

The Director  
Referrals Section (EPBC Act)  
Approvals and Wildlife Division  
Department of the Environment and Heritage  
GPO Box 787 CANBERRA ACT 2601  
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RE: Referral 2009/4833

April 22<sup>nd</sup> 2009

Dear Director

I refer to the referral of Peter Croft, Director, Coorong, Lower Lakes and Murray Mouth Project, South Australian Department for Environment and Heritage to the Minister under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) titled: Emergency response for the crisis management of Acid Sulfate Soils in the Goolwa Channel, Finniss River and Currency Creek, South Australia.

This referral will have an adverse effect on Lake Alexandrina and the wetlands and swamps of the Currency Creek and Finniss River. The acid sulfate soil conditions are not as severe as represented, and can be rectified in other, less damaging ways. The possibility of increasing fresh water flows in the River Murray, into the Lakes and out to sea are not considered, despite this being SA Government policy.

As permitted under the EPBC Act and given the significant impacts on the matters of National Environmental Significance identified in Referral 2009/4833, I request that the Minister reject the proposal to construct the regulators and weirs in the Goolwa Channel, River Finniss and Currency Creek.

If the Minister does not decide this at this point then I submit that this action should be declared a controlled action for the purposes of the EPBC Act. The controlling provisions for this action should be:

- a) subsections 16 and 17B on the grounds that the action is a matter of National Environmental Significance and is likely to have a significant impact on the Ecological Character of the declared Coorong, Lake Alexandrina and Lake Albert Wetland.
- b) subsections 18 and 18A on the grounds that the action is a matter of National Environmental Significance and is likely to have a significant impact on the Listed Threatened Species and Ecological Communities
- c) subsections 20 and 20A on the grounds that the action is a matter of National Environmental Significance and is likely to have a significant impact on the Listed Migratory Species under the JAMBA and CAMBA treaties.

Yours faithfully,

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## **1. The Effect on Lakes Alexandrina and Albert.**

Over the last 2½ years water levels in Lakes Alexandrina and Albert have continued to decline, currently being recorded at -1.06 m AHD. (<http://data.rivermurray.sa.gov.au/>) This decline has resulted from the combined effects of drought and continuing over-extraction of the river's diminishing resources by humans.

The Lakes have been saved from an even more drastic reduction in levels and further increases in salinity by life-giving winter inflows from the Finnis River and Currency Creek. Under the current conditions of the last two years, water from these two sources and their tributaries has been the main net inflow into Lake Alexandrina. The 1Gl per day maintenance flow arriving from the Murray has been effectively “cancelled out” by pumping into Lake Albert.

Despite this, with moderate local winter rains, the refreshing effects of the Finnis River and Currency Creek each season could keep the Lakes alive.

However, the building of a “regulator” at Clayton will cut off this life-giving water from the Lakes, containing it in the limited ox-bow basin between Clayton and the Goolwa Barrage.

The “siphons” permitting egress of water to Lake Alexandrina once a pool level of 0.7 m AHD has been reached, are in practice, totally inadequate. They will, in theory, allow 1Gl a day to flow into Lake Alexandrina. If this capacity is exceeded, excess flows will be directed through the barrages.

Traditionally in a normal year, the Finnis River comes down in one big flood in August or September. Such an event has often raised the level of Lake Alexandrina by 30 cm within a few days. In other words, a big proportion of water arrives all at once, and is quickly dissipated. Once the pool level of 0.7 m AHD is reached, 1Gl a day will flow through the “siphons” for perhaps a week, the rest flushing through the barrages. While this is excellent for the Coorong, it is totally inadequate for the Lakes.

The Ramsar listed wetlands of Lakes Alexandrina and Albert, once prolific with freshwater life and providing essential habitat for endangered migratory birds, are blatantly being abandoned if this project goes ahead.

A “regulator” at Clayton, combined with the already proposed weir across the Murray at the Pomanda Island site, will isolate Lake Alexandrina and by extension, Lake Albert. With no regular inflows and no outflow through the Murray Mouth to remove accumulating salinity and other pollutants, both Lakes will be condemned to an inevitable death. This death could be slow – by evaporation and increase in salinity, or rapid, should the South Australian Government act on plans already proposed to admit sea water.

