

8 February 2006

Kurnell Desalination Submissions  
Major Development Assessment  
Department of Planning

Via email: [desalination@dipnr.nsw.gov.au](mailto:desalination@dipnr.nsw.gov.au)



HEALTHY CATCHMENTS  
HEALTHY OCEANS

Dear Sir or Madam

**Re: Ref. number 05\_0082 – Submission on the proposed Kurnell Desalination Plant and Associated Infrastructure**

This letter sets out the comments from OceanWatch Australia in relation to the *Environmental Assessment: Sydney's Desalination Project*. OceanWatch Australia (OWA) is a national environmental, not-for-profit company that works to achieve sustainability in the Australian seafood industry through protecting and enhancing fish habits, improving water quality and building sustainable fisheries through action based partnerships with the Australian seafood industry, government, natural resource managers, private enterprise and the community.

OWA is strongly opposed to the proposed desalination plant on a number of grounds including insufficient justification for the plant and grossly inadequate assessment of environmental impacts of the proposal. The Environmental Assessment (EA) is more like a concept design with many of the crucial details of the proposed infrastructure, treatment process etc still yet to be determined. Thus, it is impossible to accurately ascertain the environmental impacts of the proposal, particularly the impacts on the marine environment, let alone how these are to be effectively mitigated, until further studies are undertaken. The major deficiencies of the proposal are outlined below.

**1. Justification**

There is insufficient justification for the choice of desalination as a means to augment Sydney's water supply. Alternatives such as recycling and other water conservation and reuse strategies have not been considered despite being more cost effective and environmentally sustainable. These need to be considered before approving a desalination plant.

Additionally, most of the community does not express a willingness to support or pay for such a project. Results from a Newspoll survey conducted in July 2005 revealed that 71% of the Sydney residents questioned were prepared to use quality treated water in their homes.



OWA recommends that:

1. A thorough investigation of all potentially feasible options for the supplementation of Sydney's drinking water supply

## 2. Deficiencies within the EA

The EA lacks sufficient detail to make informed and accurate decisions. This is evident throughout the EA and the consultants' reports i.e *Ocean Modelling Report* (Miller, 2005) and *Marine Ecological Assessment* (The Ecology Lab, 2005) , for example:

*"Precise details of the site layout, distribution routes and other infrastructure will not be available until further investigation and design are undertaken." (Chapter 2 of the EA)*

*"At this stage, the exact details of the location and installation of the pipeline have not been finalised, hence this assessment of impacts is presented at a relatively broad level." (Marine Ecological Assessment).*

Thus, the EA does not meet the statutory requirements in that it is insufficient to enable environmental assessment of the major issues surrounding the project and to assess the required level of environmental management and monitoring for the project.

Further studies are required to address these deficiencies, to determine the true environmental impacts and develop adequate mitigation measures. This needs to be conducted in consultation with key stakeholders such as the professional fishing industry, State and Local Government, particularly the Department of Environment and Conservation and the Department of Primary Industries such that more accurate and informed decisions can be made.

### 2.1 Dispersion of the plume/ocean current modelling

There is insufficient background data on coastal processes including current direction and strength to accurately assess the nature of the dilution and dispersal of the saline plume from the discharge outlet. One Acoustic Doppler Current Profiler (ADCP) has been deployed at the inlet site and has collected 4 months of data (300m off Tabbigai Cliff). This single site has been used to validate current flow models to predict to nature of the dispersion of the plume. A single site cannot adequately represent the real circulation patterns experienced. Professional fishermen who are experts on the daily hydrodynamics of such systems have altered OWA and Sydney Water to the presence of nearshore back eddies caused when strong northerly currents flow. This situation is likely to lead to recirculation of the saline plume and subsequent concentration of the plume in Bate Bay. This phenomenon is evident in the consultant's report, *Ocean Modelling Report* which states that:

*"the ADCP is showing similar magnitudes but greater directional spread indicates that the model may be slightly under predicting the shore parallel component. This would mean the actual far field plume may spread less over the north and south directions but more over the east and west directions."*

Additionally, the proposed pilot plant study (6 months) will not represent winter conditions where the Tasman Front is the dominant oceanic force rather than the East Australia Current.

OWA believes that the mixing zone will be extended beyond the predicted 50-75m from the diffuser. OWA has little confidence in the models, particularly if they have been based on current flow data used in the current flow models for the Deep Ocean Outfalls (DOO). Industry is aware of and has experienced significantly higher periods of minimal current flow at the seabed than indicated by the DOO current flow data. Furthermore, the EA states that this mixing zone will be larger when currents are stronger and the consultant's report indicates considerable inaccuracy in the model predictions:

*"It must be noted that the science of predicting near field dilutions of dense plumes has not been greatly studied..."*

OWA believes that the current proposal will lead to a salinity accumulation within the site area that will significantly impact on marine species.

Additionally, plume density and dispersion modelling needs to account for temperature effects. Industry is concerned that seawater concentrate will reside in the bottom layers of the water column where fish traps are set i.e. that it may not simply sink to the bottom as indicated in the EA.

