Submission
No 54

INQUIRY INTO A SUSTAINABLE WATER SUPPLY FOR SYDNEY

Organisation: Nature Conservation Council of NSW

Name: Ms Cate Faehrmann

Position: Director

Telephone: 9279 2466

Date Received: 17/02/2006

Subject:

Summary

Nature Conservation Council of NSW

The voice for the environment since 1955

Level 5, 362 Kent Street, Sydney NSW 2000
Ph: 02 9279 2466 **Fax:** 02 9279 2499
Email: ncc@nccnsw.org.au
Web: www.nccnsw.org.au
ABN: 96 716 360 601

The Chair
General Purpose Standing Committee No 5
Parliament House
Macquarie Street
Sydney NSW 2000

17 February 2005

Dear Mr Cohen,

Re: Parliamentary Inquiry into a sustainable water supply for Sydney

The Nature Conservation Council of NSW welcomes the opportunity to present a submission to the Parliamentary inquiry into a sustainable water supply for Sydney.

As the State's peak environment organisation, the Nature Conservation Council of NSW (NCC) works closely with member groups, local communities, government and business to protect, sustain and conserve the NSW environment. NCC serves as the umbrella organisation for more than 120 environmental member groups to co-ordinate and develop NSW-based community education projects, scientific research, conferences, conservation publications and awareness campaigns. NCC also advises key decision-makers at a local, state and national level.

NCC has been advocating for sustainable management of Sydney's Water supply for many years. NCC has been the co-author of 4 major reports about Sydney's water situation. The main recommendations and information are distilled from these reports and included in this submission. In addition I have attached resources that provide further valuable information.

Please contact Cécile van der Burgh, NCC's Freshwater Campaigner on 02 9279 2466 or email cvanderburgh@nccnsw.org.au if you have any queries or require further information on this submission.

Yours sincerely

Cate Faehrmann
Director

a. The environmental impact of the proposed desalination plant at Kurnell.

Environmental impacts associated with the proposed desalination plant at Kurnell include:

- Greenhouse emissions
- Adverse impacts on terrestrial biodiversity through site selection
- Adverse impacts on marine biodiversity through brine discharge and seawater intake and the construction of pipelines on the ocean floor
- Adverse impacts on groundwater through tunnelling for water supply/discharge pipes

Please find attached a detailed submission addressing these impacts in more detail.

Nature Conservation Council of NSW - Submission to Department of Environment and Heritage, Kurnell Desalination Plant Proposal EPBC Referral 2005/2331 dated 1 November 2005.

b. The environmental assessment process associated with the proposed desalination plant.

Issues with regards to the environmental assessment process associated with the Kurnell desalination plant include:

- For such a major development a rigorous environmental impact statement (EIS) must be undertaken based on a detailed proposal. Instead, the proposal was pushed through as *critical infrastructure*, only subject to an Environmental Assessment (EA).
- Had the proposal been subject to an EIS, then an assessment of alternatives would have been required. No triple bottom line assessment of alternatives was conducted.
- Environmental assessment was based on a concept plan only. No details were available about where the actual pipelines would be built, no details were available on the exact technology used for seater intake, discharge etc. No exact detail was given about the energy used.
- The EA did not include clear pathways for mitigating associated environmental impacts, such as greenhouse emissions from coal powered electricity use or environmental impacts associated with seawater intake and brine discharge.
- The NSW Government has declared the desalination proposal a 'Critical Infrastructure' under the new Part 3A of the NSW Environmental Planning and Assessment Act. The proposed critical infrastructure would bypass the *National Parks & Wildlife Act,* the *Fisheries Management Act and* the *Local Government Act.*
- The NSW Government had already indicated prior to the environmental assessment that the plant would go ahead.

Please find attached a detailed submission that details our comments with regards to the Environmental Assessment process associated with the desalination plant.

