.

Even if Horticulture in the Shepparton region grows, the volume of water available for irrigation, not the available land will be the limiting factor.

Therefore, if any or all of these properties were not available for irrigation purposes, i.e. used as a solar farm then the total irrigated production in either the Shepparton/Central Goulburn district, the GMID or even the southern Connected Basin, would not change as any available water would readily find alternative land

3.4 IRRIGATION INFRASTRUCTURE ACCESS

The GMID is an irrigation and drainage channel network providing irrigation supply and drainage services through a supply system throughout the Shepparton and Central Goulburn Irrigation areas, almost exclusively utilising earthen channels to transport water. Since 2007, a \$2bn program of works known as *The Connections Project* has progressively upgraded the supply system to enable a high service standard for users.

Based on the location of each of the four properties I am satisfied that each property can access good quality irrigation water supply, and surface drainage services from GMW.

Irrigation and drainage service access is not a limiting factor for any of these properties.

The modernised system has maintained a similar area of land serviced today as what occurred 20 years ago despite water deliveries and irrigation areas declining by 60%. Therefore, there is sufficient service land available for any

new developments across the GMID. Thus, the removal of these four properties from agriculture will have no consequence to the systems operations.

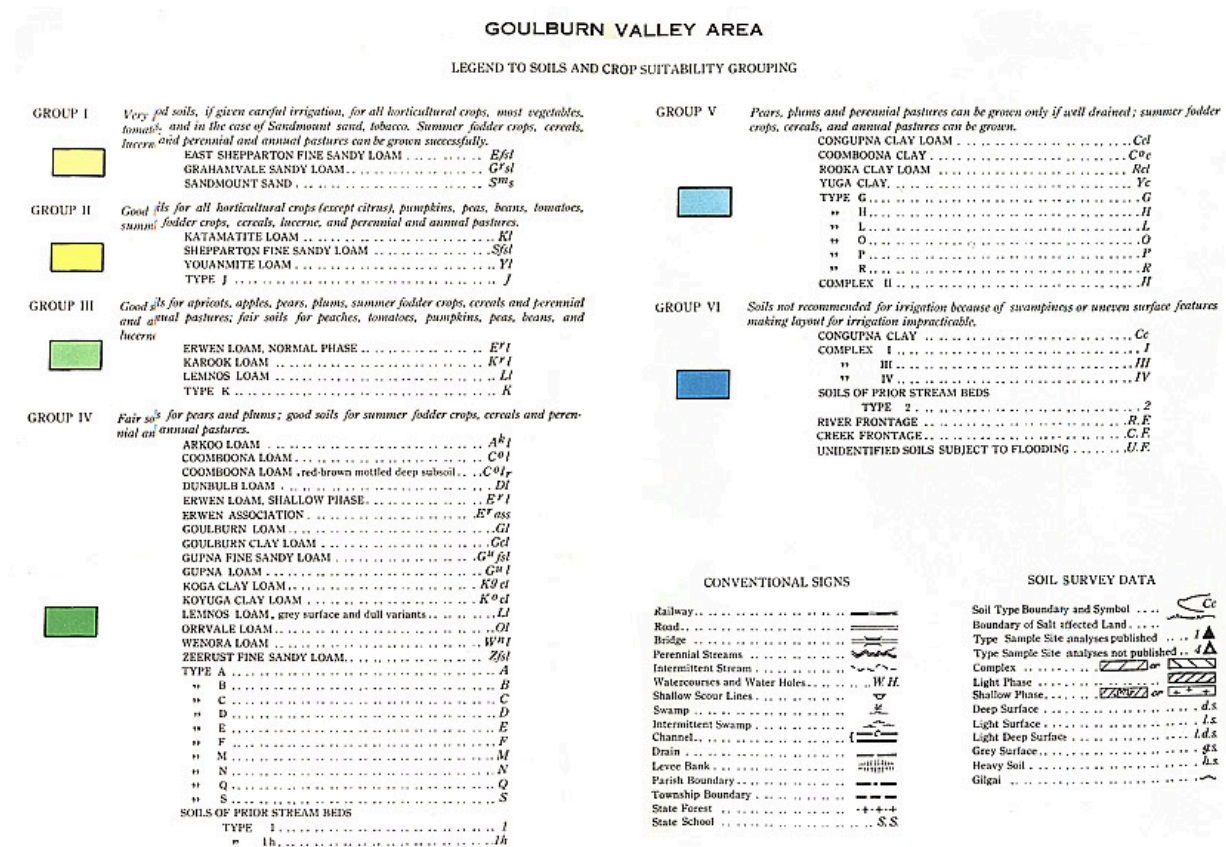
3.5 SOIL TYPES

Although it is clear that irrigation water availability is the key driver of achieving maximum agricultural production from these properties soils also dictate what land use is possible- without dramatic and expensive soil conditioning and land-forming.

Soil-type is key to establishing the highest value irrigated and dry-land agriculture possible on a property assuming water is available for crops - either as rainfall, or as is usually the case in the Shepparton area - through application of significant volumes of irrigation water.

Soils within the region have been well mapped and these maps were originally produced as a hard copy, i.e. "Soils and Land Use in Part of the Goulburn Valley, Victoria' Department of Agriculture in 1962 by J.K.M. Skene and T.J. Poutsma".

In more recent times these maps have been digitised and are available on line. A key part of the mapping is the classification into 6 groups varying from **very good soils** 'suitable' for all irrigated horticulture as well as successful irrigation of cereals, pasture summer fodder-crops, through to **good soils, fair to good, fair, only if well drained soils** and finally to 'not recommended for irrigation'.



In simple terms the productive potential of the soils follows the group suitability classifications with group 1 being the most productive.

As such horticulture in the region is concentrated on group 1 and 2 soils with some group 3 soils.

Dairying and irrigated cropping is most productive on group 1,2 and 3 soils and reasonable production on group 4 soils. Sometimes group 5 is utilised but rarely is group 6 used for productive irrigated agriculture.

The soils on the four properties vary significantly and each sites soil capability is considered individually.

3.6 FARM BUSINESS ECONOMIC RETURNS

The potential economic returns from different forms of agriculture are shown in the table below. These returns are based upon RMCG's wide experience of agricultural production and the yield and price assumptions are shown.

CROP	PRICE	YIELD	ML/HA	GROSS INCOME	
				\$/HA	\$/ML
Apples	\$1.60/kg packed	45t/ha	6	\$72,000	\$12,000
Canning Pears	\$400/t	44t/ha	6	\$17,600	\$3,000
Almonds	\$8.50	3t/ha	13	\$25,500	\$2,000
Dairy	0.40c/l	7,000l/cow, 2.5cows/ha	6	\$7,000	\$1100
Cotton	\$550/bale	12b/ha	9	\$6,600	\$730
Maize	\$300/t	15t/ha	7	\$4,500	\$640
Rice	\$400t/ha	12t/ha	13	\$4,800	\$370
Winter cropping	\$230/t	8t/ha	3 plus winter rain	\$1,800	\$300
Irrigated livestock	\$100/dse	20dse/ha	3 plus winter rain	\$2,000	\$330
Dryland cropping	\$230/t	4t/ha	na	\$900	na
Dryland grazing	\$100/dse	10dse/ha	na	\$1,000	na

3.7 FARM SCALE

In order to be a viable agriculture business that can generate sufficient income to provide a minimum of one full time job for its owner/employee, the business requires sufficient scale. Scale can generally be measured in \$ of gross farm turnover where \$500,000 I consider a reasonable minimum. For different industries a turnover of \$500,000 requires 200 dairy cows utilising 100ha, or 1,000ML of water use on a mixed irrigation farm of 300ha, or as little as 10-25ha for high value horticulture yielding \$20,000-70,000/ha. Dryland agriculture requires even more land area per business of around 700ha and this enables them to produce at least 2,000 tonnes of grain or to graze 7,000dse.

Whilst minimum scale requirements are a value judgement, the above numbers give some relativity to land area requirements in the main agricultural enterprises of the region. There are many smaller properties which supplement income with off farm activities and there are many large properties that employ people.

3.8 ROADS, ELECTRICITY SUPPLY AND OTHER SERVICES

Based on property inspections, each of the four properties has access to mains electricity supply, bitumen roads to at least one boundary, landline telephone network and (based on my phone reception) high quality 3G or 4G mobile phone coverage from at least one supplier (Telstra).

3.9 ECONOMIC VALUE OF AGRICULTURE WITHIN THE DEFINED CATCHMENT

3.9.1 THREE LEVELS OF CATCHMENT

The defined catchment for the four properties can be thought of in three levels, i.e.:

1. Shepparton Council level which includes the irrigation districts of Central Goulburn (Tatura East Property) and the Shepparton District (comprises the other 3 properties)
2. GMID level as the irrigation district operates as one system from Shepparton/Cobram in the East to Boort/Kerang in the west.
3. The Southern Connected Irrigated Section of the Murray Darling Basin which extends primarily from Griffith in the North from Shepparton in the East to Mildura/Riverland in the west.

3.9.2 SHEPPARTON DISTRICT AND CENTRAL GOULBURN

The value of agriculture is primarily related to the volume of water used for irrigation in the districts and also to the proportion used for each of the main enterprises, i.e. mixed grazing/cropping, dairy and horticulture. The dryland area also contributes to the value of production but does so purely because that is the dominant land use in the district. In the GMID dryland contributes about one third of the total agricultural production but it is considered to be a lower proportion in the Shepparton and Central Goulburn district because of the higher proportion of high value horticulture.

Based upon water use these two districts account for about 1/3 of the water use and probably about 40% of the value of agricultural production in the wider GMID region.

3.9.3 GMID

The value of irrigated agriculture within the GMID is described in “Understanding Water Availability Farm/Food Processor Viability in the GMID – Phase 1 understanding the issues – Final Report” (December 2016, RMCG for GMW, Goulburn Broken CMA and North Central CMA) as follows:

The Goulburn–Murray region is the country’s largest irrigation district. It produces more of Australia’s fruit and dairy produce than any other region, as well as significant general horticulture and mixed farming. Irrigated agriculture generates an estimated \$1.4 billion. There is also additional production from unirrigated land in the region.

Total agricultural production including dryland is expected to be \$2.1 billion, which is 18% of the States GVAP of \$11.6 billion in 2012/13 (ABARES 2015). The food processing industry in the Goulburn–Murray region is a major Victorian employer and its main exporter. There are sixteen dairy factories in the Region.

Table 3-3: Estimated GMID contemporary and, water and GVIAP by industry 1^[1]

INDUSTRY & GVIAP/ML	% IRRIGATED LAND AREA	HA	% WATER USE	GL WATER USE	% GVIAP	GMID GVIAP \$ VALUE
Horticulture ² [2] \$5,603/ML	5%	21,000	7%	92	36%	\$514 M -\$800M with packing
Mixed crops \$480/ML	15%	59,000	10%	141	5%	\$68 M
Mixed non-dairy pastures \$345/ML	18%	72,000	12%	171	4%	\$59 M
Estimated rural residential \$345/ML	8%	31,000	5%	73	2%	\$25 M
Dairy \$802/ML	53%	208,000	66%	935	53%	\$749 M
Total irrigated	100%	391,000	100%	1,412	100%	\$1,415 M

The area serviced by the GMID system for irrigation is much larger and was reported to be 561,927ha on 803,771ha of properties by GMW in the irrigated farm census of 1997. (GMW 1988). This suggests that 30% of the area laid out for irrigation in 1997 is now not irrigated.

Whilst the above estimate of the value of production is now 6 years old, the order of magnitude is still considered relevant because in recent times whilst the value of production per ML have increased slightly, the number of ML utilised has correspondingly declined. It is my opinion that the above table is a reasonable representation of the value of irrigated agriculture in the region.

3.9.4 THE SOUTHERN CATCHMENT OF THE MURRAY DARLING BASIN

This catchment is considered relevant to the region because the total water use within this catchment is fixed as discussed earlier. Any change in water use within the Shepparton region will only occur within this wider production catchment. It is noted that the water use in the Shepparton catchment district (Shepparton and Central Goulburn districts) of around 300,000 ML per annum represents about 7% of the average water use in the Southern Catchment of the Murray Darling Basin.

3.10 STATE LOCAL POLICIES OR STRATEGIES

There are two policies or strategies which specifically refer to the agricultural land use upon which the 4 sites all reside within. These are discussed in the following.

¹[1] Based on ABS 2012/13 \$/ML & ML/ha and 2012 to 2015 water availability

²[2] Includes perennial and annual horticultural crops. Annual crops include tomatoes and vegetables and are estimated to generate \$120 M using 20 GL on 4,000 ha or \$6,000/ML GVIAP. (Processing tomatoes approx. 2,000 ha, 10 GL and generates \$20 M/y).

