AGENDA

SPECIAL COUNCIL MEETING

14th May 2009

COMMENCING AT 6.00 P.M.
BERRI BARMERA COUNCIL

Notice is hereby given pursuant to Section 83 of the Local Government Act 1999, a Special Meeting of Council will be held in the Council Chambers, 19 Wilson Street Berri SA, on Thursday 14\textsuperscript{th} May 2009 commencing at 6.00 p.m.

\vspace{1cm}

DAVID BEATON
CHIEF EXECUTIVE OFFICER

11\textsuperscript{th} May 09
THE BERRI BARMERA COUNCIL
INDEX FOR MEETING TO BE HELD 14th MAY 2009

1: PRESENT:

2: APOLOGIES:

3: MOTIONS ON NOTICE: - Nil

4: REPORTS:
   4.1 Lake Bonney - Options

5: CLOSURE:
1: PRESENT:

2: APOLOGIES:

3: MOTIONS ON NOTICE: - Nil

4: REPORTS:

4.1 Lake Bonney - Options

REF: 9.21.4
OFFICER: CEO

Appendix: Yes (Appendix No. 1)

Strategic Plan:
1) Linked to Corporate Objectives: Yes
2) Corporate Objective: EH1; CS1, SC1

Budget:
(1) Impact: No
(2) Description: N/A
(3) Allocation: N/A
(4) Expenditure to date: $ -

Annual Business Plan:
(1) Linked to Plan: No
(2) Project: N/A

RECOMMENDATION:
(1) That Council welcomes the commitment of the state government to Lake Bonney to supply 26 GL of water, and supports the recommendation of the Lake Bonney Management Committee in the short term.

(2) That Council considers this measure an interim measure until the management plan for Lake Bonney is completed as the plan will include long-term ecological sustainability of the Lake and will consider the merits of regulating the flows into and out of Lake Bonney. The Council seeks the Minister’s support in finalising the Management Plan as soon as possible.

(3) That Council confirms that its preference, until the adoption of the Management Plan, is that a regulator is not installed at Lake Bonney.
4.1 – Continued

REPORT:

Subject Detail
Further to on-going discussions regarding Lake Bonney, Council has been requested to advise Minister Maywald of its preference for “short term” management options for the Lake. The Lake Bonney Management Committee has met, and resolved to recommend to Council that Option 2 be adopted. Option 2 reads: That “Water quality remains within ecological thresholds for the next 9 years. Enables fish movement during periods of refill”.

The Minutes of Meetings of the Lake Bonney Management Committee held on the 6th May and 4th May, together with a copy of the presentation made by Judy Goode, SA River Murray Environmental Manager are attached at appendix.

Budget - N/A
Actioned By - CEO
Timeframe – May 2009

5: CLOSURE:
1: **PRESENT:**
Messrs P. Symens, B. Frost, J Bannear, M. Fuller, B Hollis, Ms H. Hockey, Mrs R. O’Dea, M Campbell
Mrs T Alexander
Visitors: Cr T Chapple

2: **APOLOGIES:** Mayor P Hunt, Cr B Kanakaris, M Dunk, R Swinstead.

**Recap of options**

Option 2 – Water quality remains within ecological thresholds for the next 9 years, enables fish movement during periods of refill.

Option 3 - Water quality remains within ecological thresholds for the next 10 years, enables fish movement during periods of refill. This option would involve trade offs and would effect other wetlands & irrigators down stream

**MOTION (48/09)**
Lake Bonney Management Committee recommend Council proceeds with option 2

P Symens/P Stribley CARRIED

11: **CLOSURE:** 8.20pm
THE BERRI BARMERA COUNCIL

MINUTES OF A MEETING OF THE LAKE BONNEY MANAGEMENT COMMITTEE TO BE HELD ON MONDAY MAY 4TH 2009 AT 7.10 p.m. AT THE BARMERA HOTEL MOTEL FUNCTION ROOM, BARWELL AVENUE BARMERA

