Submission addressing the State Significant Infrastructure:

Merimbula Sewage Treatment Plant Upgrade and Ocean Outfall

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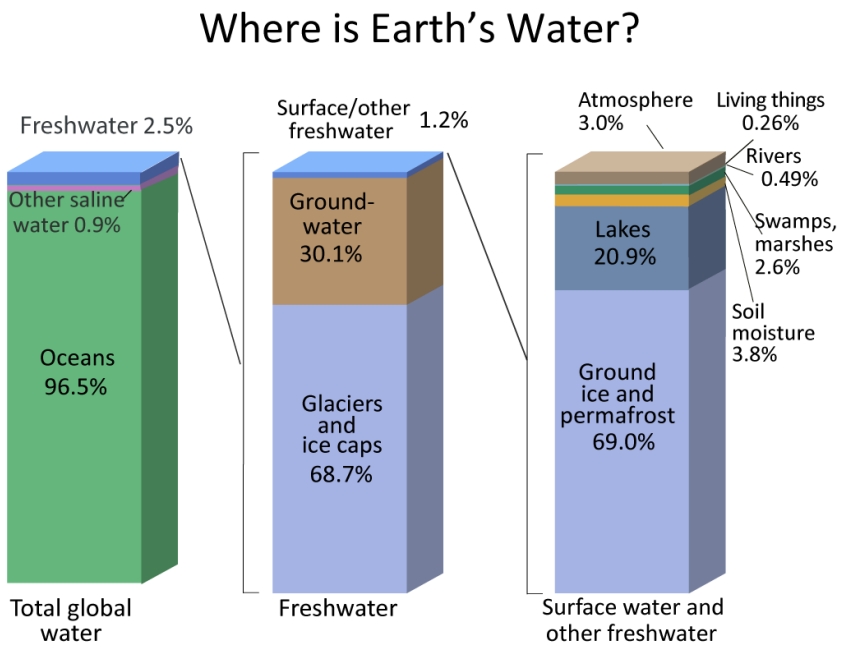
The information and views provided in this submission are exclusively mine and do not reflect the views of Charles Sturt University or any of its staff.

Please note I would be delighted to discuss the content of this submission with council at any time. I would be pleased to contribute my expertise to assist with this exciting development for our farming communities and our valley's economy.

Introduction:

The major issue: The potential waste of fresh water from this project.

It is important to note that the volume of fresh water available for mankind represents around 0.22% of water on the globe. This is summarized in this self-explanatory figure often used in the world literature.



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources. (Numbers are rounded).

In reality, we have very little water to sustain our population and industries on this driest of continents in the world.

Increased variability in our climate due to global warming

I refer to the detailed climate projections from section 4.3 of your EIS.

The IPCC Fifth Assessment Report (AR5, 2013) states with high confidence, that Australia is already experiencing impacts from recent climate change, including a greater frequency and severity of extreme weather events. We have already seen some of these extremes in recent times with both drought and bushfires having a major impact on the economy of our valley. Both of these extreme events have limited severely our agricultural economy as well as our tourism industry.

In assessing the content of table 2 it can be seen from the Climate futures of CSIRO and BOM that by 2090 under the most likely high greenhouse gas emissions scenario:

- Average daily annual temperature will increase by 3.1^{o}C (range 2.5-4.0)
- Average annual rainfall will decrease by 5% (range -19 to +5)
- The frequency of Fire weather (number of days per year FFDI5 > 50) will increase from a current base of 1.1 to a projected 2.1.
- The incidence of drought: as stated in the EIS both times spent in drought and occurrence of drought are anticipated to increase in intensity and severity.
- Solar radiation will increase by up to 3.1% (range +0.3-6.8)
- The percentage change in transpiration will increase by a massive 14.4% (range +9.5-22.2%)

These figures show clearly that the demand for fresh water over the coming 70 years in the Bega Valley will increase remarkably. Demand will increase to meet the needs of:

- The Bega valley's population which is projected to grow by 9.1% by 2036.
- Milk production which currently accounts for 65.3% of income from agriculture ($62.667million) and livestock rearing providing 27.7% of income valued at $26.616 million.
- The tourism sector currently worth $233.8 million with 3,182,051 visitors annually

Source: BVSC Investment Prospectus 2021 FINAL PDF

- Other agricultural crops including horticulture for which there is great potential in our valley. This is because our valley is relatively isolated and so provides a natural biosecurity screen against crop pathogens while providing some excellent fertile well drained soil profiles within a moderate temperate environment.