3.10.1 HUME REGIONAL GROWTH PLAN – 11.12

In the state Planning Policy Framework – clause 11-12 HUME there is an objective 11.12.1 A diversified economy with several strategies including

- *Avoid encroachment from rural residential settlement and other land uses that are non- complementary to agriculture in areas identified as strategic agricultural land and direct proposals for settlement to existing centres and townships.*
- *Support agricultural production through the protection and enhancement of infrastructure and strategic resources such as water and agricultural land, including areas of strategic agricultural land.*
- *Create renewable energy hubs that support co-location of industries to maximise resource use efficiency and minimise waste generation.*

Clause 11.12-5 Hume regional Growth Plan includes a map which categorises all of the land within the Shepparton and Central Goulburn Irrigation districts as “strategic agricultural land”.

As previously indicated the productive capability of the land so classified depends upon the specific soil type and its suitability for high value agriculture and whether there is sufficient available water for irrigation.

It is my belief that there is only sufficient water to irrigate about half of the serviced land and thus the remaining strategic agricultural land can only be used for dryland agriculture.

3.10.2 REGIONAL LAND USE STRATEGY 2008

A very thorough analysis of the regional land use was undertaken in 2008 and reported in “The Campaspe, Greater Shepparton and Moira Regional Land use Strategy – final report” October 2008 prepared by Parsons Brinckerhoff in association with RMCG.

This study objectives of the project were to:

- *Develop a common vision, role and purpose for rural land to apply to each Council and Municipality.*
- *Investigate opportunities, constraints and options for diversifying land uses in the rural areas in suitable locations to support high value rural industries, intensive agricultural production, accommodate tourism demands and other appropriate uses which are compatible with the primary purpose of the rural areas.*
- *Investigate and identify sub-regions in each of the three Municipalities that require different strategies to support and promote appropriate and sustainable agricultural enterprises.*
- *Investigate options and develop strategies for those areas where water is no longer available.*
- *Develop a common set of policies and zone provisions that prevent the fragmentation of agricultural land as appropriate to the sub-regions.*

The study established a number of principles for the subdivision of land and land use zoning.

The study provided a map of land suitability which is reproduced below.

These soil capabilities are based upon the same soil mapping referred to in my report Section 3.5.

The study was undertaken well before the full impact of the Murray Darling Basin Plan’s water recovery program had been fully implemented. Now with the benefit of hindsight it is clear that there is more than sufficient soils of all soil groupings to utilise the available water.

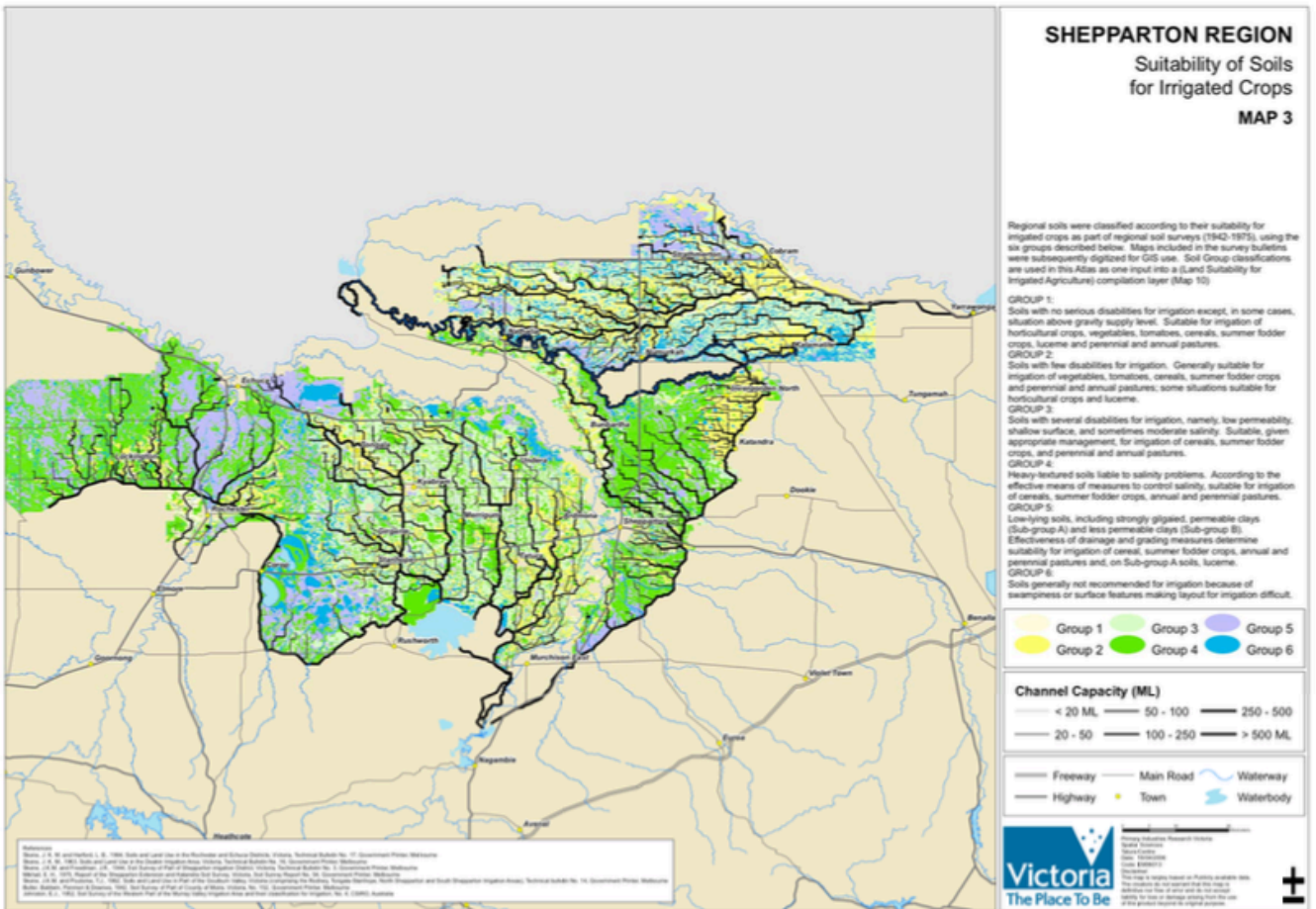


Figure AD-1 Land suitability for irrigation (Goulburn Murray Water 2006)

4 Individual property analysis

I provide the following information and opinions in relation to the specific questions regarding the agricultural potential, surrounding land uses and other factors for each property.

I undertook site visits of each property on two occasions (13/4/18 and 19/4/18) where I inspected the properties from the road boundaries.

For each property analysis I have included the site map as provided by the project proponents and I have also provided a copy of Google map which shows the current layout of the property. These maps conform with what I observed on my site visits.

4.1 610 FERGUSON ROAD, TATURA EAST (2017-162)

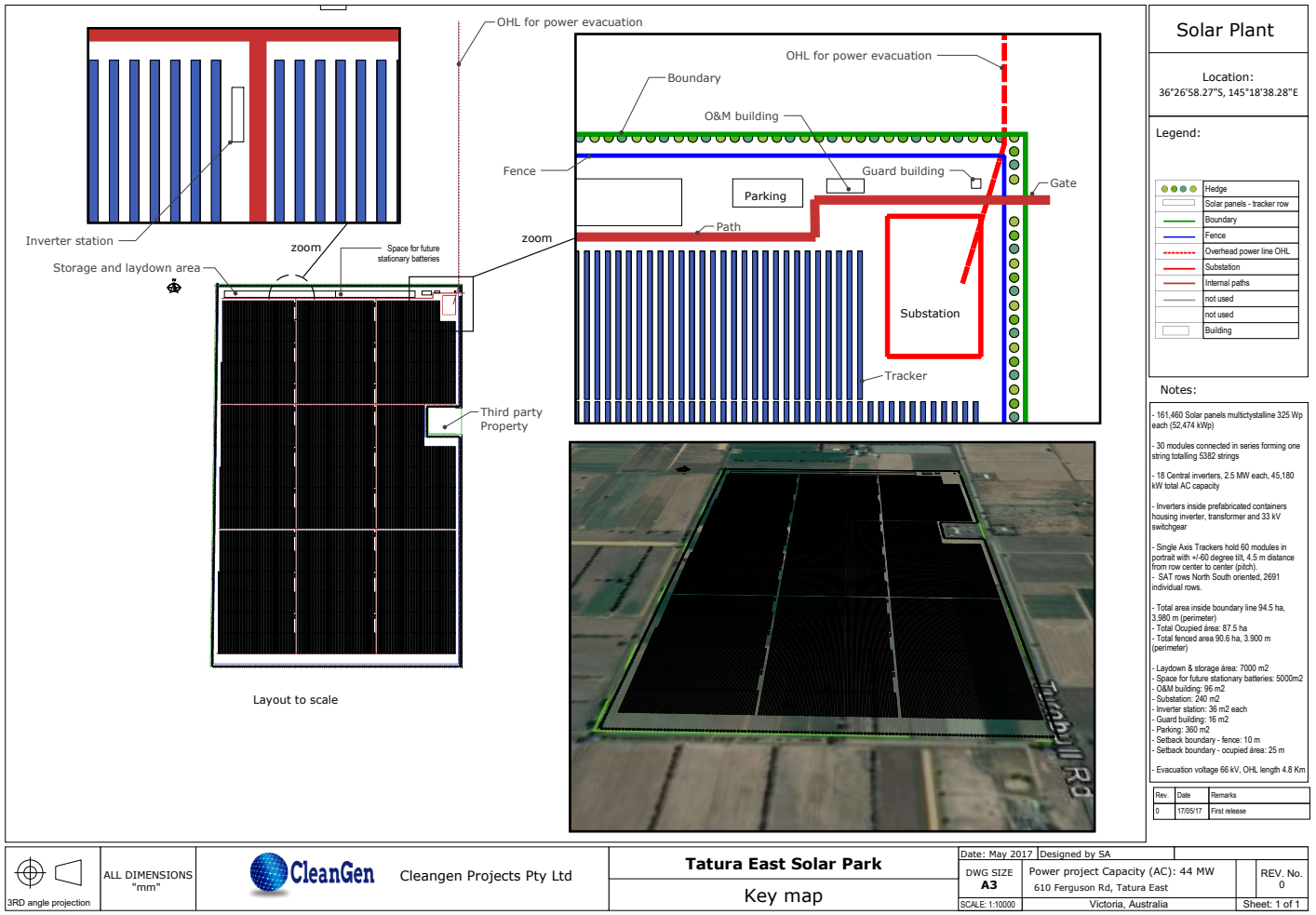


Figure 4-1: Project proponents map and schematic

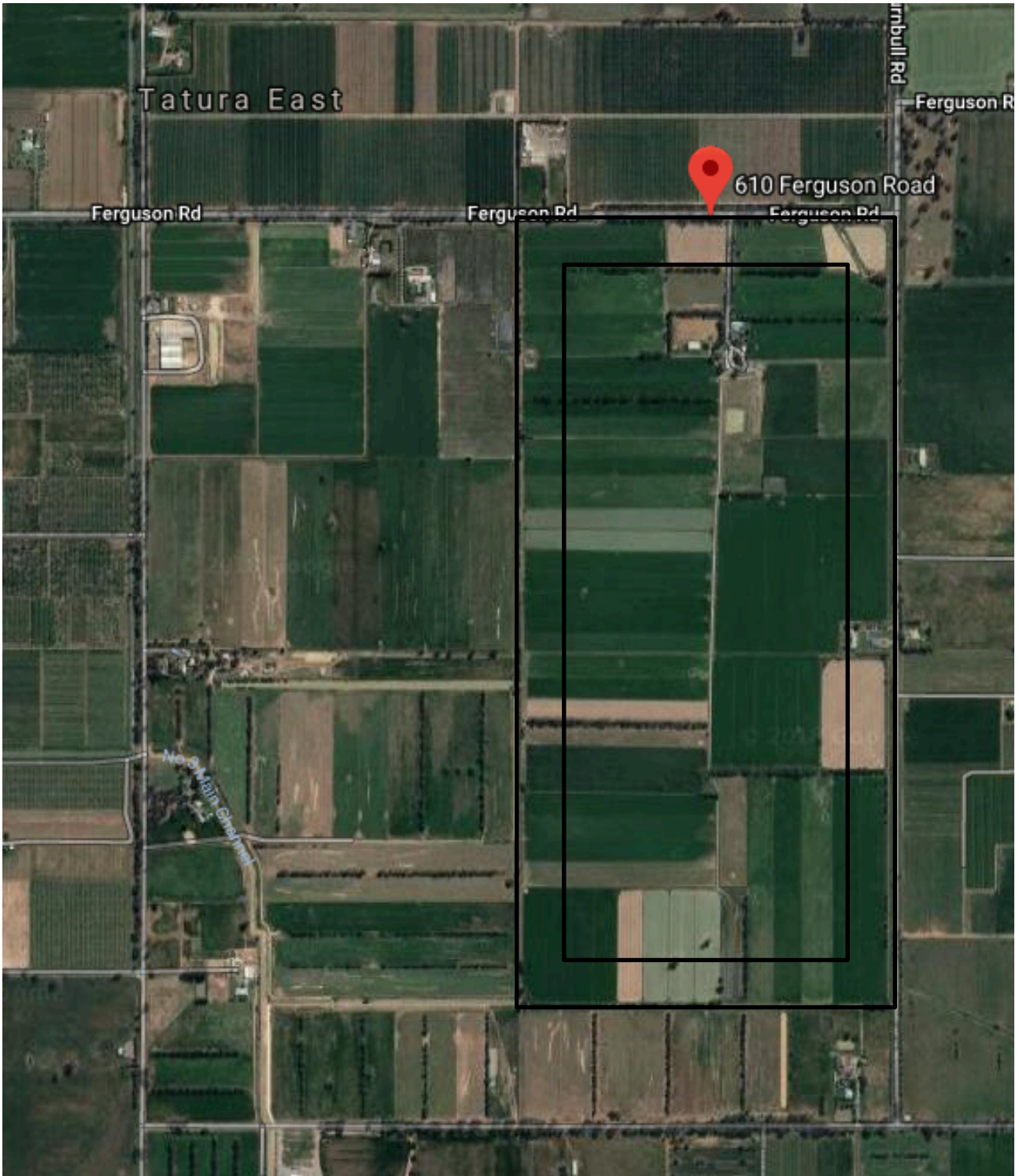


Figure 4-2: Google Maps, 610 Ferguson Road, Tatura East

a) Describe the agricultural quality of each site.