Such a death will be an environmental catastrophe for all creatures currently supported by

the Lakes. The fish-kill alone will cause a massive health hazard for those communities and farms around the Lakes.

Of the proposed weir at Pomanda Island and the “regulator” at Clayton, the Clayton construction will have the most immediate effect on the health of Lake Alexandrina, as it cuts off what has been, over the last two and a half years, its winter lifeline.

## **2. Acid Sulfate Soils.**

The main premise for building these engineering “solutions” appears to be the perceived risk of acidification in the Goolwa Channel, when the first seasonal rains cause flows over the now dry lower reaches of the Finniss River and Currency Creek. (*referral, section 2.1, page 7*)

This fear in turn is based on a single report issued by the CSIRO entitled:

“Preliminary Assessment of Acid Sulfate Soil Materials in Currency Creek, Finniss River, Tookayerta Creek and Black Swamp region, South Australia” by Rob Fitzpatrick et al. (CLW01/09)

Note the word “preliminary”. Dr Fitzpatrick himself states:

“It should be noted that this is a preliminary report. The conclusions drawn in this preliminary report may alter when full acid soil chemistry is completed on the collected samples.” (*Fitzpatrick, page iii*)

In his conclusion, we are advised:

“We recommend that the detailed monitoring program be conducted along at least three transects in both Currency Creek and Finniss River catchments and along at least one transect in the Tookayerta Creek/Black Swamp catchment. However, we recommend that the rapid monitoring be conducted along all 12 transects, which includes all current 39 soil profile sample sites.” (*Fitzpatrick, page 20*)

Most importantly, the following disclaimer is issued:

“CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice.” (*Fitzpatrick, inside front cover*)

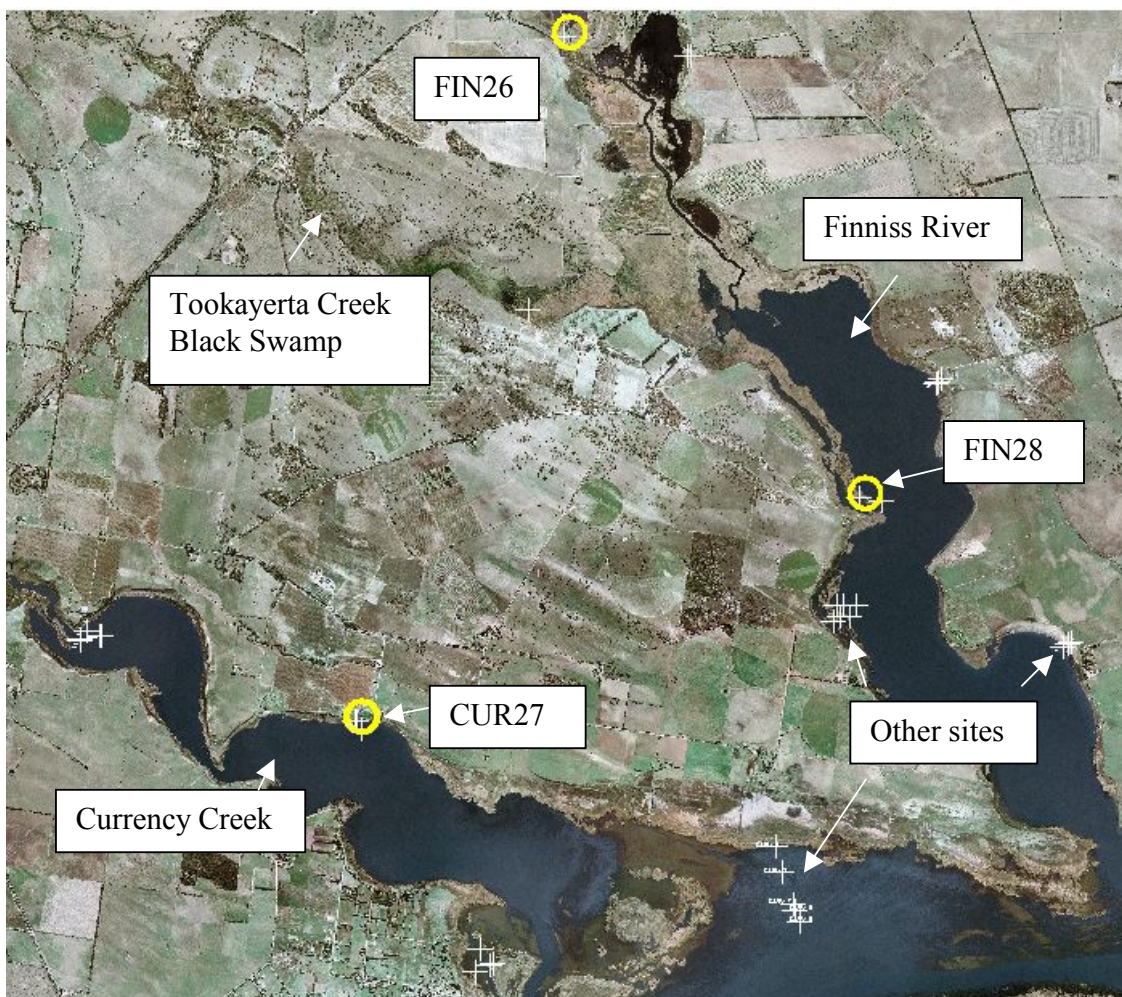
Despite this, the referral appears only to be referencing this preliminary paper as a justification for these major works. The referral states:

“Studies by the CSIRO (presentation by Dr. Fitzpatrick 2009) show that 2,000 hectares of sulfuric material has already been exposed in the Lower Lakes region. This equates to a potential of approximately 480,000 tonnes of sulfuric acid already formed.” (*referral, page 14*)

Dr Fitzpatrick mentioned this in presentations given at Goolwa and Clayton on

15<sup>th</sup> January 2009. But these presentations were not accompanied by a published paper. Nowhere are these figures mentioned in the CSIRO preliminary report, nor are they supported by any other references in the appendix. The statement on page 14 is therefore a serious misinterpretation of information presented in the CSIRO preliminary report, and a breach of the report's own disclaimer.

Close examination of Dr Fitzpatrick's preliminary paper reveals that of the 38 sites visited, 19 had no data reported and 15 were samples of water only, indicating that at the time of the measurement these sites were still submerged. Of these 15, 13 gave alkaline measurements (pH greater than seven). This leaves 4 sites, where an actual soil pH value is given. As two of these are only 5 m apart there are essentially only three sites: one on the Finniss River flats near Black Swamp (FIN 28), one on the Currency Creek flats (CUR 27) and one at Wally's Landing, Finniss River channel (FIN 26).



*Orthophoto 2002. Fitzpatrick sites shown by crosses. Acidic soils by circles.*

So the decision to build these massively expensive engineering constructions with the potential to cause unexpected adverse environmental effects is essentially based on three acid readings.

There is no reference in this referral to the detailed monitoring program recommended by Dr Fitzpatrick having taken place, nor to the promised following full report. Neither of these have appeared in the public domain.

**Recent pH measurements.**

In the period since Dr Fitzpatrick's preliminary report was prepared, the estuaries of the Finniss River and Currency Creek have dried out. To see what conditions are like now, preliminary surveys were carried out recently (April 12-19 2009) by a scientifically supervised community group using professional methodology. These measurements indicate that the acid sulfate problem may not prove to be anywhere near as severe as anticipated in the referral.

Readings were taken on both the surface and at 10 centimetre depths in random sites on the exposed sands of both the Currency Creek and Finniss River estuary flats. A majority of the sites on the Finniss River flats gave pH readings of 8.5 to 9. A few were in the range pH 6 to 7. Highly acidic readings of pH 3.0 to 3.5 were only obtained near the old +0.7 m AHD shoreline. If there is a big enough flood to reach these latter sites, there will be a massive amount of rapidly flowing water, which will be more than enough to dilute and neutralise the acid released to a safe level, even without extra buffer. Flowing over large areas of what appear to be predominantly alkaline flats, the Finniss water could be expected to pick up some neutralising capacity.

Dr Fitzpatrick's sites at Wally's Landing were revisited (FIN 26). Readings taken near the 0.75m high river bank edge varied between pH 3 and pH 5. The top of the bank gave a reading of pH 9. Transects were taken both at Dr Fitzpatrick sites, and at another 15 m to the west, across the bed from the cliff bottom to the edge of the trickle of water still flowing.