Thus the EA does not meet the Director General's requirements which state:

*"The Environmental Assessment must also indicate how the project will be designed and operated so the adequate mixing of concentrate discharge to avoid bottom hugging plumes, re-entrainment and cross contamination between intake and discharge infrastructure for the project and other development in the area."*

OWA recommends that:

2. The pilot plant study be extended such that year round conditions are adequately represented.
3. A comprehensive monitoring program to ascertain the nature of the recirculating eddies in the proposed site area be undertaken. This needs to be designed in consultation with professional fishers, and oceanographer experts.
4. Modelling of the nature of dispersion and dilution of the plume accounts for temperature effects.
5. Recommendations from the *Ocean Modelling Report* be implemented i.e. *"It is highly recommended that an additional study, including physical modelling of the near field dilution be undertaken for the design of a final option as the current body of knowledge is likely to be highly conservative."*

## 2.2 Entrainment of effluent plume from ocean outfalls

There is insufficient information/data to accurately determine whether effluent discharged from the ocean outfalls or other smaller industrial discharges will be entrained within the desalination plant, raising serious health concerns (toxins and intake of endocrine disruptors in the effluent) and having significant implications for pre-treatment of intake water. The EA states that (section 2.4 of the *Ocean Modelling Report*):

*“After ejection from outfall diffusers, sewage effluent plume rises rapidly through the water column.”* This is not always the case as temperature effects, particularly temperature inversions, also impact on the density of the plume.

This is acknowledged in the consultant’s report which notes that:

*“no data collection has been undertaken for the verification of the relative impacts of these specific plumes.”*

Thus OWA recommends that:

6. Temperature effects on the nature of dispersion of the DOO effluent plume be studied
7. The feasibility of entraining the brine flow from the desalination plant into the Deep Ocean Outfall flows be investigated. This would mitigate against both the saline pollution from the desalination plant and the freshwater pollution from the ocean outfalls the marine environment.

## 2.4 Water quality

Until the pre-treatment process and background water quality have been determined, it is not possible to ascertain the impacts on water quality of the receiving marine environment nor determine measures to mitigate against potential impacts.

Additionally there has been no assessment of the potential impacts of dredging on water quality and the potential mobilisation of toxins in the sediments and resultant impacts on the marine environment (including oysters).

OWA recommends that:

8. The water quality of the inlet must be monitored 24-7 to identify pulses of contaminated water from the Deep Ocean Outfalls (including endocrine mimics, endocrine disruptors) and other polluted and potentially toxic outflows and implement a shutdown program when the water quality is shown to be unfit for human consumption.



## 2.5 Pre-treatment

According to the EA and *Marine Ecological Assessment*, any chemicals used in the pre-treatment process will be discharged to the receiving marine waters:

*“seawater concentrate return will contain any chemicals required for the pre-treatment of the feedwater. Chemicals added during pre-treatment include chlorine, sulphuric acid, ferric chloride..”*

The *Marine Ecological Assessment* states that most of these will be in low concentrations, however there has been no assessment of the potential cumulative impact of these chemicals, or concentrations that may induce stress in marine organisms, particularly less mobile sedentary organisms such as abalone. The ocean modelling report specifically states the. *“One constituent worthy of further investigation is the Fe (OH)3. This may precipitate, and then gather in the sediment around the outlet.”* This chemical has been known to induce stress in abalone making them more susceptible to disease and parasites such as *Perkinsus* (currently affecting many abalone populations from Jervis Bay to Port Stephens). (Flocculated particles may affect feeding and breathing of abalone, increasing their susceptibility to *Perkinsus*).

Thus OWA recommends that:

9. Solids extracted from the seawater together with any additives from the pre-treatment process be disposed of as solid waste and not discharged to the receiving waters.
10. The impact of very fine precipitates and flocculants on the gill and feeding mechanisms of fish and other shellfish etc be examined.

## 2.6 Impact of discharge on marine species

The EA needs to examine the effect of all “products” within the discharge on the three main environmental parameters which affect tolerance and behaviour of marine species i.e. temperature, oxygen content and salinity.

The EA states that there is insufficient information on the salinity or chemical tolerances of the assemblages around the outlet. This is particularly important for species such as abalone that are highly sensitive to fluctuation in water quality (especially salinity) increasing their susceptibility to disease as mentioned above.

The consultants report identifies considerable impacts on commercially important species:

*“Some target species would be likely to avoid the plume (i.e. lobsters and demersal fish such as snapper and bream) and some less mobile species may die (i.e. abalone, sea urchins and turban shells).*

*“It would be expected that there would be some mortality of planktonic larvae of many important recreational and commercial species due to impingement or entrainment of the inlet, and due to the potential toxicity of the outlet plume.”*



*“Some species of fish living in or near reefs and bottom sediments would be unable to escape its influence. Little is known about the salinity tolerances of marine species living inhabitants likely to be affected by increased salinity.”*

This illustrates that there will be significant impacts to marine species

However, until the nature of the dilution and dispersion of the plume is accurately determined, it is impossible to determine the affects.

