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Look forward

SUBMISSION ON THE 'MANGLES BAY MARINA BASED TOURIST PRECINCT' PUBLIC ENVIRONMENTAL REVIEW

Introduction

The Conservation Council (WA) has identified at least 5 aspects of the proposal to construct an inland marina and canal development at Point Peron where the potential environmental outcomes (given the level of uncertainty) make this project unacceptable. These aspects are

1. The risk to the aquatic environment of Lake Richmond and its threatened ecological communities due to short and long-term changes in the groundwater hydrology.
2. The clear and effectively unmitigated contravention of the EPA's 'Benthic Producer Policy' by the proposed direct and indirect loss of seagrass from Mangles Bay.
3. The potential unresolved consequences of the proposed and ongoing dredging programs and boating activity on the aquatic ecosystem of Mangles Bay and the consequential impacts on the fisheries and marine wildlife of Cockburn Sound.
4. The failure to properly assess or present viable adaptation responses to the likely climate change impacts on this area of coastline, including the impacts of global average and local trends in sea-level.

5. The loss of the long established social values of the Point Peron environment.

   It is also noted that the State Government continues to ignore its own policies on the conservation of urban bushland.

The technical details supporting these fatal flaws will be presented to the EPA in a raft of other submissions. CCWA objective is to provide an overview of what we have learnt from these various contributions from the perspective of the State's peak conservation body.

Comments on Key Environmental Aspects

1. The risk to the aquatic environment of Lake Richmond, and its threatened ecological communities, due to short and long-term changes in the groundwater hydrology.

The PER deals with groundwater and surface water impacts in Sections 6 and 7 of the main document however the actual situation is best understood by reading the Appendix entitled 'Peer Review of Groundwater Modelling'. Unfortunately, although illuminating to some degree, this peer review is not independent as it is clear that the reviewer (Rockwater) had been previously involved in parts of the investigations and had already influenced the modeling approach taken. The EPA should require an **independent peer review of the hydrological investigations and the validity of the modeling assumptions.**

It is apparent from the peer review that the risk to Lake Richmond from any dewatering (the original concept) was high and this is why the proponent has opted for wet excavation. The cost and time implications of this change are not known. It is worth noting that the reasons for these changes in excavation method on not explained in the main PER.

The peer review makes a number of comments that reflect negatively on the competency of the hydrological investigations and explain why a great deal of caution should be applied to making critical decisions based on the results.

' There have been no useful determinations made of the aquifer parameters in the project area, in particular the horizontal hydraulic conductivity of the Tamala

Limestone and vertical permeability of the silty sand/clay layer between the TL and the Safety Bay Sand'.

So can we reasonably assess the risk to the aquatic ecosystem in Lake Richmond or not?

'Water levels and water quality measured in these bores will be dominated by those in the TL which has much higher hydraulic conductivity, and generally higher heads. This can be seen by the increase in salinities with time throughout the depth profiles of bores such as MB10 and 12. The bores should be cemented up to the base of the SBS to prevent saline water from flowing up through them into the SBS'.

This 'stuff-up' provides a useful illustration, not only of the environmental impact of the environmental assessment, but also the risk of saline water intrusion from the TL aquifer including into Lake Richmond from either providing access to the surface or drawing down the buoyant water in the Safety Bay sands (including increased discharge through the marina / canal complex.

This is further supported by the following comment in the peer review

'*The lower water level in the marina will lower groundwater levels in the SBS, resulting in additional flow to that formation (and the marina) from the TL. If the vertical hydraulic conductivity of the aquitard between the formations is 100 times than has been assumed, the quantities of water to be pumped during dewatering in constructing the marina would be much higher than have been calculated. Also it could result in some increase in salinity in the lower part of the SBS'.*

The following comment indicates again that the groundwater investigation was far from comprehensive.

‘*There are probably also private bores in areas west and east of the planned marina that were not surveyed that could potentially be impacted by the construction of the marina and introduction of seawater into it’*

Why has this work not been done? These impacts should be quantified.

Further doubt on the parameterization of the model is indicated by the following comment.

‘The adopted vertical hydraulic conductivity of the silty sand layer of 0.00013m/d for a 3m thick bed is too low and unrealistic’

These unrealistic assumptions need to be corrected in the modeling before the EPA completes its assessment.

The risk associated with the high uncertainty with the hydrological interpretation is summarized in the conclusion as follows:

‘The value of hydraulic conductivity used in the TL in the project area is considered to be too high, and an unrealistically low value of vertical conductivity has been used for the silty sand and the thin, probably discontinuous, clayey aquitard between the TL and SBS’.