<b>Transect 1</b>	<b>0 m Bottom of river bank</b>	<b>4 m vegetation</b>	<b>5.5m vegetation</b>	<b>7.7 m clods</b>	<b>10.7 m clods</b>	<b>13.7 m Stream edge</b>
pH top layer	3.0	5.5	7.5	8.5 to 9	9.0	9.0
pH -10cm	3.5	5.0	8.0	5.5 to 6.5		
pH water				7.3	7.7	7.8

<b>Transect 2</b>	<b>0 m top of bank</b>	<b>0.5 m Yabby hole</b>	<b>2 m Tree roots</b>	<b>4 m edge of vegetation</b>	<b>7 m cracked clay</b>	<b>9 m clods</b>	<b>12 m Stream edge</b>
pH top layer	9.0	3.5	4.0	4.5	7.5	9.0	9.0
ph -10 cm			4.5	4.5			
pH water					7.5	7.5	7.5

The results at Wally's Landing appeared to conform with those of the Finniss flats – acidic pH near the bank, then readings gradually becoming less acidic through the vegetated area of the upper bed (ending approx. 4.5 m to 5.5 m). The remainder of the

transect across the cracked clay bed was basic. Water in the cracks between the clods averaged pH 7.5 and in the stream itself was pH 7.8.

The situation on the Currency Creek flats is less clear-cut. Surface pH readings showed either 4 to 4.5 or 8.5 to 9. While similar readings appeared in clusters i.e. groups of 4 to 4.5 or groups of 8.5 to 9, at this early point of the survey spatial distribution still appears to be random. However, the ratio of acidic to basic readings was approximately 50-50. One could therefore reasonably expect that when the flats were inundated, the two could neutralise each other.

**Measurements by other professional bodies:**

Measurements were taken on the property of B & A Allnutt by two other professional bodies:

a) South Australian Murray Darling Basin Natural Resources Management Board:

Location: Finnis River flats, Finnis

Date: 15<sup>th</sup> July 2008

Easting 0304605

Northing 6077840

Layer	Site 1 (In Wetland)	Site 2 (Between site 1 and high water mark)	Site 3 (High water mark)
0-5cm pH	7	6	6
5-30cm pH	7	5	6.5
>30cm pH	7	5	6.5
Soil Salinity (EC)	3730	3450	2490

(ref: pers. com)

b) Water parameters measured by Earth Systems, of Melbourne, in the Finnis River at Finnis on April 9<sup>th</sup> 2009, are as follows

pH	8.18 @ 23.1°C
EC	30.9 mS/cm
TDS	21.3 g/L
Turbidity	10.8 NTU
Dissolved oxygen	8.20 mg/L
Redox potential	+41.9 mV
Alkalinity	~195 mg/L CaCO <sub>3</sub> eq.

(ref: pers. com)

This indicates both alkaline pH and the presence of buffering carbonates.

The current pH in the Goolwa Channel on 20<sup>th</sup> April 2009 was 8.26.

(<http://data.rivermurray.sa.gov.au/>)

These combined figures for soil, water in cracks, stream water and water in the Goolwa channel, preliminary though they are, strongly suggest that when the first flush of water comes down the Finnis River and Currency Creek, there will be little if any problem with acid. Water in the Goolwa channel itself is currently maintaining a slightly basic profile. Stream water in the Finnis has been recently shown to be pH 7.8 (measured at Wally's Landing), and pH 8.81 (measured at the Allnutt's property), thus being slightly basic even now. The soil measurements taken thus far indicate an urgent need for much wider surveys with many more measuring points to give a comprehensive picture. Serious hotspots could be given remedial treatment by liming or mulching. None of this preliminary evidence justifies these massive engineering works.

### **Earth Systems Report**

The Management Options report by Earth Systems Dr. Jeff Taylor, recently released by DEH, offers a range of satisfactory options for dealing with possible acidic sites in the Lower Lakes, without constructing weirs. This report is NOT cited as a reference at all in the referral, even though it was written for PIRSA and DEH and dated December 2008. One has to ask why not.