My key observations regarding the agricultural quality of the site are:

- During my visit, I was advised (by a person who said he was the son of the owners) that the property has been a productive dairy farm of approximately 200 cows but has been retired from dairy production for the last 3-4 years. The dairy shed is no longer an operating dairy as most of the machinery has been removed.

- The site is a well laid-out rectangular 94.5ha irrigation property with irrigated pastures potentially covering more than 90% of the area.
- The irrigation layout is typical of a dairy farm of the last 20 years. It did not have automatic irrigation or modern “fast flow” capabilities but would be considered a good functioning layout.
- The property currently is used for beef production.
- The property is outside identified areas subject to a flood overlay in DELWP’s Planning Property Report. The property does have a small area in the north-east corner which is subject to “inundation overlay schedule” (LSIO).
- The site is well served by the GMW Irrigation and drainage systems and has excellent access to water for irrigation.
- The soils are shown in the soil map extract below.
- The soils comprise:
 - a) Yellow coded – Shepparton fines Sandy soils – Group 2 soil
 - b) Light green coded – Lemnos Loam – Group 3 soil
 - c) Dark green coded – Goulburn Loam – Group 4 soil
 - d) Light Blue coded – Congupna Clay loam – Group 5 soil
- Horticulture suitability: The site is mostly group 2 and 3 soils which are classified as ranging from good soils for all horticulture to good soils for some horticulture. The group 4 soils are not considered suitable for horticulture.
- Pasture cropping suitability: The site is considered to have soils well suited for most crops and pasture.

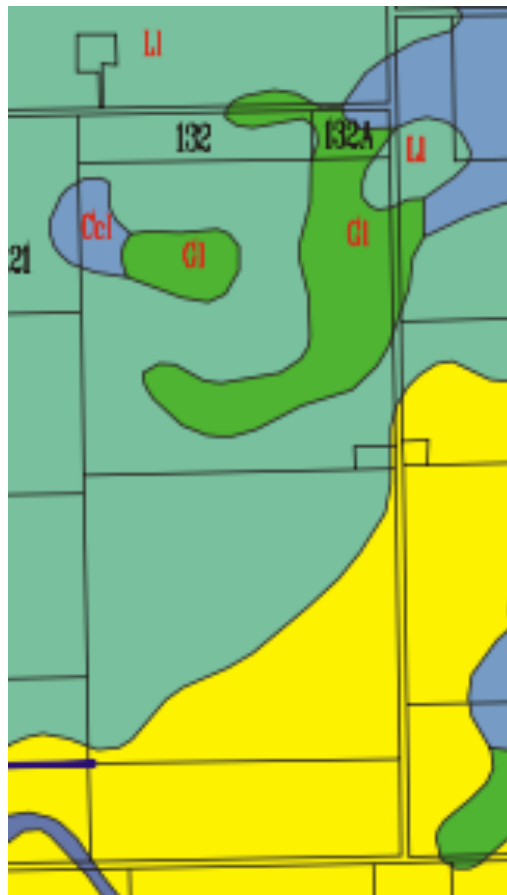


Figure 4-3: Extract of Map 71, Goulburn Valley Soil Map (Skene & Poutsma, 1962), 610 Ferguson Road, Tatura East

- The property is well sized for a part time mixed grazing operation. The current irrigation infrastructure, fencing and buildings would be appropriate for the next 10-20 years before needing upgrade or replacement.
- It is also well sized and suitable for a horticulture development. However, the current irrigation infrastructure, fencing etc. would all become obsolete.
- The property is considered relatively small for some agricultural activities, i.e. it is too small for a viable dryland property, a mixed farming property and also too small for a dairy farm of the future.

b) Describe the surrounding land uses to the sites.

The surrounding land use comprises a mix of uses including:

- Horticulture properties (apples) to the north and to the South East of the property
- Several rural residential properties nearby
- Some irrigated mixed grazing properties to the south and to the west of the site

It is noted that given the surrounding uses, the property is most likely to have the potential for either:

- Remaining as a part time grazing property, or
- Becoming part of one of the surrounding horticulture developments. If this occurred there would be some potential economies of scale materialised from this use.

c) For each site, describe whether the site is strategically identified for agriculture in a state or local policy or strategy.

- The site is within the Goulburn Murray Irrigation District and is serviced by Goulburn Murray water.
- The property is outside identified areas subject to a flood overlay in DELWP's Planning Property Report. The property does have a small area in the north-east corner which is subject to "inundation overlay schedule" (LSIO).
- The property is zoned FZ1 (Farming) and is outside the boundaries nominated for other current *Strategic Projects* outlined on the Greater Shepparton reference Page on 27th April 2018.

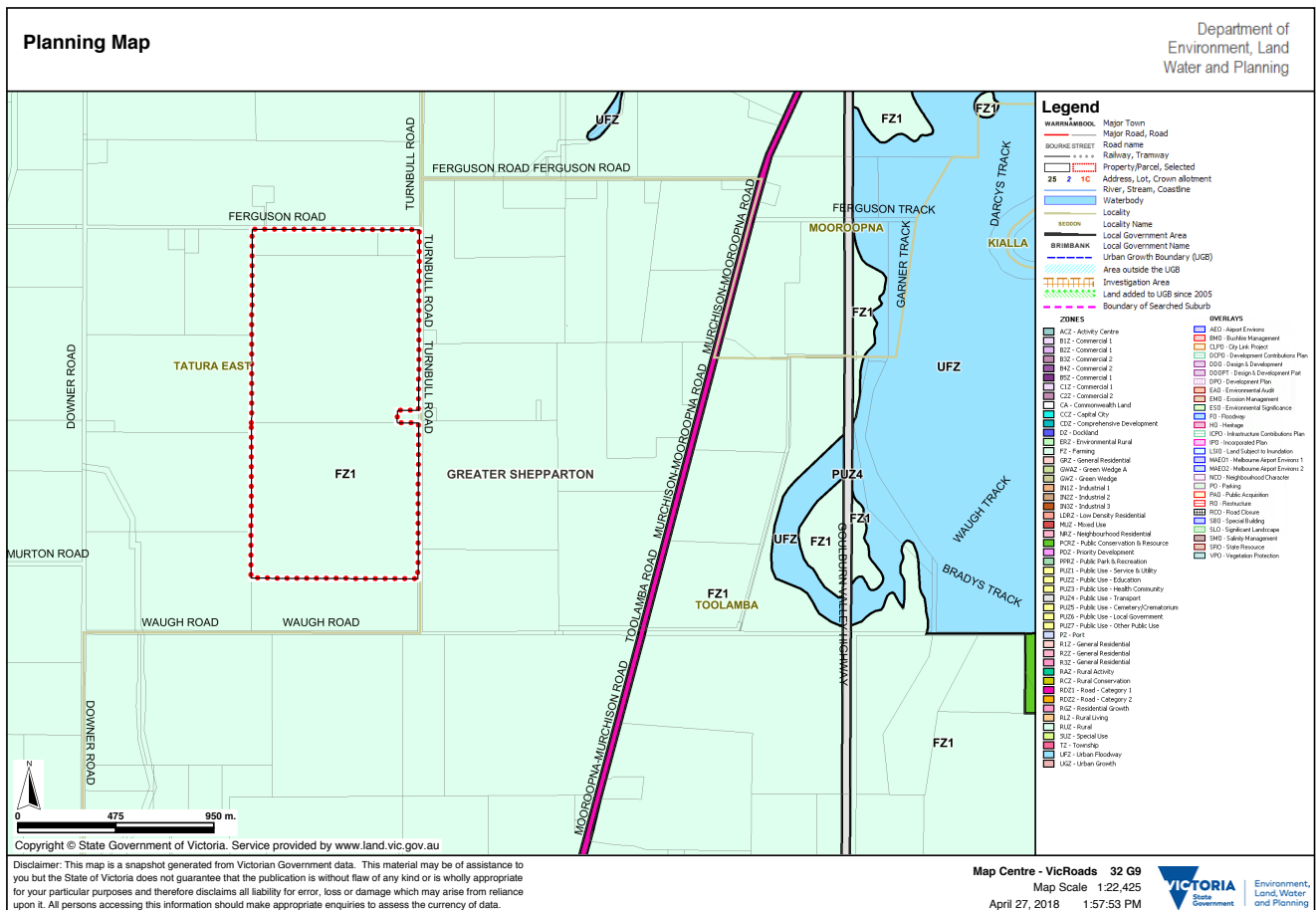


Figure 4-4: Greater Shepparton Planning Scheme: reference property 610 Ferguson Road

The property is located within the Hume Regional Growth Plan and is categorized as part of a very large area classification of “strategic agricultural land”.

Based on mapping and descriptions of other strategies the property is outside the area indicated for the 5 current Greater Shepparton strategies:

- The Greater Shepparton Heritage Study Stage 11C December 2017;
- Investigation Area 2 – Raftery Road, Kialla;
- The Shepparton South Precinct Structure Plan;
- The Shepparton-Mooroopna 2015: Regional City Growth Plan;
- The Greater Shepparton movement and Place Strategy and the Draft Greater Shepparton Townships Framework Plan review March 2018.

d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.

- The primary economic impact region of this site is the Tatura, Mooroopna and Shepparton region. This is best encapsulated as within the Shepparton and Central Goulburn Irrigation districts which collectively cover approx. 250,000ha and use nearly 400,000 ML of water per annum on approximately 100,000ha.

- The current estimated potential agricultural gross annual value of production for the site as a beef grazing operation is around \$160,000 to \$250,000, depending upon intensity of water use which could range from 4-6ML/ha or 400-600ML.
- The current estimated production for the site represents <0.15% of water use covering 0.04% of the land within the irrigation district and approx. 0.05% of the agricultural value of irrigated production within the Central Goulburn/Shepparton irrigation districts.
- The property could be used for horticulture provided significant capital expenditure was expended and thus produce a gross income of 80 ha @ \$70,000/ha or up to \$5.6 million.
- If the water was used on another property in the region then this property would be then able to be converted to dryland agriculture.
- If the property was no longer used for agriculture the net loss is not either the current level of production nor is it the lost potential of horticulture/Lucerne production as the water that would have been used for irrigated agriculture is still available for use in the region as there is plenty of suitable land.
- Thus, the agricultural loss is considered to be only its dryland agricultural production level of \$75,600 (94.5ha @\$800/ha).
- This loss of production represents 0.07% of the total dryland agricultural production within the Central Goulburn/Shepparton irrigation districts.
- This loss of production represents a much smaller % of the total agricultural production within the Central Goulburn/Shepparton irrigation districts – estimated to be 0.02%

e) Describe the irrigation channels and their service catchment.