Nature Conservation Council of NSW – Submission to Department of Planning. Environmental Assessment Kurnell Desalination Plant, Dated 3 February 2006.

c. Methods for reducing the use of potable water for domestic, industrial, commercial and agricultural purposes, including sustainable water consumption practices.

Sydney is using more water than is sustainable. Looking 25 years ahead, there will be a shortfall between the amount of water that Sydneysiders use and the amount of water provided from the catchments around our city, unless we make some changes and take action now.[1]

Sydney Water statistics show that Sydney uses an average 630 billion litres (or GL) of drinking water per year. 450 billion litres per year of this water is discharged into the ocean as effluent after we have used it once. Sydney-siders use an average of 420 litres of drinking water per person per day even though the average amount of water people drink is below 4 litres.

A sustainable yield that allows for adequate environmental flows for the rivers from where the water is extracted is estimated at 450-500 billion litres (or GL) per year.[2] This means that Sydney must use water more efficiently, and recycle more of the water it uses. In addition, more rainwater must be harvested through the installation of rainwater tanks.

The Peak Environment Groups have called for the following measures to reduce the use of drinking quality, or potable, water:

- Revise demand management targets per capita and adopt an overall consumption target of 500 GL/year to ensure safe and sustainable yield.
- Initiate permanent water restrictions on specific outdoor uses for residential, commercial and public sector uses, to make water available for environmental flows and promote a long-term change in water use behaviour.
- Extend the BASIX program (retrofitting with water efficient devices and rainwater tanks) to all existing households and businesses in Sydney – not limit this important initiative to new buildings and renovations as is currently the case.
- Set penalty pricing for Sydney Water, applicable where Sydney Water exceeds demand management targets, based on per capita and proposed total consumption target.
- Extend support for installing rainwater tanks and cut red tape (the draft plumbing code released late 2005 is not helpful in achieving a sustainable water supply.)
- Establish a clear, effective pricing signal to reflect natural scarcity for water, such as a rising block pricing regime for retail water with equity provisions, including low-income rebates and pensioner discounts.
- Water prices should be reviewed, including bulk water extractions from the river systems, to incorporate environmental externalities (such as river flows) and to correct market failure (where the price does not reflect resource scarcity) to provide a viable market for recycled water. The Independent Pricing and Regulatory Tribunal (IPART) has under-priced Sydney's drinking water for many years and the current price does not reflect environmental externalities.

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[1] Department of Infrastructure, Planning and Natural Resources (2004), *Meeting the Challenges, Securing Sydney's water future. The Metropolitan Water Plan.* P.2.

[2] Peak Environment Non-Government Organisations (2004), Sydney's Water-going to Waste? 4th Sydney Water Project

Please find attached a copy of the detailed report *Sydney's Water- Going to Waste?* (2004) by the Peak Environment Non Government Organisations, which outlines the above recommendations in more detail.

d. The costs and benefits of desalination and alternative sources of water including recycled wastewater, groundwater, rainwater tanks and stormwater harvesting.

Any calculation of the cost and benefits of desalination and alternative water sources should involve a triple bottom line assessment of the long-term, full economic, environmental and social benefit and cost. It should never be limited to a financial cost analysis only.

In order to achieve a good overview of the full cost and benefit of each water supply option one must take into consideration all environmental, social and economic externalities, such as the cost of polluting our waterways, declining biodiversity, the cost of decline in landscape values, long-term impacts on tourism and other industries that rely on the health of waterways and the cost of excessive greenhouse emissions. Also we should take into consideration what the cost has been of our current practices and how much it would cost to fix it.

Secondly, State Government should re-assess *all* possible water supply options, including water recycling for potable re-use, in addition to non-potable reuse, and establish trial processes at a location where high-grade reuses can be undertaken. State Government has refused to assess water recycling for potable re-use to date. Fact is though that unplanned potable re-use already takes place on a large scale throughout Sydney and that safe planned potable re-use is a successful strategy in many other countries.