Important points from the conclusion, page 34, "Stage 1 Preliminary Assessment of Treatment Options":

"The addition of substantial quantities of limestone to the Lower Murray Lakes for the purposes of neutralising AMD from Acid Sulfate Soils is a feasible option, from both a technical and economic perspective."

"The mass of sulfuric acid likely to be generated in response to dewatering of the sediments around the shoreline of the Lower Murray Lakes has yet to be accurately quantified."

This conclusion

- a.** Canvases a practical option to deal with possible acid problems which is a great deal simpler and cheaper, and less environmentally damaging, than the building of "regulators" and the pumping of water from Lake Alexandrina.
- b.** Reinforces the need for further monitoring and studies to understand the actual extent and mechanism of acid sulfate soils, and the emerging science associated with their threat to water bodies.

Note, nowhere in either Dr Fitzpatrick's or Dr Taylor's reports is there a single recommendation for the building of weirs and "regulators".

## **Conclusion.**

This referral should be rejected on grounds that:

1. Justification for the “regulator” works to counter the risk of acidification in the Goolwa basin, the Finniss River and Currency Creek is based on one single preliminary report (with only 4 acid soil readings from 3 sites), and against the advice of the report's own cautionary disclaimer.
2. The speculative figures regarding amount of acid released appearing on page 14 of the referral do not appear in the CSIRO's preliminary report at all. Nor are there any other hard data references to these figures in the appendices.
3. There is no evidence of the further monitoring recommended by Dr Fitzpatrick having taken place, nor of the promised full report to follow up the initial preliminary report by CSIRO.
4. Nowhere in either Dr Fitzpatrick's report or the report of Dr Jeff Taylor of Earth Systems, is there a single recommendation for the construction of weirs or “regulators”.
5. Monitoring from three other sources suggests the acid danger may be far less than first feared. These preliminary surveys need to be augmented by a comprehensive program of measurement, embracing many points over the entire area of the Finniss and Currency Creek flats and upstream and downstream of Wally's Landing, before any meaningful conclusion can be drawn.
6. Adverse environmental effects.

There will be serious adverse environmental effects on Lake Alexandrina, as its lifeline of fresh water from the Finniss River and Currency Creek and their tributaries will be cut off by the “regulator” blocking the channel at Clayton. There are also possible adverse environmental effects on the Finniss River, Currency Creek, Tookayerta Creek and the Black Swamp, due to the disparity in height between the Finniss River and Currency Creek “regulators” (0.0 m AHD) and the Clayton “regulator” (+0.7 m AHD). There is a strong possibility of the saline water being pumped from Lake Alexandrina into the Goolwa basin pool over-topping these lower “regulators” and travelling upstream.

The salinity of this water east of the Clayton “regulator” is typically 9 to 10,000 EC. (measurements reported by M. South, farmer, Point Sturt). The entry of saline water to sensitive wetlands will have serious and damaging effects, in particular, on the reed beds in Tookayerta Creek, habitat for the nationally endangered Mount Lofty Ranges Southern Emu-wren.

Upstream refuge pools contain precious fresh-water habitat – the remnants from the once prolific Lower Lakes fringing wetlands – and are thus critical to the survival of freshwater species endemic to the area, including Murray Hardyhead and Yarra Pygmy Perch.

7. Nowhere in this referral is the possibility canvassed to actually obtain more water down the Murray and thus rehabilitate the system this way. All the millions being spent on engineering solutions could be spent instead to pay a decent higher-than-market-price to encourage farmers with high security licences to sell. There are many farmers out there approaching retirement age who would be attracted by this offer.

I repeat what I have expressed in other communications elsewhere; the health of a river system is indicated by the health of its estuary. To abandon the estuary is to abandon the idea of a sustainable healthy river. History is littered with failed civilisations dependent on failed irrigation schemes. That failure began with just the situation we are in now.

Proposals for such solid and expensive engineering works as these “regulators” at Clayton and the Finnis River and Currency Creek, combined with proposals for a weir across the Murray at Pomanda Island site, strongly suggest the acceptance by the South Australian Government that the River Murray will never flow into its once flourishing Lower Lakes and Coorong again.

To abandon these internationally significant wetlands covered by the Ramsar, JAMBA and CHAMBA agreements, is not only a travesty which should shame any government or nation, it is also the first step in the demise of our once productive Murray Darling Basin river system.