The status of the current water supply for Bega valley's dairy industry.

I have held discussions independently with 3 dairy consultants working with a wide range of dairy farmers in the valley. They all agree that most of these dairy enterprises operate with insufficient water for irrigation, animal consumption and the cleaning of milking facilities for a significant portion of each year.

Many of the soil profiles of the valley are light and free draining and respond well to irrigation. In times of drought farmers need to build the cost of expensive imported feed and sometimes even water into their budgets to retain their milk quota set by dairy processors. More water for irrigation allows farmers to conserve more fodder in the form of silage and hay to drought proof

their operations. Farmers would be paying for this extra water to defray at least in part the costs borne by the council to pipe the water to them.

The re-cycling of water from the Merimbula STP to our dairy farmers will form part of the circular economy which is so important to the sustainability of our resources managed by our BVSC.

Joint discussions between BVSC councillors and community representatives back to 2012-2013 rejected a recycling proposal based on operational costs and in particular the cost of pumping water from the treatment plant to high ground to the west of Merimbula.
I understand that:

- at no stage was there a thorough economic analysis of the potential productivity gains for farmers and for our valley's economy achieved through the provision of this water.
- the processing of solid waste and redistribution of treated water to remove the need for any ocean outfall was not investigated.
- the major improvements in efficiency of generation, storage and utility of solar power to support pumping requirements were not countenanced.

What additional information could have been included in the EIS?

When developing a management policy for the management of a key resource essential for the development and growth of our valley, it is important to model the needs for water for both domestic, industrial and agricultural needs over the period in question: in this case the coming 70 years and beyond. Then a thorough economic analysis can be made to establish the financial viability of piping the resource to support industry in the valley as opposed to simply wasting it by building a long ocean outfall. The utility of solar power to drive the system needs to be incorporated. Solar power technology is used widely throughout the world to source and distribute water.

The water requirements both now and in the future can be calculated using the "water footprint" principles espoused by Hoekstra and Mekonnen from 2012 (1). These authors calculated that the volume of water required to produce a tonne of milk, for example was 1,021cubic metres (m^3) while much more was required for the production of a tonne of beef at 15,415 m^3. Of course, these figures will vary according to the environment and breeds of the animal resources.

Requirements can then be partitioned between the 3 major sources of water.

1. Bluewater – surface/groundwater;

2. Green water – rainwater that infiltrates the soil;

3. Greywater – blue/green water polluted through industrial, urban or agricultural use.

We know the limitation of blue water in the Bega valley constrained by the catchment area of the Bega river and related tributaries and the limited capacity of aquifers feeding them. We also know that many of the soil profiles of the valley are light in nature and drain freely without holding a lot of moisture after rainfall. Again, this can be calculated.

Our capacity to provide grey water comes from our ability to process and recycle our wastewater from facilities like the Merimbula sewage treatment works. The value of this water to the council's important circular economy based on recycling then has to be calculated.

Two case studies very close to us:

1. A review of current usage and value to the regional dairy industry and community of the **Northern Shoalhaven Reclaimed Water Management Scheme (REMS)** prepared by the respected dairy consultancy SCIBUS (Camden NSW) has become available.

This scheme has been operational for 19 years and currently supplies reclaimed water for use on dairy farms (and other users) on the Shoalhaven River floodplain for irrigation purposes as well as for use for stock water and operational functions including dairy shed, yard and machinery washing. During that period nearly 27 gigalitres (27,000 megalitres) of reclaimed water have been beneficially recycled by participating dairy farms.

Of the initial 14 farms engaged in this scheme, 9 remain, all of which have expanded their production significantly with their ability to use the water for irrigation of high-quality forage crops. Based on the farm studies for the years 2017-2018 and 2018-2019 the consultant calculated that the **mean annual benefit for the Shoalhaven economy was $11.3million**. This included the additional employment of 82 people in the region.

I grant that their capital expenditure on infrastructure to pipe the water to farms would have been significantly less than what we are investigating with the Bega Valley, nevertheless the potential benefits for the economy may outweigh this initial cost by a wide margin in a relatively short time. **A detailed feasibility study along with a projected financial analysis needs to be undertaken for our valley and for the utility of water from the Merimbula STP.**

The document is available for council to peruse.

2. The second example is provided by the **East Gippsland wastewater management system**. The topography of this region is very similar to that of Merimbula, while their objectives to recycle their wastewater and minimise its release into their ocean ecosystem are also similar to ours.