- The property has good access to irrigation water from the Goulburn Murray Water channels within the Central Goulburn region. Water is supplied from the Goulburn Supply System supplied through water from the Goulburn River, supplemented by water stored in Eildon reservoir.
- The property is serviced by, and has access-to, the extensive Goulburn Murray Water drainage system.

f) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

My opinion on any conditions is as follows:

- The impact of this operation on surrounding horticultural properties in terms of temperature effects or insect effects is not within my area of expertise
- I know of no potential impact of this operation on adjoining grazing or rural residential properties provided there is adequate fencing controls.
- Any evaluation of the change in micro-climate that may or may not occur as a result of the solar farms should consider that:
 - Pasture/crop production is practised across the GMID with relatively similar productivity per ML despite there being a considerable range in temperatures and seasonal conditions
 - Existing changes in land use (e.g. dryland with bare cultivated soils in summer, irrigated pasture and tree crops) all produce currently a wide range of micro-climate conditions which are not considered unacceptable to adjoining landholders.

a) **Describe the agricultural quality of each site.**

My key observations regarding the agricultural quality of the site are:

- The current land use for the site is irrigated mixed winter cropping/grazing.
- The site is a well laid-out but irregular 95.9Ha irrigation property with residual of winter irrigated crops covering more than 90% of the area
- There are significant timbered areas on the property.
- The site inspection confirmed this is/recently has been an actively irrigated property with well established annual cropping, high quality road-access on two sides and good fencing
- The irrigation layout is typical of an irrigated mixed farm of the last 20 years. It did not have automatic irrigation or modern “fast flow” capabilities but would be considered a good functioning layout with reuse capabilities.
- The property is well drained internally with good access to the regional drainage system.
- The soils are shown in the soil map extract below which indicates;
 - a) Dark green coded – Goulburn Loam-Lemnos Loam, and Gupna Loam – Group 4 soils
 - b) Horticulture suitability: The site is mostly group 4 soils which are classified as fair soils for some horticulture. The northern area is similar to the adjoining apple orchard and thus is considered of similar suitability.
 - c) Pasture cropping suitability: The site is considered to have soils well suited for most winter crops and pasture.

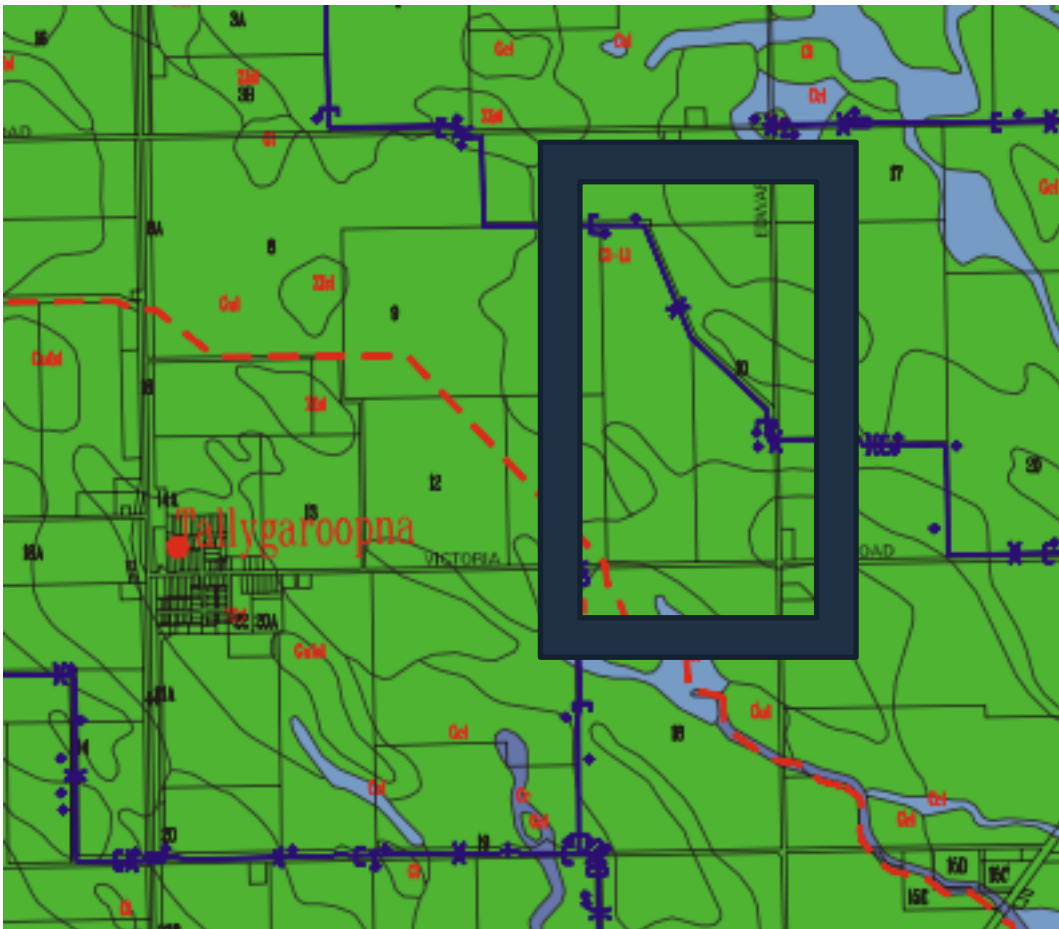


Figure 4-7: Extract of Map 54 Goulburn Valley Soil Map (Skene & Poutsma, 1962), 235 Victoria Road, Tallygaroopna

The property is located within the Hume Regional Growth Plan and is categorized as part of a very large area classification of “strategic agricultural land”.

Based on mapping and descriptions of other strategies the property is outside the area indicated for the 5 current Greater Shepparton strategies:

- The Greater Shepparton Heritage Study Stage 11C December 2017;
- Investigation Area 2 – Raftery Road, Kialla;
- The Shepparton South Precinct Structure Plan;
- The Shepparton-Mooroopna 2015: Regional City Growth Plan;
- The Greater Shepparton movement and Place Strategy and the Draft Greater Shepparton Townships Framework Plan review March 2018.

d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.

- The primary economic impact region of this site is the Tatura, Mooroopna and Shepparton region. This is best encapsulated as within the Shepparton and Central Goulburn Irrigation districts which collectively cover approx. 250,000ha and use nearly 400,000ML of water per annum on approx. 100,000ha.
- The current estimated potential agricultural gross annual value of production for the site as a mixed farm operation is around \$160,000 to \$200,000, depending upon intensity of water use which could range from 3-4 ML/ha or 300-400ML.
- The current estimated production for the site represents <0.10% of water use covering 0.1% of the land served by the irrigation system and approx. 0.05% of the agricultural value of irrigated production within the Central Goulburn/Shepparton irrigation districts.
- The property could be partly used for horticulture provided significant capital expenditure was expended and thus produce a gross income of 40 ha @ \$70,000/ha or up to \$2.8 million.
- If the water was used on another property in the region then this property would be then able to be converted to dryland agriculture.
- If the property was no longer used for agriculture the net loss is not either the current level of production nor is it the lost potential of horticulture production as the water that would have been used for irrigated agriculture is still available for use in the region as there is plenty of suitable land.
- Thus the agricultural loss is considered to be only its dryland agricultural production level of \$76,720 (95.9 @\$800/ha).
- This loss of production represents 0.07% of the total dryland agricultural production within the Central Goulburn/Shepparton irrigation districts.
- This loss of production represents a much smaller % of the total agricultural production within the Central Goulburn/Shepparton irrigation districts – estimated to be 0.02%.

e) Describe the irrigation channels and their service catchment.

- The property has good access to irrigation water from the Goulburn Murray Water channels within the Shepparton region. Water is supplied from the Goulburn Supply System supplied through water from the Goulburn River, supplemented by water stored in Eildon reservoir.
- The property is serviced by and has access-to the extensive Goulburn Murray Water drainage system.

f) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

My opinion on any conditions is as follows:

- The impact of this operation on surrounding horticultural properties in terms of temperature effects or insect effects is not within my area of expertise
- I know of no potential impact of this operation on adjoining grazing or rural residential properties provided there is adequate fencing controls.
- Any evaluation of the change in micro-climate that may or may not occur as a result of the solar farms should consider that:
 - Pasture/crop production is practised across the GMID with relatively similar productivity per ML despite there being a considerable range in temperatures and seasonal conditions
 - Existing changes in land use (e.g. dryland with bare cultivated soils in summer, irrigated pasture and tree crops) all produce currently a wide range of micro-climate conditions which are not considered unacceptable to adjoining landholders.

4.3 1190 AND 1220 COSGROVE LEMNOS ROAD, 260 TANK CORNER EAST ROAD, 875 BOUNDARY ROAD AND 85 CROOKED LANE, LEMNOS (2017-301)