1: PRESENT:
Mayor P.R. Hunt, Cr V. Kanakaris, Messrs P. Symens, B. Frost, J Bannear, R. Swinstead, M. Fuller, B Hollis, I Penno, Ms H. Hockey, Mrs R. O'Dea, M Campbell
Messrs S.D. Kubasiewicz (Manager, Environmental Services), Mrs T Alexander
Visitors: Cr T Chapple, Messrs S Warrick, Ms J Goode, Ms M Deakin

2: APOLOGIES: Harold Willcourt, Merv Dunk, John Beech, Joe Gropler

3: CONFIRMATION OF MINUTES:
MOTION (LBMC 42/09)
That the Minutes of the Meeting held on March 9th 2009 be taken as read and confirmed.
P Symens/B Kanakaris CARRIED

4: BUSINESS ARISING.
Recommendation

5: PREsentations:
Judy Goode made a presentation to the committee. The presentation outlined 3 options
Option 1 – Do nothing
Option 2 – Water quality remains within ecological thresholds for the next 9 years, enables fish movement during periods of refill.
Option 3 - Water quality remains within ecological thresholds for the next 10 years, enables fish movement during periods of refill. This option would involve trade offs and would effect other wetlands, irrigators down stream

MOTION (LBMC 43/09)
Informal meeting to be held on Wednesday 6th May 2009 at 7.30pm in the Len Mahoney Room Berri Town Hall to discuss options 2 and 3
P Symens/H Hockey CARRIED

6: CHAIRMAN’S REPORT:
MOTION (LBMC 44/09)
That the Chairman’s Report for April 2009 be taken as read and confirmed
H Hockey/I Penno CARRIED
7: **COUNCIL MEETING:** Items report to the council meeting held on the 27th April 2009 being the Foreshore Plaza plans, number of boat ramps. Entry sign to be erected either side of Barmera including a photo. Committee were given the opportunity to pick 2 photos for these signs.

**MOTION (LBMC 45/09)**
That a new selection of pictures to be placed in the Barmera Visitor Centre for public comment and relayed to the Committee at the next meeting.  
I Penno/B Frost  
CARRIED

8: **REPORTS:**

8.1 **Lake Bonney Foreshore Plaza**
Steven Kubasiewicz to contact PIRSA concerning the usage of funding and if it can be redirected to other areas.

**MOTION (LBMC 46/09)**
Foreshore Plans to lay on the table at this stage.  
I Penno/H Hockey  
CARRIED

9 **CORRESPONDENCE:**

**MOTION (LBMC 47/09)**
That the correspondence to Karlene Maywald’s Office and Rajiv Mouveri, Project Manager, Murray Futures – Riverine Recovery Project, Department of Water Land and Biodiversity Conservation seeking funding and South Australian Tourist Commission accepting Emily White’s resignation from committee and correspondence from Karlene Maywald’s Office acknowledging request for funding be received.  
I Penno/R Swinstead  
CARRIED

10: **OTHER BUSINESS:**

10.2 **Next meeting date:** The date of the next meeting for the committee is the 1st June 2009.

11: **CLOSURE:** 9.15pm
Lake Bonney: Current Status, Options Assessment and Short-term Management Actions

May 09

Judy Goode
SA River Murray Environmental Manager
Purpose of this presentation

• This Lake Bonney Community Management Committee has been specifically formed to focus on potential long term management options for the Lake and Loch Luna

• Project brief has been developed to assess a range of long-term management options - still awaiting confirmation on funding prior to initiating this investigation

• The response to the temporary disconnection of Lake Bonney has the potential to impact on long term management options

• It is appropriate that this community group has an opportunity to consider a range of short term management options and make a recommendation (to be submitted to the Minister) on a preferred option
Lake Bonney was temporarily disconnected from Chambers Creek/Loch Luna in September 2007, along with 5 other unregulated wetlands and 27 regulated wetlands which had been progressively disconnected since September 2006.

Disconnecting Lake Bonney has achieved evaporative water savings of 42,158ML (up to and including 30 April 2009).

Disconnecting the Lake involves a level of risk.