Their scheme not only distributes water to East Gippsland Water's own properties to irrigate pasture and tree plantations at Newmerella, Mallacoota, Metung, Paynesville, Bairnsdale and Bruces Track Farm near Swan Reach, but also to third parties including golf courses and Bairnsdale Racecourse, as well as farmers across a wide area located at Newmerella, Swan Reach, Paynesville, Omeo, Cann River and Kalimna West. In addition, the recycled water is helping to protect the biodiversity of wetlands including the internationally significant Macleod Morass on the outskirts of Bairnsdale and the Tambo Bay Wetlands near Metung.

This organisation is able to utilise 95-100% of its recycled water across 11 treatment plants throughout 21,000 sq km (population, 45,000) without the need for an ocean outfall. Furthermore, the Bairnsdale waste treatment plant is using new technology to generate power from the organic solids.

The area of our valley is a third this size with 7 sewage treatment plants servicing output from 34,000 residents. **It would be very beneficial to learn from their experience and achieve similar environmental targets to add to our valley's circular economy?**

Listed benefits in the EIS

The list of project benefits detailed in Section 8 is very short and provides no indication of any economic impact for the future of the Bega valley. I select 3 examples.

Firstly, as stated:

"The Project would result in improved wastewater quality. The reduction in risk associated with this means there are potential benefits to the health and values of both estuaries, including recreational use and fishing".

This is a notable positive outcome for water that has potential for both domestic use and for the irrigation of recreational facilities and limited horticulture around Pambula. The restoration of Aboriginal heritage values in the sand dunes is also of great cultural importance.

Secondly:

"The quality of treated wastewater discharge is improved and the distance of this discharge to sensitive receivers, notably Merimbula and Pambula Lake where aquaculture is located, is increased. The ocean outfall pipeline would allow treated wastewater to disperse away from Merimbula Beach. This eliminates the risk of wastewater being entrained in the surf zone where it would generally have more potential to disperse parallel to the beach and towards the estuary entrances. This also means there is less potential for poor quality water to enter Merimbula Lake, which contains oyster aquaculture (which is particularly susceptible to changes in water quality)."

There are contradictions in this statement. Whereas it is stated that the risk for wastewater to affect the amenity of the Merimbula surf beach is eliminated, the potential for poor quality water to enter Merimbula lake which passes by the northern end of the same surf beach is not: it is just reduced. The Merimbula lake oyster industry therefore remains under threat.

Thirdly:

"The ocean outfall pipeline and diffuser structure may have a positive effect on species diversity and abundance. The pipeline infrastructure would constitute a change from sandy seabed habitat to hard substrate habitat for a wide range of colonising sessile invertebrates, effectively resulting in the creation of an artificial reef. Some sections of the structure may also be potentially suitable for natural colonisation by blacklip abalone. If colonisation of the structure by blacklip abalone is a possibility, this could potentially produce benefits for the Merimbula Bay reefs habitat and/or the local abalone fishery by increasing the pool of Merimbula Bay reefs contributing to local larval supply. Snapper may also be attracted to the pipeline and diffuser infrastructure and in doing so, the Project may have a positive effect on local snapper population. This may result in a net positive effect on species diversity and/or abundance in the central region of Merimbula Bay, which may also equate to improved recreational fishing opportunities."

This statement is full of speculation without any scientific evidence to support this. While the recreational fishermen may see benefit, where is the economic impact for our valley?

Can we think again on this proposal?

I know it has taken this important development 10 years of hard work to formulate and then plan. Our priorities for the importance of water conservation and use have evolved significantly over this time and we now recognise that fresh recycled or "grey" water is a resource that we must maximise the use of on our driest of continents. This fits with the futuristic circular economy based on recycling that is now so important to our council's activities.

Sydney's Deepwater Ocean Outfalls, costing the equivalent today of $600 million opened in 1990 after years of construction, solved the sewage and wastewater problems of that city at that time. However, due to the strain on stored water reserves for Sydney in the first decade of this century, a $1.8billion reverse osmosis desalination plant was constructed by 2012 to boost Sydney's supply by a maximum of 500 megalitres per day. So, on the one hand they expel wastewater through their ocean outfall and on the other they are desalinating water to meet any shortfalls in supply. This makes no economic sense.

I would hate to see the Bega Valley Shire Council caught in a similar situation say in 50 years' time.

The information provided in this brief submission makes a sound case to establish the true value of the water that is destined to be wasted in the ocean with the construction of the ocean outfall.

1. Hoekstra AY, Mekonnen MM. The water footprint of humanity. Proceedings of the National Academy of Sciences of the United States of America. 2012;109(9):3232-7.