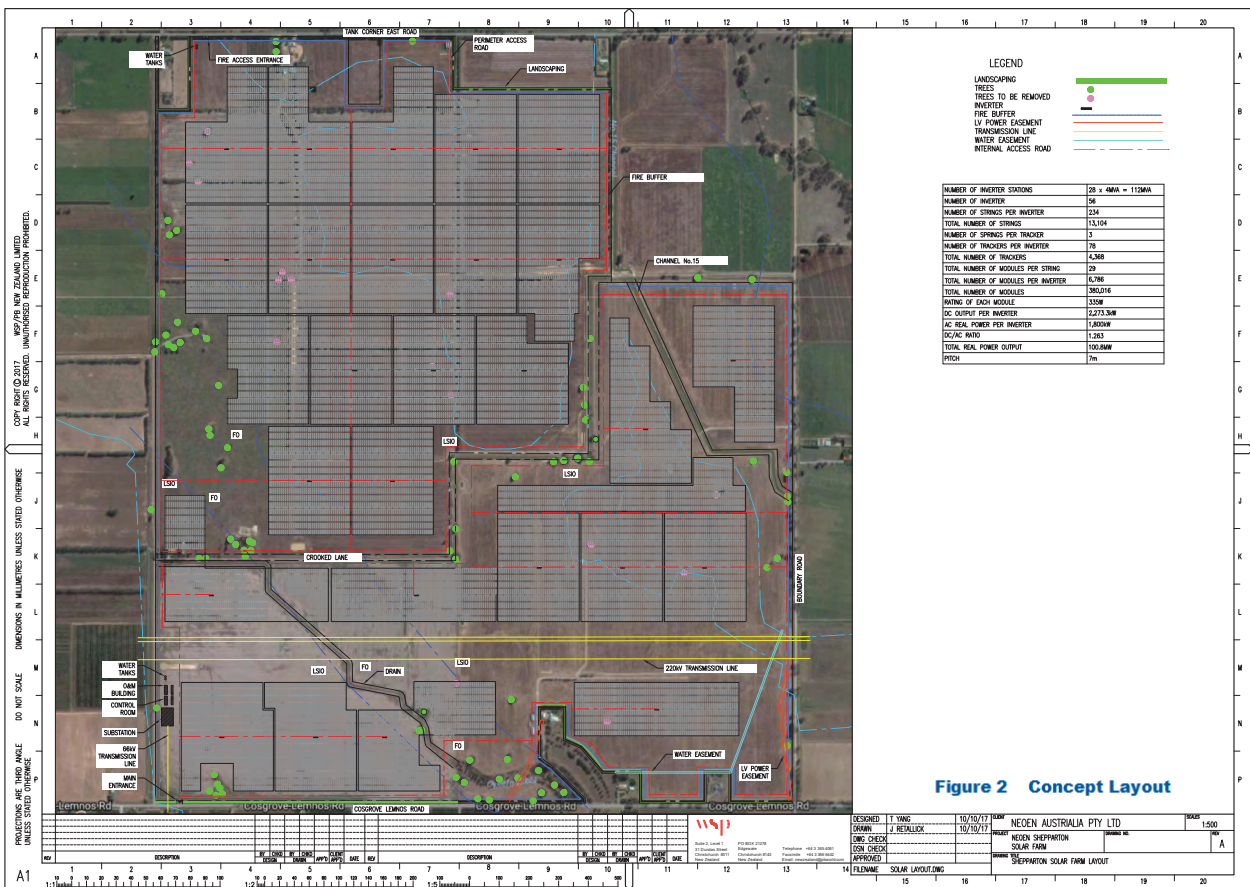


Figure 4-9: Project proponent map

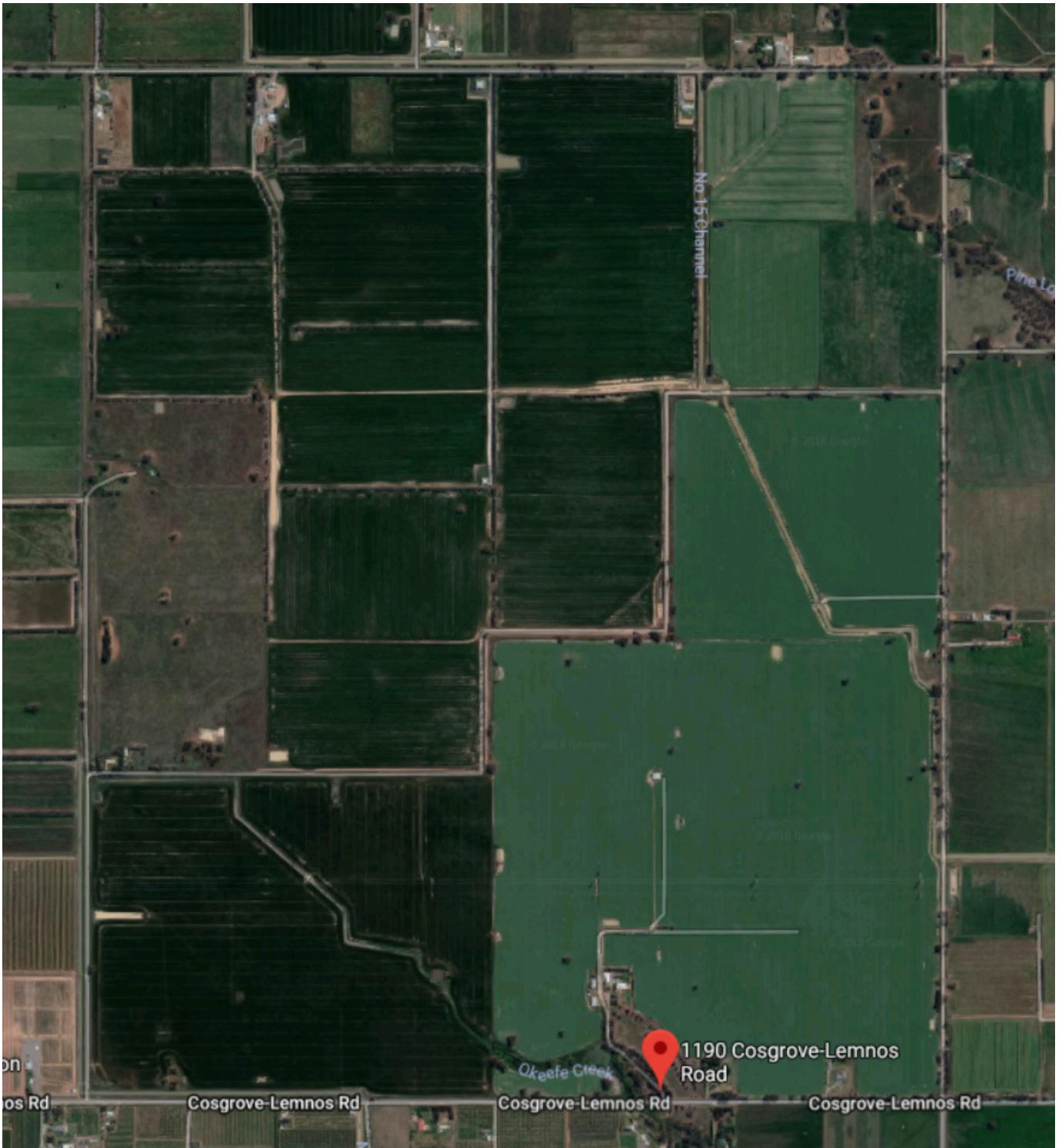


Figure 4-10: Google Maps extract including 1190 Cosgrove-Lemnos Road, Lemnos; and other adjoining properties

a) Describe the agricultural quality of each site.

- The site is a large property with a mixture of dry-land and irrigated farmland on several titles with a total area of 482 Ha. The irrigated component of the property is a well laid-out but irregular, utilising approximately 55% (265Ha) of the 482 Ha property with irrigated crops and pastures. The remaining 45% of the farm-area (217Ha) is devoted to dryland cropping, with only a small area of remnant vegetation, internal roads, natural drainage channels (O’Keefe Creek) and various farm buildings.

- The property is well suited to its current mix of mixed farming and dryland and is of sufficient scale to be run as one viable operation
- The property could be converted to fully irrigated mixed farm using up to 2,000ML making it a very viable operation
- The property is also well suited to being converted to a large dairy farm
- Some of the property (say 40ha could be converted to horticulture although the most suitable areas are disjointed and odd shaped. This limits its potential horticulture capability
- The property could be converted to dryland however would not be of sufficient scale on its own.

b) Describe the surrounding land uses to the sites.

- The surrounding land use is dominated by irrigated pasture and cropping on 3 sides.
- There is an extensive area of horticulture to the immediate South and south west of the property.
- There are a number of lifestyle properties in the area.

c) For each site, describe whether the site is strategically identified for agriculture in a state or local policy or strategy.

- The site is within the Goulburn Murray Irrigation District and is serviced by Goulburn Murray water.
- The property has a small section in the south-west corner which is classified in DELWP's Planning Property Report as subject to a floodway overlay (FO), however the majority of the land is subject to inundation overlay (LSIO).
- The property is zoned FZ1 (Farming) and is outside the boundaries nominated for other current *Strategic Projects* outlined on the Greater Shepparton reference Page on 27th April 2018.

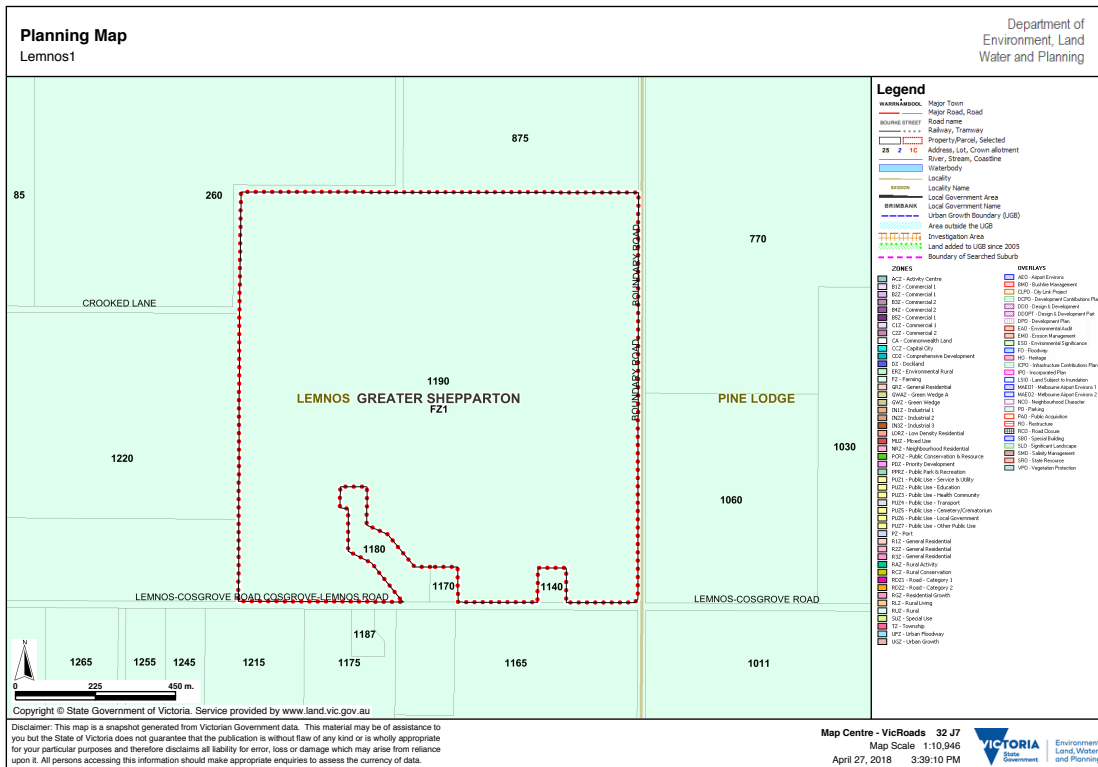


Figure 4-12: Greater Shepparton Planning Scheme: Reference properties: 1190 Cosgrove Road

The property is located within the Hume Regional Growth Plan and is categorized as part of a very large area classification of “strategic agricultural land”.

Based on mapping and descriptions of other strategies the property is outside the area indicated for the 5 current Greater Shepparton strategies:

- The Greater Shepparton Heritage Study Stage 11C December 2017;
- Investigation Area 2 – Raftery Road, Kialla;
- The Shepparton South Precinct Structure Plan;
- The Shepparton-Mooroopna 2015: Regional City Growth Plan;
- The Greater Shepparton movement and Place Strategy and the Draft Greater Shepparton Townships Framework Plan review March 2018.

d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.

- The primary economic impact region of this site is the Tatura, Mooroopna and Shepparton region. This is best encapsulated as within the Shepparton and Central Goulburn Irrigation districts which collectively cover approx. 250,000ha and use nearly 400,000 ML of water per annum on approx. 100,000ha.
- The current estimated potential agricultural gross annual value of production for the site as a mixed farming operation is around \$500,000 to \$700,000, depending upon intensity of water use which could range from 3-4 ML/ha across half the area, i.e. 750-1000ML.
- The current estimated production for the site represents <0.25% of water use covering 0.2% of the land within the Central Goulburn/Shepparton irrigation districts.
- The property could be partly used for horticulture provided significant capital expenditure was expended and thus produce a gross income of 40 ha @ \$70,000/ha or up to \$2.8 million. The remainder of the property could be fully developed for mixed irrigation using 1500ML on 400ha producing crops of \$2,500/ha or a further \$1million. Thus, the potential production of the property for an intensive mixed farm/horticulture is \$3.8million per annum.
- If the farm was converted to a dairy farm then it could conceivably milk up to 1,000 cows using 2,500ML producing \$2.8million in milk production
- If the water was used on another property in the region then this property would be then able to be converted to dryland agriculture.
- If the property was no longer used for agriculture the net loss is not either the current level of production nor is it the lost potential of horticulture/mixed farm or dairy production as the water that would have been used for irrigated agriculture is still available for use in the region as there is plenty of suitable land.
- Thus the agricultural loss is considered to be only its dryland agricultural production level of \$385,000 (482ha @\$800/ha).
- This loss of production represents 0.3% of the total dryland agricultural production within the Central Goulburn/Shepparton irrigation districts.
- This loss of production represents a much smaller % of the total agricultural production within the Central Goulburn/Shepparton irrigation districts – estimated to be 0.1%

f) Describe the irrigation channels and their service catchment.

- The property has good access to irrigation water from the Goulburn Murray Water channels within the Central Goulburn region. Water is supplied from the Goulburn Supply System supplied through water from the Goulburn River, supplemented by water stored in Eildon reservoir.
- The property is serviced directly by the extensive Goulburn Murray Water drainage system and the O'Keefe creek.

g) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

My opinion on any conditions are as follows:

- The impact of this operation on surrounding horticultural properties in terms of temperature effects or insect effects is not within my area of expertise
- I know of no potential impact of this operation on adjoining grazing or rural residential properties provided there is adequate fencing controls.
- Any evaluation of the change in micro-climate that may or may not occur as a result of the solar farms should consider that:
 - Pasture/crop production is practised across the GMID with relatively similar productivity per ML despite there being a considerable range in temperatures and seasonal conditions
 - Existing changes in land use (e.g. dryland with bare cultivated soils in summer, irrigated pasture and tree crops) all produce currently a wide range of micro-climate conditions which are not considered unacceptable to adjoining landholders.

4.4 1090 LEMNOS ROAD CONGUPNA (2017-344)