Whilst the MD Basin controlled storages remain at critically low levels (1,285GL or only 14% of capacity) compared with the long term May average of 4,960 GL (53% capacity), the modelling and monitoring results have raised serious concerns about an extended closure of Lake Bonney.

Due to highly elevated and highly saline ground water intrusions entering the Lake, salinity levels will continue to rise in the absence of significant freshwater inputs.

To maintain salinity levels within acceptable ecological thresholds for fish and turtles (<23,000EC), a 10GL partial refill allocation was provided to the Lake from November 2008 to January 2009.
Impacts of temporary blockage

- Water levels will begin to drop slowly, at the rate of evaporation – approx 8mm/day in summer, 2mm/day in winter
- For example, if the river connection was blocked for 8 months, water surface area would reduce by ~5%
- Average lakeshore retreat of 60-70 metres over 8 months
- Increase in saline groundwater inflows
- Reduced access for recreational users, jetties
- Increased salinity of ~7,000EC over 12 months
- Persistent increase of ~1200EC after 12 months
Impacts of temporary blockage

- Reduced water access for irrigators, domestic/stock users – need to provide alternative water access
- Retreat of fish populations to deeper water, potential intolerance to increasing salinity, DO events, algae
- Potential impact on recreation and tourism
- Odours generated as Lakeshore exposed - ASS risk to be identified
- Cultural heritage issues – potential exposure of burial sites and Indigenous artefacts
When would the Lake be refilled?

- This will depend on flows to South Australia in 2007-08
- It is hoped a blockage would only be needed for 12 months
- Under the worst case drought scenario, this could extend well beyond 12 months
- Ecological triggers will be developed
- Implementation of a robust monitoring plan
Long-term ecological risks

- Increased salinities
- Potential for acid sulfate soils
- Deteriorating ecological condition (i.e. tree health and loss of species diversity resulting from delayed refill)
- Pest plant and animal impacts
- Need for a drought recovery strategy, based on refill triggers
Long-term opportunities

• Potential for permanent pump relocation from lakes, wetlands and backwaters – submission being prepared to NWC
• Upgrade and install appropriate infrastructure
• Development of wetland management plans and construction of permanent inlet/outlet regulators for improved long-term management outcomes
Whilst the 10GL allocation had the desired effect of reducing EC, due to the refill commencement date and high evaporation losses over summer, salinity levels have increased to an average of 16,500EC (as of 24 April 2009)

Under a “do-nothing” scenario, hydraulic modelling indicates that by 1 July 2009, salinity levels will be 20,309EC

Numerous scenarios have been modeled to assess a range of short term (<5 years) management options for Lake Bonney (aim is to keep salinity below inferred ecological trigger for fish and minimize persistent salinity in the lake)

Instructions to hydraulic modellers:

- Identify the minimum water requirements needed to keep salinity levels in Lake Bonney <21,000EC for the next 5 years.
- Ensure actions do not have an adverse EC impact to downstream users.
- Don’t be constrained by focusing only on freshwater inputs.
Options assessed

- Do- nothing

- Influence of 10GL, 15GL and 20GL (200ML/day) allocation beginning 1 July every year until reconnection

- **Influence of 26GL (500ML/day) allocation beginning 1 July every year until reconnection**

- Inflows of 10GL delivered throughout the year, coupled with a 15GL (500ML/day) booster

- Inflows of 15GL delivered throughout the year, coupled with a 10GL (500ML/day) booster

- **Inflows of 26GL (500ML/day), coupled with outflows of 6GL (constant)**

- **Refill of Lake Bonney and reconnection to the river, with regulating structure to prevent saline discharge to the river**

*only the 3 options in blue keep EC <20,000*
Influence of 26GL (500ML/day) allocation beginning 1 July every year until reconnection
Influence of 26GL (500ML/day) allocation beginning 1 July every year
Inflows of 26GL (500ML/day), coupled with outflows of 6GL (constant)
Refill of Lake Bonney, with water levels kept at 9.7mAHD for the next 5 years
Refill of Lake Bonney, with water levels kept at 9.7mAHD for the next 10 years
Issues with any scenario that relies on exporting saline water out of Lake Bonney:

- **Disposal**
  
  *(We have investigated potential disposal to Loveday and Cobdogla Irrigation Drainage Disposal Basins; as well as Noora Disposal Basin. All have issues).*

- **Cost**

- **Infrastructure**
  
  *(new infrastructure would be required in association with relying on established CIT infrastructure which has been designed for different purposes and to cater for different customers)*

- Salt remains on the River Murray floodplain if exported to Loveday or Cobdogla disposal basins

- **Exporting saline water out of Lake Bonney is not viable**
<table>
<thead>
<tr>
<th>Option</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do Nothing</strong> (scenario that would see no additional freshwater added to the Lake until SA returns to entitlement flow conditions)</td>
<td>Significant water savings during the ongoing and worsening drought.</td>
<td>Water quality will deteriorate. Fish, turtles and vegetation will die. Water levels will continue to recede. ASS risks may be increased. Persistent salinity difficult to manage long-term</td>
</tr>
<tr>
<td><strong>26GL/yr for the next 5 years (with culverts)</strong></td>
<td>Water quality remains within ecological thresholds for the next 9 years. Enables fish movement during periods of refill.</td>
<td>Significant ongoing investment in monitoring and reporting required. Ecological trigger approaches every year. Gradual increase in persistent salinity.</td>
</tr>
<tr>
<td><strong>Immediate refill with water level kept at 9.7mAHD for the next 5 years (with culverts)</strong></td>
<td>Water quality remains within ecological thresholds for the next 10 years. Scale down monitoring requirements. Enables fish movement.</td>
<td>Requires greater volumes of water (refill plus losses). Ecological trigger well below every year. Gradual increase in persistent salinity.</td>
</tr>
</tbody>
</table>
Where will the water come from?

• Year 1, 2, 3, 4, 5 Option 2 – 26GL /annum

• Year 1 Option 3 - Refill volume of 27 GL (to return to 9.7m AHD) plus 29 GL evaporation

• Year 2, 3, 4, 5 Option 3 – evaporation only

• Evaporation losses could be sourced from Dilution Flows (696 GL/year)

• Refill volume could be sourced from other wetland evaporative savings – this will inevitably involve tradeoffs.
Both of the two refill options will be contingent on the installation of box culverts in the existing earthen embankment for the following reasons:

- Prevent saline discharge to river if weir pool level drops
- Cost (immediate and for future refills)
- Ease of operation
- Maximise benefits of freshwater inflows (ability to apply rapid transfer)
- Potential to retrofit carp cages to culverts *(contingent on funding)*

**The box culverts should not be considered permanent regulators and can be reused** (consistent with preferred long term management actions yet to be identified)

Persistently higher salinity will remain in the Lake until the next flood
Recommendations

The LBMC is asked to provide recommendations to the Minister on the preferred ‘short term’ management options:

OPTION 1       Do nothing
OPTION 2       26GL freshwater inflow annually
OPTION 3       Refill Lake and maintain connection to the river (includes refill volume of ~ 27GL in year 1 + annual evaporative losses ~ 29GL)
Discussion...
Lake Bonney Modelling 2009

Tailwater depth and Q calculations

Date: 29-Apr-09

Number of box culverts: 2
Length: 6.1 m
Width: 1.2 m
Height: 1.2 m
Slope: 0%
Entrance type: Wingwall flare 30-75 deg
Entrance loss coefficient: 0.4
Manning’s n: 0.013 (for concrete)
Constant headwater depth: 1.34 m / 9.8 m