‘If the vertical conductivity of the aquitard is much higher than has been assumed there could be higher groundwater flows to the marina, particularly if it is dewatered, with the additional flows originating from the TL. This could result in some salinity increases to the lower part of the SBS’.

If the EPA were to apply the precautionary principle it would recommend against this project based on the uncertainties presented in assessing the impact on the hydrology of the area, including the aquatic ecosystem in Lake Richmond. **Any attempt to reduce those uncertainties to an acceptable level would require a**

thorough regional assessment of the geological and hydrological structure of the Tamala limestone and its relationship to the aquifer in the Safety Bay Sands

A more thorough modeling approach should also consider the impact of a sea level rise of 0.9m on the intrusion of the salt wedge (with and without the marina / canal development) and its consequences on Lake Richmond.

Failure to Protect Other Threatened Thrombolite Communities From Groundwater Contamination

The Thrombolite community in Lake Richmond may well be the last of its type in WA if not in the world. The equivalent microbiolites in Lake Cooloongup were wiped out by Western Mining's contaminated groundwater plume some years ago. It is quite likely that the structures in Lake Clifton have also ceased living due to nutrient inputs and rapidly rising salinity, due at least in part to groundwater extraction. The fact that the living thrombolites have already largely been reduced to fossils due to regulatory failure by both the State and Commonwealth (Ramsar, EPBC Act) governments is a matter of great concern. The regulatory response to this project is literally the last chance to get it right.

In order to downplay the threat posed to the Threatened Ecological Community of thrombolites by intrusion of water from the TL aquifer the proponents continue to suggest that this microbialite assemblage may have developed in seawater and would be tolerant of higher salinities. The proponents state:

"*Historically, Lake Richmond was saline as it was connected to the marine environment. Water quality in the lake in the mid 1960s was brackish to saline with 2000 to 3500 mg/l dissolved salts recorded (English et al. 2003). In the 1960's drains were installed to drain Rockingham's Stormwater into Lake Richmond which have stabilised in the range 300 to 400mg/L totally dissolved solids*".

Lake Richmond was cut off from the sea by the accreting cuspate foreland of Point Peron about 4000 Years BP. Whilst thrombolites are examples of the most

ancient forms of life the structures in the Lake have been dated back to 1400-1500 Years BP, that is long after the connection with the marine environment had been severed. The evidence suggest at the unique microbialite communities in Lake Richmond developed in high PH (8.3 -9), low salinity (< 1.4 ppt) environments rich in calcium, bicarbonate and carbonate from groundwater flowing through Holocene dune sands (Moore 1993, Moore pers.com). The water in the Tamala Aquifer has a geochemistry similar to seawater and dissimilar from the carbonate / bicarbonate rich water in Lake Richmond that presumably flow in from the superficial ground-waters in the Safety Bay Sands. Intrusion of seawater from the salt wedge or saline groundwater from the TL aquifer will fundamentally change the aquatic ecosystem in Lake Richmond.

2. The clear and effectively unmitigated contravention of the EPA's 'Benthic Producer Policy' by the proposed direct and indirect loss of seagrass from Mangles Bay.

The proponent admits to the direct and indirect seagrass loss of 5.66 hectares of seagrass. This does not include longer term attrition due to increased sediment instability from the dredged channel and the chronic impacts of the compromised water quality in the adjacent marina. Even so the cumulative loss threshold for seagrass meadow in Cockburn Sound under the EPA's Benthic Primary Producer Habitat Policy has been vastly exceeded. That is, the acceptable level of additional seagrass loss in Cockburn Sound is zero. CCWA expects the EPA to apply its policy to this assessment.

The proponent has attempted to circumvent the EPA's Benthic Primary Producer Habitat Policy by claiming that at some unspecified time it will be able to restore seagrass meadow within the anchor change scars in Mangles Bay and or elsewhere.

The proponent's attempts at seagrass planting in Mangles Bay are on a trajectory to failure probably because the finer, organic sediment in this area is not sufficiently stable. In any event what is proposed is a speculative offset with a lag

time, if successful, of at least 10 – 15 years and as such should have no bearing on the application of the policy. That is, it will not mitigate the food-chain impacts on other ecosystem components including current fish and marine wildlife populations caused by the loss of primary production.

CCWA would expect the EPA to defer any consideration of projects involving removing seagrass meadows (below the cumulative loss threshold), until the replacement seagrass meadow has been established and demonstrated to be ecologically functional.