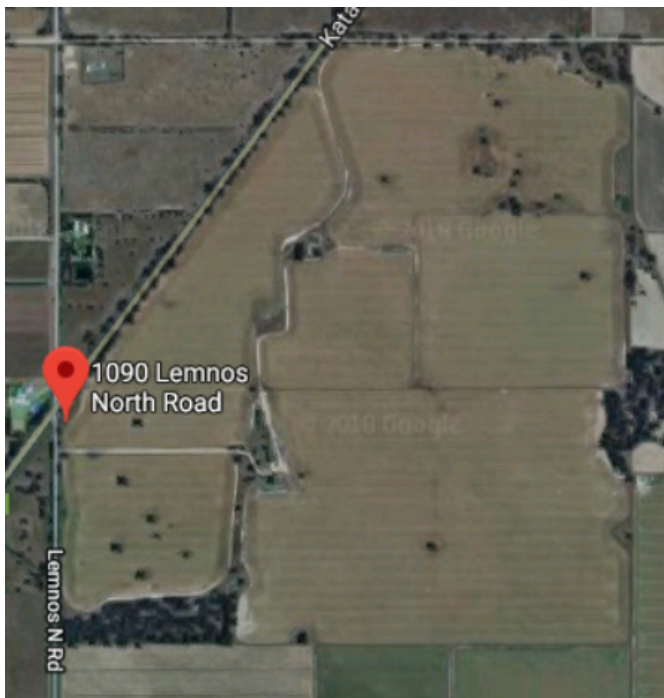


Figure 4-17: Google Maps extract, including 1090 Lemnos Road, Congupna

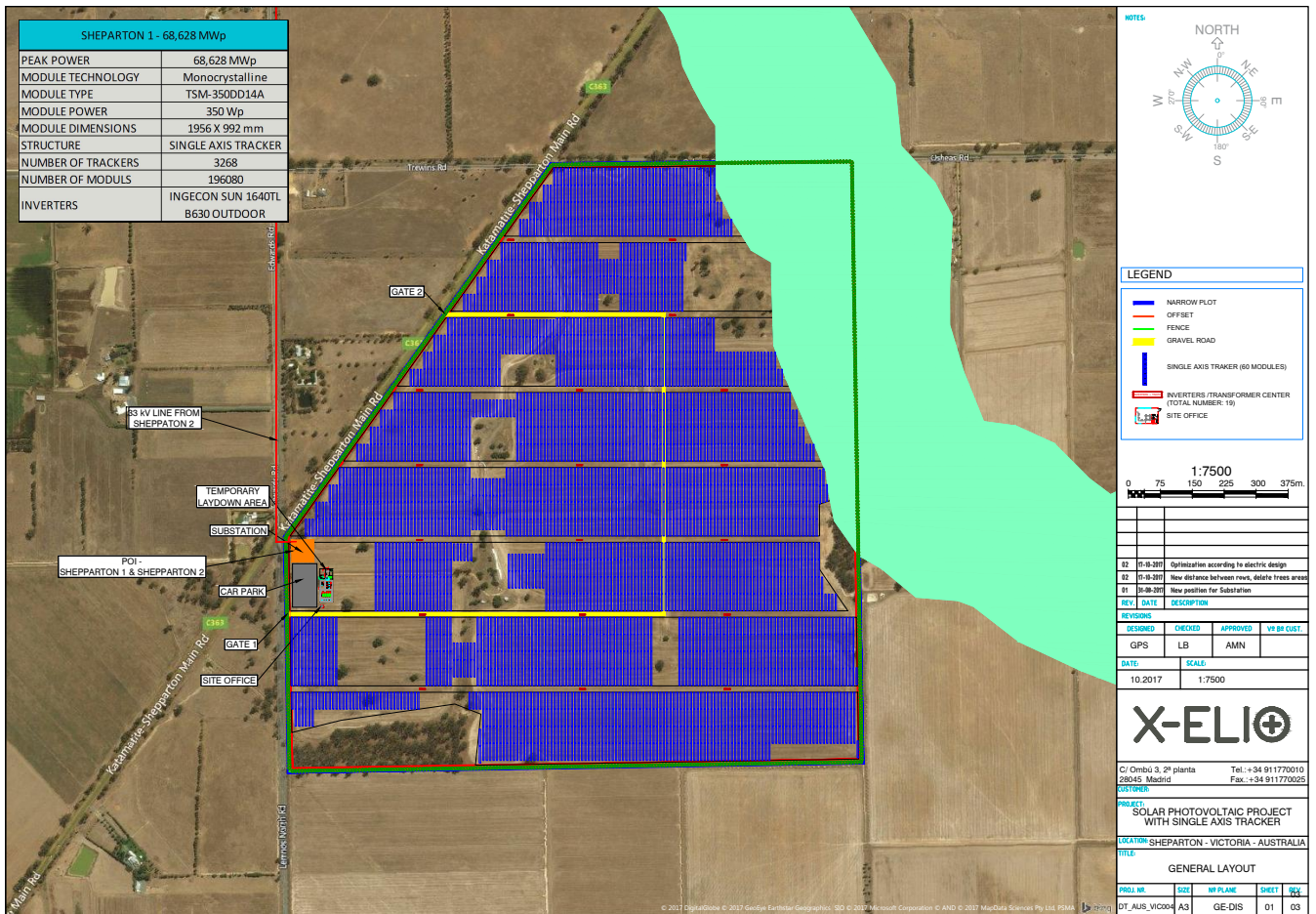


Figure 4-18: Project proponent map indicating proposed layout: 1090 Lemnos Road, Congupna

a) Describe the agricultural quality of each site.

- The site is an irregular 160ha dryland property with dryland cropping activities covering approximately 90% of the area, with some remnant vegetation in the South-west and North east corners of the property. There is evidence of flood irrigation layouts on neighboring properties to the west of this property.
- There is no evidence of irrigation infrastructure.
- The property has a small section in both the south-west corner and the north-east corner which is classified in DELWP's Planning Property Report as subject to a floodway overlay (FO), however the majority of the land is subject to inundation overlay (LSIO).
- The soils are shown in the soil map extract below which indicates;
 - a) Dark green coded – Goulburn Loam, and Gupna Loam – Group 4 soils.
 - b) Horticulture suitability: The site comprises group 4 soils which are classified as fair soils for some horticulture, but is considered unlikely to be developed for horticulture.
 - c) Pasture cropping suitability: The site is considered to have soils well suited for most winter crops and pasture.

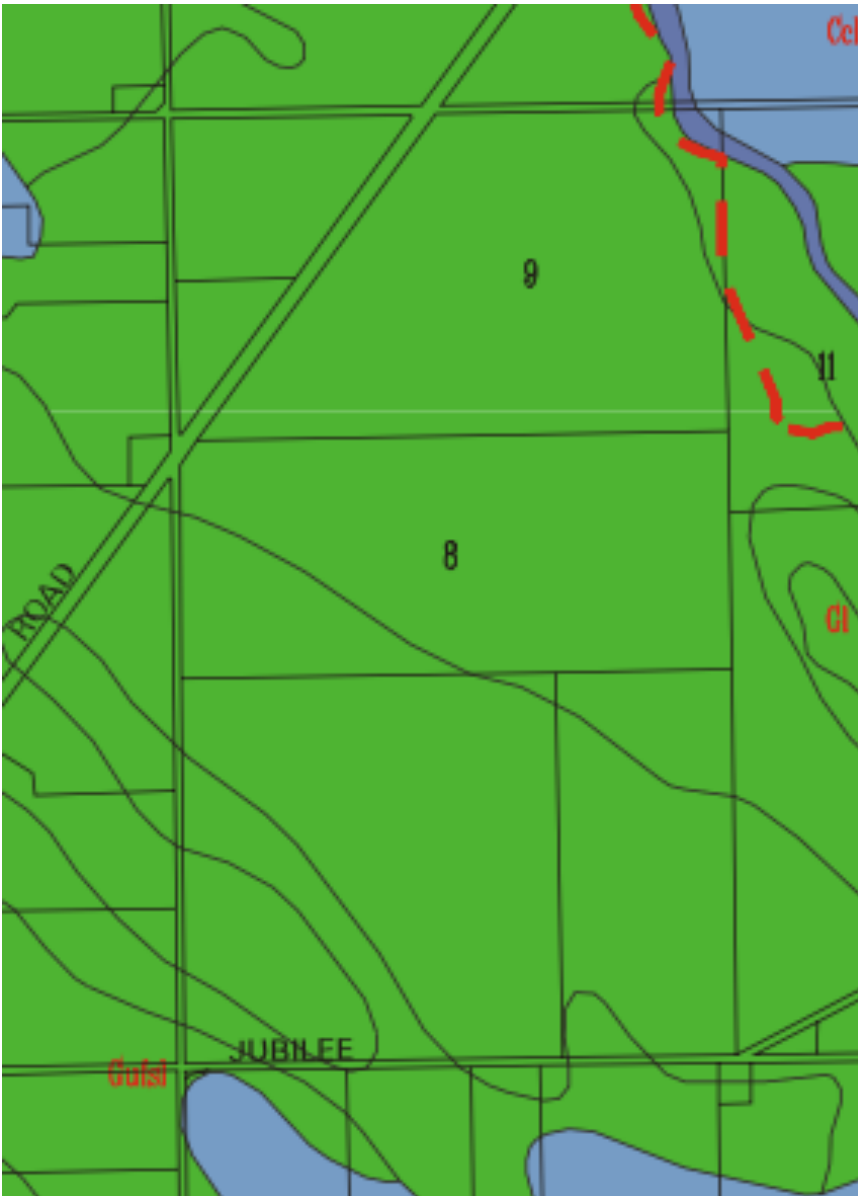


Figure 4-19: Extract of Goulburn Valley Soil Map 54 (Skene & Poutsma, 1962), 610 Ferguson Road, Tatura East

- The property is well suited to its current dryland cropping use
- The property could be converted to a mixed irrigation farm but would require extensive irrigation infrastructure, however it is too small to be a farm its own right
- The property is too small to be considered as a dairy farm but could be used as an adjunct if developed for pasture irrigation
- The property is considered unlikely to be considered for irrigation development as this would require the purchase of water entitlements and this would occur at the expense of another property retiring.

b) Describe the surrounding land uses to the sites.

- The surrounding land use is dominated by dryland cropping although some neighbouring farms do have flood irrigation layouts and are connected, to the irrigation network. There is a depression joined to a natural drainage line on the North-East corner of the property.

c) **For each site, describe whether the site is strategically identified for agriculture in a state or local policy or strategy.**

- The site is within the Goulburn Murray Irrigation District and is serviced by Goulburn Murray water.
- The property has a small section in both the south-west corner and the north-east corner which is classified in DELWP's Planning Property Report as subject to a floodway overlay (FO), however the majority of the land is subject to inundation overlay (LSIO).
- The property is zoned FZ1 (Farming) and is outside the boundaries nominated for other current Strategic Projects outlined on the Greater Shepparton reference Page on 27th April 2018.



Figure 4-20: Greater Shepparton Planning Scheme (extract): Reference property 1090 Lemnos Road, Congupna

The property is located within the Hume Regional Growth Plan and is categorized as part of a very large area classification of “strategic agricultural land”.

Based on mapping and descriptions of other strategies the property is outside the area indicated for the five current Greater Shepparton strategies:

- The Greater Shepparton Heritage Study Stage 11C December 2017;
- Investigation Area 2 – Raftery Road, Kialla;
- The Shepparton South Precinct Structure Plan;
- The Shepparton-Mooroopna 2015: Regional City Growth Plan;
- The Greater Shepparton movement and Place Strategy and the Draft Greater Shepparton Townships Framework Plan review March 2018.

d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.

- The primary economic impact region of this site is the Congupna (village) and the Greater Shepparton region. The current use of the property is for the production of non-irrigated crops for grain production and grazing and presumably the sale of livestock, stock feed and grains.
- The land area of 160 Ha is smaller than most viable stand-alone grazing and dry-land cropping operations but would be well suited to property expansion by a neighboring landowner.
- Assuming maximum production and 90% of the area (allowing for timbered areas) being farmed by an efficient farmer the maximum production without irrigation is probably cereal cropping with a gross production of 4.0 tons/ha per ha at \$230/t, gross value of crop of \$830/ha and a gross margin of \$567/Ha. Gross income would be \$141,930 and a gross margin of \$81,648 for the whole property
- The agricultural loss is considered to be only its dryland agricultural production level of \$141,930.
- This loss of production represents 0.1% of the total dryland agricultural production within the Central Goulburn/Shepparton irrigation districts.
- This loss of production represents a much smaller % of the total agricultural production within the Central Goulburn/Shepparton irrigation districts – estimated to be 0.03%

e) Describe the irrigation channels and their service catchment.

- The property is not irrigated (and appears to never have been irrigated). The property has no immediate access to irrigation water from the Goulburn Murray Water channels within the Central Goulburn region.
- The property is serviced by and has access-to a natural depression (i.e. the landscape offers some drainage) to the North-East of the property.

f) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

My opinion on any conditions are as follows:

- The impact of this operation on surrounding horticultural properties in terms of temperature effects or insect effects is not within my area of expertise
- I know of no potential impact of this operation on adjoining grazing or rural residential properties provided there is adequate fencing controls.
- Any evaluation of the change in micro-climate that may or may not occur as a result of the solar farms should consider that:
 - Pasture/crop production is practised across the GMID with relatively similar productivity per ML despite there being a considerable range in temperatures and seasonal conditions
 - Existing changes in land use (e.g. dryland with bare cultivated soils in summer, irrigated pasture and tree crops) all produce currently a wide range of micro-climate conditions which are not considered unacceptable to adjoining landholders.

5 Economic value of Agriculture

- g) Define the agricultural economic impact region for the sites, describe the cumulative agricultural economic contribution of the sites to that region, and describe the agricultural economic loss if the sites are used for solar farms.*

5.1 CURRENT ECONOMIC VALUE OF PRODUCTION OF THE FOUR PROPERTIES

The current economic value of the four properties have been calculated based upon their current observed enterprises and the farm business economic returns discussed earlier. This is provided in the individual property assessments. The current gross value of production has been calculated for each property as:

- Tatura 94.5ha - \$160,000 - \$250,000
- Tallygaroopna 95.9ha - \$160,000 – \$200,000
- Lemnos 482ha - \$500,000 - \$700,000
- Congupna 160ha - \$141,930

Thus, the total current value of the four properties is between \$800,000 to \$1,300,000 say \$1million per annum.

If we assume the GMID agricultural production is \$2.1billion and this district uses 1/3 of the water but has a higher % of horticulture, then the regions production could be up to \$1billion. This means that the four properties are currently contributing about 0.1% of the region's agricultural production.

Theoretically three of the four properties could be developed, some partly for horticulture and some for more intensive mixed farming and generate more value of production. However, this would require more water, and this would mean some other land would need to be retired. The increased theoretical production is more than \$10million per annum but this would come at the expense of a similar loss of production on the land that would be retired.

5.2 LOSS OF AGRICULTURAL LAND IMPACT ON CATCHMENTS ECONOMY

As discussed previously the limit to production in the three levels of defined catchments is the available water. As there is more than sufficient land in each of the three levels of defined catchment then the loss of the agricultural land from all four proposed developments has only been considered to have a “net” dryland production value.

The only two possible exceptions to this that have been considered are:

1. whether any one of the four proposed sites have a unique site capability or existing infrastructure that makes it unique and have additional value beyond its dryland production capability, or
2. if the development themselves have an impact on the production ability of the surrounding properties.