Thus, OWA recommends that upon accurate determination of the nature of dilution and dispersion of the plume and the and the quality of the water discharged from the plant that:

11. Studies be conducted to determine then salinity/chemical tolerances of assemblages in the vicinity of the outlet.
12. Undertake a comprehensive monitoring program of marine species and their habitats (as recommended in the *Marine Ecological Assessment*). Industry needs to be engaged in the design and implementation of the program. For example the abalone industry needs to be involved in the identification of abalone populations and reefs in the vicinity of the intake and outlet and contribute to appropriate monitoring populations and areas of reef of concern and contribute to the development of appropriate monitoring programs.
13. The proponent identifies any potential impacts to marine species, particularly commercially important fish and their habitat, appropriate environmental safeguards and mitigation measures in consultation with industry, DPI etc or if not possible to mitigate, identify processes for compensation, prior to the approval and operation of the plant.

## 2.7 Location of the outlet

There is no justification within the EA for the choice of outlet site. The EA notes that the intake and outlet structures are to be located on a large rocky reef bed which has diverse marine life “fish abundant and diverse” (Table 7.6).

OWA recommends that:

14. More suitable locations for the inlet and outlet points be investigated such as offshore sandy substratum which would have less immediate impact on the diverse and abundant marine life observed at the proposed inlet and outlet points.

## 2.8 Intake entrainment and impingement

The EA states that the entrainment of planktonic larvae may affect recruitment to local fishing stocks (including threatened species). As planktonic communities represent the base of the food chain for many marine organisms, the potential flow on impacts to higher organisms is significant.

The *Marine Ecological Assessment* acknowledges:

*“Gathering additional information on the abundance, type, spatial and temporal variation of plankton that would be entrained into the desalination plant would be important, in terms of formulating an accurate assessment of the impacts on the ecosystem.”*

OWA strongly recommends that:

15. The above study be undertaken.

## 2.9 Ocean Enrichment events

The EA has not considered consequences of ocean enrichment events (natural and manmade). There is potential for clogging of the desalination membranes with algal blooms, slime and blubbers as a consequence of such events including algal blooms etc.

OWA recommends that:

16. The potential for and impact of ocean enrichment events on the operation of the desalination plant be investigated in consultation with Industry members.

## 2.10 Construction impacts

### 2.10.1 *Seagrass/Caulerpa taxifolia*

Both proposed pipeline routes involve the destruction of seagrass and disturbance of the invasive marine weed *Caulerpa taxifolia*.

*“the two paths of the proposed pipeline would pass through a patchy bed of seagrass habitat including the pest species *Caulerpa taxifolia*.”*

Sydney Water plans to mitigate for loss of seagrass by replanting certain species including *Posidonia*, which is known to have a very poor survival rate in replanting. Further, loss of seagrass may provide opportunity for the marine weed *C. taxifolia* to establish in these areas where seagrass has been destroyed. Additionally, any disturbance of *C. taxifolia* is likely to facilitate the spread of the invasive weed as it reproduces by fragmentation (i.e. vegetative propagules).

This is a significant impact that cannot be successfully mitigated.

### 2.10.2 *Groundwater and Groundwater dependent communities*

The EA notes the potential for impacts to wetlands and groundwater dependent communities from hydrological change.

Sydney Water indicates that they will develop strategies to recharge groundwater by capturing and remobilising the stormwater runoff through infiltration devices. The effectiveness of these



strategies is questionable given the limited land available, the available infiltration rates and the potential to further contaminate groundwater (6.3).

OWA recommends that:

17. More effective strategies be determined in consultation with local councils and DEC.

### 2.11 Greenhouse gas

Significant greenhouse gases will be generated in the operation of the plant, up to 1.25 million tonnes/year, the equivalent of 250 000 news cars on Sydney's roads. Thus, it is critical that greenhouse gas offsets are detailed as outlined in the Director General's requirements *"appropriate details of each offset option must be included in the environmental assessment including implementation measures for each offset option."* This has not been provided within the EA.

OWA recommends

18. Provision of details of greenhouse offset options and implementation measures as required by the Director General

### 3. Conclusion

OWA does not support the proposed desalination plant and strongly disagrees with the conclusion of the EA that *"the project can proceed without any significant environmental impacts."* It is highly evident that there is insufficient information presented within the EA to reach such a conclusion. The proposal fails to meet many of the Director General's requirements and has potential for significant environmental impacts, particularly to the marine environment. OWA recommends that further studies (as outlined through this submission) be conducted in order to accurately ascertain the true impacts of the proposal and such that effective mitigation measures can be identified. OWA strongly recommends that if the desalination plant is to proceed that further and continued consultation with Industry, State and Local Government is required in order to design and scope out the required studies, monitoring programs etc such that the environmental impacts of the proposal can be accurately determined and effective mitigation measures developed.

Please do not hesitate to contact me on (02) 9660 2262 should you require further information.

Yours sincerely



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