<table>
<thead>
<tr>
<th>Tailwater depth (m)</th>
<th>Tailwater level (m AHD)</th>
<th>Flow (m³/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8.46</td>
<td>5.86</td>
</tr>
<tr>
<td>0.2</td>
<td>8.66</td>
<td>5.86</td>
</tr>
<tr>
<td>0.4</td>
<td>8.86</td>
<td>5.86</td>
</tr>
<tr>
<td>0.6</td>
<td>9.06</td>
<td>5.86</td>
</tr>
<tr>
<td>0.8</td>
<td>9.26</td>
<td>5.86</td>
</tr>
<tr>
<td>1</td>
<td>9.46</td>
<td>5.86</td>
</tr>
<tr>
<td>1.02</td>
<td>9.48</td>
<td>5.86</td>
</tr>
<tr>
<td>1.04</td>
<td>9.5</td>
<td>5.71</td>
</tr>
<tr>
<td>1.06</td>
<td>9.52</td>
<td>5.52</td>
</tr>
<tr>
<td>1.08</td>
<td>9.54</td>
<td>5.32</td>
</tr>
<tr>
<td>1.1</td>
<td>9.56</td>
<td>5.11</td>
</tr>
<tr>
<td>1.12</td>
<td>9.58</td>
<td>4.89</td>
</tr>
<tr>
<td>1.14</td>
<td>9.6</td>
<td>4.66</td>
</tr>
<tr>
<td>1.16</td>
<td>9.62</td>
<td>4.43</td>
</tr>
<tr>
<td>1.18</td>
<td>9.64</td>
<td>4.17</td>
</tr>
<tr>
<td>1.2</td>
<td>9.66</td>
<td>3.9</td>
</tr>
<tr>
<td>1.22</td>
<td>9.68</td>
<td>3.61</td>
</tr>
<tr>
<td>1.24</td>
<td>9.7</td>
<td>3.3</td>
</tr>
<tr>
<td>1.26</td>
<td>9.72</td>
<td>2.95</td>
</tr>
<tr>
<td>1.28</td>
<td>9.74</td>
<td>2.56</td>
</tr>
<tr>
<td>1.3</td>
<td>9.76</td>
<td>2.1</td>
</tr>
<tr>
<td>1.32</td>
<td>9.78</td>
<td>1.5</td>
</tr>
<tr>
<td>1.33</td>
<td>9.79</td>
<td>1.05</td>
</tr>
<tr>
<td>1.335</td>
<td>9.795</td>
<td>0.8</td>
</tr>
<tr>
<td>1.34</td>
<td>9.8</td>
<td>0</td>
</tr>
</tbody>
</table>

J:\A546-WAT\PRJ32101128A\Lake_Bonney_Sat05_WrkPapers\Lake Bonney culverts.xls
Printed: 29/04/2009 2:48 PM  Page: 1 of 1
Inflow=Outflow=26 GL/year

Predicted Lake Water Level (mAHĐ)

× Measured Water Levels at Lake Bonney Jetty (mAHĐ)

Predicted Average Lake Salinity (EC Units)

× Measured Salinity at Lake Bonney Jetty (EC Units)
Inflow=Outlow=10GL/yr + 15GL/yr booster in July @ 200ML/day
Predicted Lake Water Level (mAHD) (Scenario 5)
Water Level O=10GL/yr (Var 1)
Water Level O=200ML/day prior to inflow (Var 2)
Measured Water Levels at Lake Bonney Jetty (mAHD)
Water Level O=10GL/yr (Var 3)
Predicted Average Lake Salinity (EC Units) (Scenario 5)
Salinity (EC) O=10GL/yr (Var 1)
Salinity (EC) O=200ML/day prior to inflow (Var 2)

Measured Salinity at Lake Bonney Jetty (EC Units)
Salinity (EC) I=O=10GL/yr (Var 3)

Date (mmm/yyyyy)
Lake Fill Scenario: Maintain a water level of 9.7 mAHD

- Predicted Lake Water Level (mAHD)
- Measured Water Levels at Lake Bonney Jetty (mAHD)
- Predicted Average Lake Salinity (EC Units)
- Measured Salinity at Lake Bonney Jetty (EC Units)
Inflow=Outlow=15GL/yr + 10GL/yr booster in July @ 200ML/day
Inflow=Outflow=6GL/yr + Release of 20GL/yr in July