It is my opinion that none of the four properties are unique nor will the development have an impact on the production ability of the surrounding mixed farms and dairy properties. I am not qualified to comment on the potential impact of a micro-climate on the surrounding horticulture properties.

The loss of agricultural production is therefore considered to be equivalent to 832.4ha of dryland production producing \$800/ha of gross income. This is approx. \$666,000 of gross farm income annually. This typically would

require up to 2 labour units. This represents about 0.55% of the dryland area in the Shepparton and Central Goulburn dryland areas. It represents about 0.6% of the region's agricultural production.

6 Expert statement

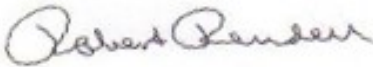
To my knowledge there is no part of my opinion that is not fully researched.

The only question outside my expertise relates to setbacks concerns the impact of micro-climates on horticulture.

This expert statement is accurate in so far as I deemed it necessary to form my opinion. For example, there is recent ABS farm production data that could have been used to update the regional economic information. However, I considered that from my knowledge and experience this was not essential in forming my opinion. Further I could have obtained tax returns for each of the existing properties to confirm their current levels of economic production. Rather I considered more relevant to use a generic range to come to my conclusion.

7 Expert declaration

'I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.'

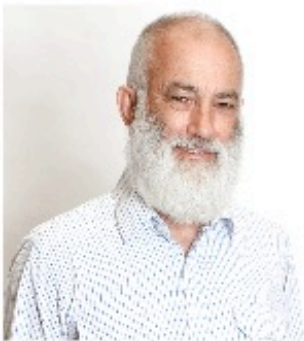


Signed

7 May 2018

Dated

Appendix 1: Rob Rendell's CV



Rob Rendell

B.Eng. (Ag.), CPAg

03 5441 4821
0428 510 642

robr@rmcg.com.au

Rob is a recognised leader in the water sector. He is well-known for his innovation, and thorough understanding of the technical aspects of the irrigation industry.

Rob has more than 40 years' experience in irrigation, groundwater drainage, salinity management, project management, extension, reclaimed water re-use, practical irrigation farming and farm management, agricultural industry benchmarking and sustainability indicators.

He has led the development of policy guidelines and practical approaches to the use of land based systems for the application of reclaimed water. These projects have covered every type of irrigation system and every type of irrigated agriculture. Rob has been a part of developing processes for managing over-allocated groundwater resources. More recently, Rob has been working on irrigation projects in Asia with DAFF and ADB.

Rob's largest project (\$2 billion, over 10 years) has been the Northern Victorian Food Bowl project, which involved modernising the GMID irrigation area, where Rob played a role as the "architect" of the scheme.

QUALIFICATIONS

- Bachelor of Engineering (Agriculture)

EXPERTISE

- Irrigation infrastructure modernisation
- Irrigation, drainage and salinity mitigation
- Farm economic assessments
- Project management and extension
- Reclaimed water re-use
- Environmental assessments
- Groundwater management
- Farm discussion groups
- Agricultural industry benchmarking

PROFESSIONAL EXPERIENCE

1989-present: RMCG	- Senior Fellow - Principal
(Rob was a co-founder of the business in 1989 and has recently stepped back from partnership of the business to become a Senior Fellow.)	
1986-1989: ACIL Australia Pty Ltd	- Senior Consultant
1976-1986: Rural Water Commission of Victoria	- Executive Engineer - Research Engineer - Assistant Engineer
1975-1978:	Farming in Numurkah

Project Examples

INTERNATIONAL PROJECTS

- Technical expert for the DAFF funded joint CACID (Cambodia, Australia, China Irrigation Dialogue) project. In 2014/15, this involved three field visits (Cambodia, Australia and China) of a high-level team of 15 water experts from the three countries. The team identified lessons that could be applied to Cambodia in its quest to improve its irrigation management and provided the basis for ongoing projects.
- Recycled wastewater irrigation scheme in New Zealand.
- Benchmarking of Australian tomato industry against California and New Zealand.
- Australian Water Partnership projects, including: ADB Asia-Pacific Irrigation Strategy, and Water Efficiency Improvement in Drought Affected Provinces in the central coast and central highlands of Vietnam.

ENVIRONMENTAL WATER EXPERT

- Appointed "Independent water recovery reviewer" for the MDB's Living Murray water recovery project 2005/08.
- Appointed independent environment expert to Rural Water Corporation Board's "Management & Environment Audit" sub-committee (1992/93).

STRATEGIC WATER MANAGEMENT

- The foodbowl modernisation project involves \$2 billion infrastructure upgrade to Northern Victorian Irrigation System. Rob was a key architect in developing the project strategy.
- The development of the Murray Darling Basin Plan has provided several opportunities for Rob including strategic advice to the MDBA chairman and Victorian State Water Minister.
- Presented to the Senate inquiry into the Murray Darling Basin Plan (2016).

SOCIO-ECONOMICS

- Basin Plan - GMID socio-economic impact assessment for the GMID Water Leadership Forum (2017).
- Minister Crean through DORA engaged RMCG to identify economic diversification projects in the affected areas in the MDBA. This involved considerable community engagement and local knowledge by Rob.
- Delivering the Basin Plan – Economic and social profiles and impact assessments in the Murray Darling Basin (Lead consultant Marsden Jacob Associates – 2009).
- Assessment of local community impacts of proposals for the Murray Darling Basin Plan (Lead consultant EBC – 2010/11).

RURAL INDUSTRY DEVELOPMENT

- Involved with business and technical analysis for many agricultural industries including wool, rice, processing tomatoes, mixed irrigation and dairy.
- Developed the economic evaluation tool for the MLA and AWI R&D corporations to evaluate potential projects.

FARM ADVICE, TRAINING AND EXTENSION

- Rob provided technical irrigation and general farm management advice to farmers throughout Northern Victorian and Southern New South Wales. He has also conducted three farmer discussion groups (Wakool, Numurkah and Pyramid Hill) as part of Farm Management 500 project.
- Rob has also been involved in developing new extension programs such as "Farm Advance" and Farm Management 500. In addition, Rob has developed extension material such as "Energy Efficient Irrigation" and "Rural Stock & Domestic Water Supplies" (SEC 1991).

PUBLICATIONS

- **Rendell R.** (2017) 'Agriculture in Northern Victoria (Australia) Over the Past 20–30 Years: Factors Influencing Decision Making by Individual Farmers' In B. Hart & J. Doolan (Eds.), *Decision Making in Water Resources Policy and Management: An Australian Perspective* (pp 59-84). Academic Press.
- Bridley S.F., Brown A.H., Currey D.T., Floyd L.B., Harper G.L., Hutchison D., Jakovidis G., Long A.A., **Rendell R.J.**, Robinson E.P., Saunders S.C., Tregear J.R. and Viney W.L. (1988) *Irrigation and Drainage Practice*. Rural Water Commission of Victoria, Armadale (Vic)

PROFESSIONAL TRAINING

- Company Directors Course Diploma

PROFESSIONAL AFFILIATIONS

- Australian Institute of Agricultural Science and Technology
- Australian Institute of Company Directors
- CPAg
- Society of Agricultural Engineers
- Irrigation Australia

Appendix 2: Copy of Instructions from Holding Redlich



13 April 2018

Rob Rendell
RMCG
Bendigo
135 Mollison Street,
Bendigo, Victoria 3550

Associate Tess Bowyer
Email tess.bowyer@holdingredlich.com
Partner Joseph Monaghan
Direct Line (03) 9321 9857
Email joseph.monaghan@holdingredlich.com
Our Ref JBM:TEB:17040110

By email robr@rmcg.com.au

Dear Mr Rendell

Greater Shepparton City Council
Review Panel: Solar Farm Permit Applications
Planning Permit Application No: 2017-162, 2017-274, 2017-301 and 2017-344

We act for the Greater Shepparton City Council.

At the request of our client, the Minister for Planning has become the decision maker for the above solar farm planning permit applications and referred the applications and the submissions made in response to them to a Review Panel before Planning Panels Victoria.

This letter confirms your retainer to act as an independent expert in relation to the Review Panel, and sets out the terms of your retainer.

In addition to the terms in this letter, your retainer is governed by the Planning Panels Victoria Guide to Expert Evidence (**Guide**). A copy of the Guide is attached. You must comply with the Guide in undertaking your work and providing your report, and in your preparation for giving evidence.

Introduction

1. Your responsibilities as an expert witness

As you are aware, your role is that of an independent expert, and not an advocate for any party. Although you are retained by us, you are retained as an independent expert to assist Planning Panels Victoria, and your overriding duty is to Planning Panels Victoria. Planning Panels Victoria expects you to be objective, professional and to form an independent view about the matters on which your opinion is sought.

Please read the Guide carefully and ensure that you comply with it.

Melbourne . Sydney . Brisbane

Level 8 555 Bourke Street Melbourne Vic 3000 DX 422 Melbourne
GPO Box 2154 Melbourne Vic 3001 T +61 3 9321 9999 www.holdingredlich.com

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ABN 15 364 527 724

As required by the Guide, your report must give details of your qualifications, and of the literature, documents and other material used in providing the report. All facts and assumptions on which your opinion is based should be clearly and fully stated.

Until your report is in final form it should not be signed. You should, however, be aware that unsigned draft reports may need to be disclosed to other parties to the Amendment. If, after exchange of reports prepared by the other parties or at any other stage, you change your view on a particular matter for any reason, you should inform us in writing of the change of view without delay, including the reasons for the change.

You should make it clear if a particular question or issue falls outside your area of expertise.

Retainer

2. Background

- (a) Greater Shepparton City Council was the Responsible Authority for the following planning permit applications proposing solar farms in Greater Shepparton (**Planning Permit Applications**). The Minister for Planning is now the decision maker and has established a Review Panel which will make recommendations to the Minister as to whether a planning permit should issue for each application:
- (i) 2017-162
 - (A) Subject Land: 610 Ferguson Road, Tatura East
 - (B) Proponent: CleanGen (2017-162)
 - (ii) 2017-274
 - (A) Subject Land: 235 Victoria Road, Tallygaroopna
 - (B) Proponent: X-Elio Australia Pty Ltd 2017- 274 and 2017-344
 - (iii) 2017-301
 - (A) Subject Land: 1190 and 1220 Cosgrove Lemnos Road, 260 Tank Corner East Road, 875 Boundary Road and 85 Crooked Lane, Lemnos
 - (B) Proponent: Neoen Australia Pty Ltd 2017-301
 - (iv) 2017-344
 - (A) Subject Land: 1090 Lemnos North Road, Congupna
 - (B) Proponent: X-Elio Australia Pty Ltd
- (b) Con Tsotsoros (Chair), Amanda Cornwall and Ken Joyner have been appointed as the Panel under sections 97E, 153 and 155 of the *Planning and Environment Act 1987* to consider submissions about the Planning Permit Applications.

3. Panel Hearing Schedule

The Public Hearing has been scheduled for the week commencing 14 May 2018 and is expected to be completed in 6 days, with the 6th day on 28 May 2018. The Hearing is to be held at 505

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Wyndham Street Shepparton. You are likely to be called on 14 May 2018. We understand that these dates are acceptable to you. Panel directions dated 12 April 2018 are attached. There are a series of other requirements under the directions that you must comply with. Please refer to those directions. The directions set out dates for when your reports are due and a process for expert witness conclaves.

If you require further documentation, please let me know.

4. Your opinion

We seek your opinion on the following matters:

- (a) Describe the agricultural quality of each site
- (b) Describe the surrounding land uses to the sites
- (c) For each site, describe whether the site is strategically identified for agriculture in a state or local policy or strategy.
- (d) Define the agricultural economic impact region for each site, describe the agricultural economic contribution of each site to that region, and describe the agricultural economic loss if the site is used for a solar farm.
- (e) Define the agricultural economic impact region for the sites, describe the cumulative agricultural economic contribution of the sites to that region, and describe the agricultural economic loss if the sites are used for solar farms.
- (f) Describe the irrigation channels and their service catchment.
- (g) Provide your opinion on any conditions insofar as they are relevant to your area of expertise, including the conditions in relation to setbacks.

In providing your opinion, you should refer to any relevant studies. You must also undertake a site inspection.

Your opinion should be fully set out in your written report. From time to time we may also require you to respond to additional evidence or expert opinions if and when received from other parties. You will also need to be available to give evidence before Planning Panels Victoria. A copy of Planning Panels Victoria's directions are attached and they set out the days on which our clients will give evidence. Subject to confirming with us first, you should also attend the hearing to hear evidence from other experts whom you consider will give evidence relevant to your area of expertise and issues that affect our clients.

5. Confidentiality

Your independent expert report and any drafts prepared in accordance with your retainer are confidential and are not to be copied or used for any purpose unrelated to the Planning Permit Applications Review Panel without the permission of our clients.

Similarly, all material supplied to you by Holding Redlich is confidential, and must not be copied or used for any purpose unrelated to your retainer without the permission of our clients.

