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## **REPORT ON THE ENVIRONMENTAL ASSESSMENT FOR THE MACQUARIE RIVER TO ORANGE PIPELINE PROPOSAL**

### *Summary*

This review of the Environmental Assessment of the Macquarie River to Orange Pipeline proposal is provided in response to requests for independent advice from the Environment Defender's Office and the Orange and Regional Water Security Alliance. Selected sections of the proposal dealing with the aquatic ecology of the Macquarie River have been reviewed.

I consider there are many deficiencies in the Environmental Assessment (EA). It fails to meet the standard required to support such a major project, which has significant environmental implications and which has been classed as a 'Controlled Action' under the Commonwealth's EPBC Act. The main identified deficiencies are summarised, in no particular order, in the comments noted below.

### *Protecting low flows*

Key issues with the proposals described in the EA relate to the protection of low flows:

- Peak demands for water supply occur in dry periods, coinciding with stressful periods for aquatic biota during times of low river flow. This interaction poses particularly severe problems for aquatic ecology and for the status of threatened fishes and other animals. Conservative, risk-averse flow management is essential at such times to avoid serious environmental harm and this principle should be a driving factor in the design and economics of water supply planning.
- The problems with extractions during stressful low-flow periods relate not only to the proportions of flow diverted

but also to the increase in the duration and the frequency of such low-flow 'spells'. This aspect is not assessed effectively in the proposal.

- The proposal does not conform to current best practice. Considerable guidance is available to ensure proper protection for low flows, from the detailed analyses of the *Proposed Interim Environmental Objectives for NSW Waters* (1997) (Appendix D, Table 2.2) through to the extensive series of technical reports available through the National Water Commission's *Waterlines Report No. 76* (2012): *Guidance on ecological responses and hydrological modelling for low-flow water planning*. These sources have obvious fundamental importance for development of the EA. Furthermore, the proposal does not appear to recognise the NSW Office of Water's *Macro Planning Approach* (2011), which advises policy for developing water extraction proposals. All of these sources provide the basis for far more satisfactory planning for water extraction in low-flow periods than the proposals outlined in the Macquarie River project's EA.

- I reject the comment (Executive summary page xv and subsequently) that '... these changes [in aquatic ecology] would be unlikely to have a significant impact on the quality of aquatic habitat aquatic biota...' (sic). During periods of low-flow stress, the imposition of further reductions in flow is likely to raise water temperatures, reduce dissolved oxygen, favour noxious alien species like carp and redfin, together with parasites and disease organisms, interfere with reproductive and migration cycles among aquatic biota, increase predator pressures and cause other potential impacts.

- A massive-scale mortality among Murray cod late in the early-1980s drought is a potent example of the hazards of low-flow periods and the practical need to avoid extending or exacerbating them. In that event, low water levels, crowding of fish in diminished habitats, high temperatures and an outbreak of protozoan gill parasites, mainly *Chilodonella*, made the fish acutely vulnerable to the reduced water quality that occurred following storm runoff. Although the subsequent loss of most cod from much of the river above Burrendong Dam was a natural event, it highlights the kinds of processes that can have disastrous, long-term impacts in systems where inadequate low-flow management imposes ecological stressors.

#### *Inappropriate conclusion*

The conclusion (Executive summary, page xi) that water extraction from the river would not '... significantly impact on flows in the river...' is clearly wrong on both statistical and qualitative bases, since it is proposed to

extract almost one-third of the total river flow in low-flow periods. The real question that should be addressed concerns the *acceptability* of the various proposed impacts that will affect river flows and their ecological implications.

#### *Inappropriate analyses and scales*

- Most of the proposal documentation on water use and river flows uses annual average figures. This is highly inappropriate because it hides the data extremes and frequency distributions that are environmentally critical. Details of the extent and severity of these extremes - especially in the ecologically stressful low-flow ranges - are an essential requirement for proper evaluation of the proposal. The analyses employing an annualised flow-duration curve is one key case in point. These analyses should instead rely on projections from the frequency distribution of flows for the month in which there will be the greatest impact on low flows, as advised in the *NSW Macro Planning Approach* (2011). This will provide a much more environmentally sensitive and reliable assessment of the effects of extraction.

- Related to this problem, the graphical representations of flow and other data in the body of the report are completely lacking in axis labels and scales, and the figure legends are similarly inadequate for proper assessment.

#### *Model performance*

- Evidence should be provided of the results of rigorous, preferably independent, performance testing of the predictive river-flow modelling.

- The river system modelling section (10.2.2) is unsatisfactory because it uses a hypothetical, ten-year calibration period.

#### *Threatened species*

It is disingenuous for the proposal to suggest (Executive summary, page xiv and subsequently) that threatened species might 'potentially occur' in the proposed extraction area. There are reliable records that trout cod, Murray cod, silver perch and freshwater catfish do in fact live in the river in this area.

#### *Offtake structure*

- There is a hazard represented by offtake structures of the proposed type, which has not been recognised in the EA. Native fishes such as cod, catfish and silver perch are attracted to structures that provide shade and cover; offtake pipes suspended in the water column commonly lead to fish aggregation in the immediate vicinity. Induced pressure

shocks may be transmitted to surrounding water when the intake structure is back-flushed or air-purged. Fish are particularly susceptible to this impact and mortalities are likely. This problem was believed to have caused mortalities observed among Australian bass at a comparable water-extraction site in the Manning River. The solution is to avoid creating attractive habitat around the structure and to attenuate pressure changes during flushing and purging.

#### *Aquatic ecology assessments*

- The brief and superficial ecological observations at the offtake site (Appendix G Section 3) in no way constitute 'in-depth studies', as claimed in the EA. Very limited sampling of water quality and biota over an extremely short period, during which the river was in flood, cannot be considered even to begin to approach an adequate field assessment of the river's ecological condition. None of the study's stated objectives have been satisfactorily achieved. As acknowledged in this section, the study does not serve as a baseline for impact assessment, although a full ecological assessment is required under the Commonwealth EPBC Act's notice of the project as a 'Controlled Action' (Appendix N).

#### *Project rationale*

Whilst I have serious reservations about the project's overall rationale and justification, as illustrated by modelling results and projections, I will forgo commentary on these aspects in favour of other reviewers with more specific expertise.

I conclude that the proposal should be rejected on the basis of the many inadequacies noted.

Dr John H Harris

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