- Predicted Lake Water Level (mAHĐ)
- Predicted Average Lake Salinity (EC Units)
- Measured Water Levels at Lake Bonney Jetty (mAHĐ)
- Measured Salinity at Lake Bonney Jetty (EC Units)
Max 26GL/yr Freshwater release each year through two 1200x1200 culverts

Date (mmm/yyyyy)

Water Level (mAHD)

Salinity (EC Units)

- Predicted Lake Water Level (mAHD)
- Measured Water Levels at Lake Bonney Jetty (mAHD)
- Predicted Average Lake Salinity (EC Units)
- Measured Salinity at Lake Bonney Jetty (EC Units)
**Model Structure**

The model contains three modules, with the water balance and salt balance module developed as a spreadsheet model in Microsoft Excel 2003 and the groundwater module developed in MODFLOW-2000, in a Groundwater Vistas framework. The figure below indicates how the modules interact and the key inputs and outputs.

Please refer back to the Feasibility Assessment Report (Document number 05-1230-04-2101021A dated 29/9/06) for a complete description of the model set-up, data collection, modelling and initial scenario assessment.

**Key Assumptions**

The key model assumptions are summarised below:

- For the rainfall and evaporation inputs to the water and salt balance model, the projected daily values were assumed to be the average of the daily rainfall and evaporation data from the 6 year period between January 2002 and December 2008. This period was selected as it is most representative of the current climate and drought conditions.

- Daily rainfall and evaporation data was collected from the Bureau of Meteorology. Rainfall data from Barmera (Station No 24001: -34.2486 Lat, 140.4641 Long) and Class A Pan Evaporation data from the Loxton Research Centre (Station No 24024: -34.4390 Lat, 140.5978 Long) was used.

- The model assumes there is no interaction (i.e. no inflow/outflow) between the river and the Lake and no irrigation off-takes.
- It was also assumed that the river will remain at pool level (i.e. 9.8 mAHD upstream of Lock 3).

- The effective evaporation was calculated from the pan evaporation using the following formulae from a study undertaken by the CRC and CSIRO Land and Water (2000):

  \[
  \text{Effective Evaporation} = F_1 \times F_2 \times \text{Pan Evaporation}.
  \]

  where

  \[
  F_1 = 1.025 - 0.0246 \times \exp(0.00879 \times S), \text{ where } S = \text{the water salinity (in g/L)}.
  \]

  \[
  F_2 = 1 - 0.029 \times \ln(A), \text{ where } A = \text{lake surface area (Hectares)}
  \]

- The lake bathymetry is based on the hydrographic survey of the Lake produced in October 2005 by HYDRO-MAP. The survey provided water storage volumes and surface areas at 0.5 m intervals between 5.07 mAHD and 9.82 mAHD.

- The urban stormwater catchment area for Lake Bonney is estimated to be 50 Ha and the estimated stormwater runoff for Barmera is 16.5 ML/year. It was assumed that half the stormwater runoff from Barmera flows to Lake Bonney. A runoff coefficient of 0.1145 was determined by applying the total rainfall in Barmera from 1990 to 1995.

- Rural stormwater runoff into Lake Bonney is estimated to occur from an area of approximately 2647 Ha based on contour mapping in the area. A runoff coefficient of 0.038 was assumed for the rural catchment, which is one-third of that used for the urban catchment.

- A rainfall salinity concentration of 50 mg/L was assumed.

- A freshwater inflow salinity of 400 EC was assumed.

- Freshwater inflow was calculated based on the hydraulic capacity of two 1200x1200 box culverts. The calculations were based on a culvert length 6.1 m and 0% slope, with a Wingwall flare 30-75 deg and a Manning’s n roughness of 0.013.

- The model assumes complete mixing of river and lake water. It is unlikely that complete mixing will occur, however, modelling of the effects of salinity mixing is a complex issue requiring inputs on lake stratification, temperature, variation in salinities in the water body and wind speed and direction. Further, the model is not designed to simulate mixing of lake water and groundwater due to density-dependent processes which occur when the water body salinities are high.