3. The potential unresolved consequences of the proposed and ongoing dredging programs and boating activity on the aquatic ecosystem of Mangles Bay and the consequential impacts on the fisheries and marine wildlife of Cockburn Sound.

The proposed dredging program will directly and indirectly have the immediate impact of removing 5.66 Ha of benthic producer habitat. Thereafter sediment instability around the dredged channel, the periodic re-suspension of fine sediment in the channel and frequent re-dredging will drive an ongoing trend in seagrass loss of unknown dimensions. The compromised water quality in the marina, including storm-water discharges to Cockburn Sound, will put further pressure on a system which continues to decline and may be approaching an ecological tipping point from which it will not recover.

Long-established research indicates that Mangles Bay (as a sheltered seagrass environment in an otherwise exposed coastline) is an important fish nursery, at least on the scale of Cockburn Sound. For some species e.g. King George Whiting it may be critical nursery habitat for much of the west and even the south coast. The area supports stocks of the principal commercial and recreational fish species and critical non-exploited forage fishes such as anchovies, the principle prey species for the Little Penguins from the Garden Island colony (B. Cannell Appendix - Potential Impacts of Mangles Bay Tourist Precinct on Little Penguins). Mangles Bay is used as a reference site to determine the annual recruitment strength of a

range of targeted fish species precisely because of it functional importance (See Appendix – Mclean (Oceanica) Potential impacts of the proposed Mangles Bay marina based tourist precinct on fish and invertebrates).

Given the importance of the Mangles Bay to both fisheries and marine wildlife the current declining trend in the indicators requires more attention and the potential for the additional ecological stresses generated by this development to trigger the total demise of the seagrass meadow is of major concern.

Recent sampling conducted by the Sentinel Penguins program (Conservation Council WA Citizen Science Program) indicates that there are elevated levels of mercury in the aquatic foodchain at the southern end of Cockburn Sound. Some individual penguins have feather concentrations around proposed toxic effect levels. Since Mangles Bay is the sink where most fine sediments and contaminants circulating in Cockburn Sound are ultimately stored it is potentially a major source of methyl mercury generation, especially given the area is eutrophic and its organic sediments may become anoxic under certain conditions. Dredging of the sediments in Mangles Bay may significantly enhance this ecological hazard.

Dredging in Mangles Bay could produce a significant Hg contamination hazard, particularly for localized top predators like the Garden Island Little Penguins. Assessment of this hazard would require sampling Hg in the resident biota of the Mangles Bay seagrass meadow, preferably choosing indicators from different trophic levels.

4. The failure to properly assess or present viable adaptation responses to the likely climate change impacts on this area of coastline, including the impacts of global average and local trends in sea-level.

The proponent has made no real attempt to address the interactions between the proposed development, climate change drivers and key environmental assets in the project area. They say they have considered the State Planning Policies 0.9m sea-level rise in their design but the impact was not modeled. LIDAR analysis

could have been employed to look at the static sea-level at 0.9m over the region. Such analysis of levels at Mandurah area show vast areas that will no longer be habitable, particularly around the estuary. The proponent does some 'arm-waving' at possible engineering solutions but does not assess the additional environmental impact of these measures.

In relation to climate and sea-level change the proponent also needed to consider;

- the erosion of the landform (i.e. the Point Peron tombolo) resulting from reduced swell protection from the offshore limestone reefs,

- groundwater changes including the penetration of the salt wedge with a sea-level rise of 0.9m,

- the impact of extreme *La Nina* events on top of global average sea-level rise,

- the impact of sea-temperature rise (and thermal expansion) in a region experiencing rapidly rising sea temperatures (relative to other parts of the world),

- the impact of extreme storm events,

- The impact of tsunami waves entering this constrained corner of Cockburn Sound and the marina.

5. The loss of the long established social values of the Point Peron environment.

The natural coastal environment of Cape Peron and its low key camps has long been the focus of community education and recreation. Certainly a great many people can recall their family holidays there or their early adventures away from home with the school or scouts or church group. The bio-physical impact of this development together with the privatization of the public lands is a major threat to the social values that have historically been nurtured by this environment.

The implementation of this development, if it were to be approved, would be extremely protracted taking up to 9 years to complete the various excavation stages alone. The major earthworks including the wet excavation, possible dry excavation, dredging and haulage will not only diminish the value of Point Peron as an environmental asset and reduce the tourism amenity it will also cause massive life-style disruption in the north-western sector of Rockingham. It is not clear whether the protraction of the development period is the result of the necessity for wet excavation, the probable difficulty in financing the whole project or a combination of these and other factors. In any event the reason for such a protracted development plan should be made explicit.