6. Conflicts of interest

As an independent expert, it is important that you are free from any possible conflict of interest in the provision of your advice. You should ensure that you have no connection with any party which would prevent you from providing your opinion in an objective and independent manner.

You have confirmed to us that you have no conflict involving any of the parties to this Review Panel. If any conflict or potential conflict becomes apparent to you during your work on this matter, please tell us immediately.

7. Fees

Our clients will be responsible for payment of your reasonable fees.

8. Communications

Please direct all communications, whether verbal or written, to our office, so that we can coordinate all activities in connection with the Planning Permit Applications and ensure privilege is maintained as appropriate.

If you have any questions or comments about this assignment, please contact the writer. If you have any questions or comments, please contact the writer. If you require any further documentation in addition to that enclosed with the brief, please let us know.

Yours sincerely



Holding Redlich

Index of Documents

Doc. Number	Document Title	Date of Document
1.	Guide to Expert Evidence (Planning Panels Victoria)	April 2017
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		

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Appendix 3: Summary – Update on water use in GMID and sMDB

UPDATE ON WATER USE IN GOULBURN MURRAY IRRIGATION DISTRICT (GMID) AND SOUTHERN CONNECTED BASIN (sMDB)

LESS WATER AVAILABLE FOR IRRIGATION IN THE SOUTHERN BASIN (sMDB) – it’s more than 22%.

The Basin Plan (BP) has recovered an estimated. 773GL of General Security (GS) and 699GL of High Security (HS) entitlements from buyback and farm efficiencies works. This represents approximately 22% of the GS (3,600GL) and HS (3,300GL) entitlements across the sMDB. This means that depending upon seasonal allocations the water recovered reduces sMDB irrigation water by between 900 and 1500GL in most years.

In addition, policy changes and changed irrigator behaviour (e.g. use of carryover) mean that irrigator water use is now less than what is permitted under the Murray Darling Basin Cap and is significantly less (could be 500GL) than what was assumed in the development of the BP Sustainable Diversion Limits (SDL). Unfortunately,

the MDBA does not appear to have undertaken the modelling to determine the exact impact to date.

WATER PRICES HAVE INCREASED

The price of water varies primarily with allocations and under the same climate conditions today (post buyback etc.) the price of water has almost doubled with less water available to irrigators.

AVAILABLE WATER VARIES WITH SEASONAL CONDITIONS

The last 12 years represent the range of seasonal conditions that are likely to be experienced across the basin in future. What is unknown is the relative proportion in future of each scenario. The table below provides a summary of the water allocated in this period. In any one year the actual water used changes slightly with the use of carryover.

sMDB climate scenarios, water allocation and use and price – post 2006

Climate Scenario	Allocation level	Frequency (last 12 yrs)	Total water allocated (GL)*		Price (\$/ML)		Comment
			Actual	Projected	Actual	Projected	
Very Wet 10/11, 11/12, 12/13	Victorian Low security water available, 100% NSW GS	3	6,200	5,300	20-50	50	Carryover increased
Wet 13/14, 16/17	90% NSW General Security	2	5,400	5,000	65	70	Rice expands
Average 14/15, 17/18	55% NSW General Security	2	4,300	4,000	125	130	Rice sits on allocation
Dry 09/10, 15/16	30% NSW General Security	2	3,500	3,300	150-208	210	Small rice crop as it sells to dairy/cotton
Drought 06/07, 07/08, 08/09	10% NSW GS, 80% NSW HS, and 50% Vic/SA high security	3	2,100	1,700	300-680	600	Horticulture minimises and cotton/dairy sell mostly, rice fails

The "actual" refers to what happened in those particular years, whereas the "projected" refers to what would happen if those years were repeated today.

INDUSTRY USE OF WATER HAS CHANGED

Horticulture (excluding almonds) has continued to slowly increase its water use over the last 50 years from 600GL in 1970 to around 800GL in 2015/16 and is likely to continue to slowly increase to 900GL in the foreseeable future.

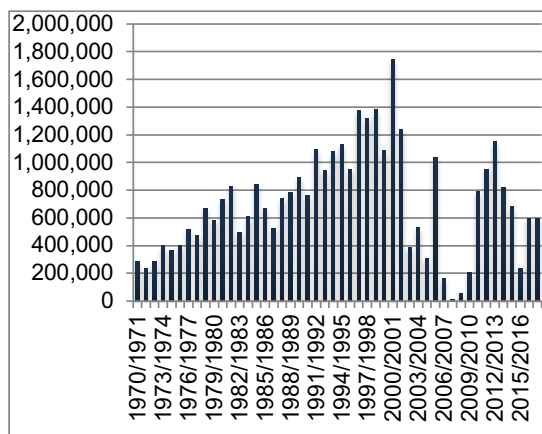
Almond's water use has increased from almost nothing in 1999/00 to over 400GL in 2015/16 and is predicted to increase to over 600GL in the foreseeable future.

Since 2010, Cotton has continued to replace rice in the Murrumbidgee region. Cotton currently uses 450GL and is expected to increase to up to 700GL in the foreseeable future.

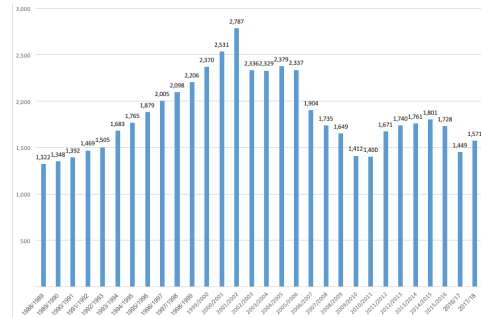
Since peaking in the early 2000s dairy has reduced in production and water use. This is shown in the graph for the GMID below. Dairy is now estimated to use 1000GL in the southern basin but is expected to reduce to 900GL on average in the foreseeable future.

Rice production increased dramatically prior to 1999/00 reaching over 1.4 million tonnes. However, in recent times the production has halved and now varies according to the climate scenario and allocations. This ranges from 0.2 million tonnes to 1million tonnes. This is shown in the graph below. Rice water use now averages 650GL but ranges from 250GL to 1000GL per year.

sMDB Rice production over time (tonnes)



Dairy production in the GMID (ML)



REGIONAL WINNERS AND LOSERS

Some industries continued to expand and others decline as the water availability has reduced with the Basin Plan and changed irrigator behaviour. Similarly, some regions have also expanded and others declined.

In general terms since 1999/00 when water use across the basin was at its peak, it is observed that:

- SA Riverland region has maintained its overall water use.
- Victorian/NSW Mallee region has expanded its water use significantly.
- NSW Murrumbidgee has maintained its High Security water use but decreased its GS water use. BUT the decrease in water use has been offset by the expansion of cotton which uses less water per ha
- NSW Murray Irrigation has significantly reduced its water use as rice industry has declined.
- Victorian GMID area has significantly reduced its water use resulting in a large decline in the dairy industry. With 430GL of the buyback and farm efficiency HS entitlements coming directly from the GMID, and additional indirect back trade of water out of the GMID to other regions where water has been recovered, this has resulted in a 500 to 600GL reduction in water use in the GMID. This is almost half of the total average reduction (1200GL) in the sMDB consumptive pool.

THE FUTURE ESTIMATED WATER USE BY INDUSTRY IN SOUTHERN CONNECTED BASIN

The new projected equilibrium (GL) in the sMDB based on current entitlements and no more recovery

Sector	Drought (06/07)	Dry (15/16)	Average (14/15)	Med-wet (16/17)	Wet (12/13)
Mixed grazing	121	286	316	416	474
Rice	72	241	631	943	1,143
Cotton	241	676	676	721	721
Other crops	145	406	541	554	554
Dairy	435	811	901	970	1,067
Horticulture	1,400	1,442	1,442	1,386	1,286
Carryover to next year				554	554
Total (incl. carryover & 500GL of groundwater)	2,414	3,863	4,507	5,545	5,800

IMPACT ON GMID SYSTEM WATER USE

The water managed by the GMID system has already halved and could be as little as 1/3rd in 5 years time compared to the turn of the century. This is shown in the table below. It is noted that water use in GMID does not vary nearly as much as it does in NSW as Victoria has predominantly HS entitlements compared to NSW's significant amount of GS entitlements.

THE BASIN PLAN IMPACT ON GMID

The dairy industry in the GMID has already reduced its production level by 1/3rd from the pre-millennium drought level of 2,350ML, to its current level of 1,550ML. This involved a reduction of

800ML in milk production, with an annual farmgate value of \$320 million (at 40c/litre) or a value ex-factory of \$640 million (at 82 cents/litre). The previous economic study attributed \$200M of the farm gate lost annual production and \$360M of the reduced processed milk value to the Basin Plan. It also attributed \$25million/annum of lost mixed farming production to the Basin Plan. In total over 1,000 jobs were estimated to have been lost.

The study also recognised the region received over \$2 billion worth of funding for GMID modernisation and \$250 million in farm efficiency grants and \$700 million from buyback. This funding provided 750 jobs in the short term. This study also recognised that not all of the water reduction was due to the Basin Plan.

Diversions, deliveries, and losses in the GMID (GL)

Time period	Diversions into GMID	Deliveries (incl. 80GL env. & urbans)	Losses
1990's to 2,000	3,000	2,150 +/- 400	850
Current - 2018	1,550	1,250 +/- 200	300
5 years time - Almonds/cotton use more	1,350	1,100 +/- 175	250
5 years time with 450 GL UpWater as well	1,100	900 +/- 150	200
What happens in Drought/floods			
<ul style="list-style-type: none"> ▪ Last time 3 yr drought and/or 10/11 flood ▪ Next drought ▪ Next drought with UpWater 	<ul style="list-style-type: none"> ▪ 1100 ▪ 800 ▪ 650 	<ul style="list-style-type: none"> ▪ 700+/-200 ▪ 500+/-100 ▪ 400+/-100 	<ul style="list-style-type: none"> ▪ 400 ▪ 300? ▪ 250?

ENTERPRISE WATER USE IN GMID HAS CHANGED AND WILL CONTINUE TO DO SO

Water use in the GMID by sector (GL) (incl 70-120GL of Groundwater)

Sector	2000	Current		5 years' time		5 years with 450 GL UpWater	
	average	Average (17/18)	Last drought (06/07)	Average	Drought	Average	Drought
Mixed grazing	283	139	75	110	40	85	30
Crops	160	155	42	108	34	91	29
Dairy	1468	825	615	720	359	595	300
Horticulture	90	131	100	138	137	138	133
Total	2,000	1,250	832	1,075	570	908	491

PROPOSED 450GL UPWATER

The Basin Plan has provision for a further 450GL of water recovery (UpWater) from infrastructure water saving projects provided it meets a socio-economic test. A recent Ernst Young report identified possible sources of the UpWater and included the possibility of a further savings in GMID operations of 237GL. This is considered to be impractical as GMID has already reduced losses to less than 350GL. It is considered that most of the water is expected to come from farm efficiency grants from across the southern basin.

SOUTHERN BASIN FARM EFFICIENCY GRANTS PENALISES THE GMID

It is considered that farm efficiency grants provided a better solution for the GMID than buyback because the effective price paid for water was a 33% premium and it assisted farmers coming out of the drought to increase productivity sooner than they otherwise could have. However ultimately the water recovered reduced the consumptive water pool across the southern connected basin. The resulting "back trade" of entitlements, particularly by horticulture meant that GMID and Murray Irrigation reduced their water use.

Any future farm efficiency grants will continue this process of reducing the available water to the GMID and Murray Irrigation, but will have no impact on the available water to the Riverland, Sunraysia

or even Murrumbidgee (because of the cotton expansion using less water than rice). Some GMID irrigators may obtain a further subsidy to bring forward works that they would have done anyway, the region would lose access to the savings transferred to the environment, which would otherwise have been made available for production. Outside of the GMID Horticulture and cotton would be subsidised to expand and by trading water out of the GMID, the GMID would effectively give up the water on their behalf.

IMPACT OF 450GL ON GMID

The expected water use in the GMID if 450GL proceeds via farm efficiency grants is shown in the table above. This suggests that on average the water use in the region will decline by a further 167GL or 18% and in a repeat of the 06/07 drought would see a 79GL reduction. Despite this drop, Horticulture would continue to slowly expand but dairy and mixed farming would decline even further than they already have.

The resulting drop in dairy production is estimated to be 235ML of milk which represents 15% of current production levels. This would mean nearly \$100mill of dairy farm gate production or \$200 million of dairy factory production within the region would be lost as a result of the UpWater implementation.

Water prices would rise a further \$30 per ML on average and the job losses based on previous modelling would be a further 500 jobs lost to the region.

This report has been prepared by:

RM Consulting Group Pty Ltd trading as RMCG

135 Mollison Street, Bendigo, Victoria 3550

(03) 5441 4821 — rmcg.com.au — ABN 73 613 135 247



Offices in Bendigo, Melbourne, Torquay and Penguin (Tasmania)



Key Project Contact

Rob Rendell

0428 510 642

robr@rmcg.com.au

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