Public perceptions of recycled water are clearly more favourable than the government has portrayed. A recent poll by the Sydney Morning Herald (June and July 2005) indicated that 46% of the 10 000 plus respondents were in favour of recycling as a measure to alleviate Sydney's water crisis. Community education programs regarding recycled water would do much to further alleviate any fears the public may have about water recycling.

Only if all options and the full costs and benefits are taken into consideration, a selection of the most sustainable water supply options can be made.

To facilitate information about potable re-use we have attached the following sources that explain the recycling process in detail.

Jennifer Simpson (1996). *Water Quality, from wastewater to drinking water to even better.*

The star rating system.

e. Practices concerning the disposal of trade waste.

Trade waste should be 100% cleaned up *before* it is disposed off in the same system that carries sewage. It is disgraceful that industries pay Sydney Water to carry their waste away and dispose of it without cleaning it properly. Trade waste disposal needs a complete overhaul.

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1 November 2005

Ms Lee Kingdom
Referrals Section (EPBC Act)
Approvals and Wildlife Division
Department of the Environment and Heritage
GPO Box 787
Canberra ACT 2601

Dear Ms Kingdom,

RE: Submission Sydney Desalination Plant Kurnell
EPBC referral 2005/2331

As the State's peak environmental organisation since 1955, the Nature Conservation Council of NSW (NCC) works closely with member groups, local communities, government and business to ensure a positive future for our environment. NCC serves as the umbrella organisation for more than 120 environmental member groups to co-ordinate and develop NSW-based community education projects, scientific research, conferences, publications and awareness campaigns. NCC also advises key decision-makers at a local, state and national level.

NCC would like to register its grave concerns with the proposed desalination plant for the Kurnell Peninsula in NSW. The plant is likely to have a significant impact on protected matters, national heritage places, a RAMSAR wetland, migratory birds and the marine environment. The details of these potential impacts are outlined in this submission.

On the basis of the listed potential impacts and given the lack of detail and transparency of the proposal, NCC urges the Minister for the Environment, the Hon. Ian Campbell, to declare the proposal a 'controlled action'.

If you require any information on any of these points or would like to discuss them further, please contact Cécile van der Burgh on 02 9279 2466 or email cvanderburgh@nccnsw.org.au

Yours sincerely

Cate Faehrmann
Director

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In addition, NCC would like to raise the following concerns:

- The proposed desalination plant could produce up to 500ML of drinking water per day. This would be the largest plant of its kind in the world. Impacts of such a large-scale plant on Australia's fragile marine life are untested.
- Ecological assessments of the Kurnell site and other documents that were submitted by Sydney Water as appendices with the desalination plant proposal to the Department of Environment and Heritage were not made accessible to the public. Freedom of Information requests have failed to obtain this information as the documents are deemed 'Cabinet in Confidence' (Appendix 1).
- The NSW Government has declared the desalination proposal a 'Critical Infrastructure' under the new Part 3A of the NSW Environmental Planning and Assessment Act. The proposed critical infrastructure bypasses the *National Parks & Wildlife Act,* the *Fisheries Management Act and* the *Local Government Act.* The NSW Government has already said the plant would go ahead, regardless of the environmental impacts.
- No environmental impact assessment has been undertaken to date and the NSW public has not been consulted about this proposal.
- The proposal lacks the appropriate detail to determine what the potential environmental impacts will be. It does not specify the details of the infrastructure that will be built.
- Only last Monday the NSW Government declared that two pilot plants would be build on the site. There is no mention of these pilot plants in the proposal currently submitted to DEH by Sydney Water.

Based on the potential impacts as listed in this submission and given the lack of detail of the proposal, NCC urges the Minister for the Environment, the Hon. Ian Campbell, to declare the proposal a 'controlled action'.

Comments on potentially significant impacts that need to be taken into consideration are provided in this submission.

Potentially Significant Terrestrial Impacts

There are potentially significant impacts on many threatened terrestrial animal and plant species, including the Green & Golden Bell Frog, the Wallum Froglet, and Grey Headed Flying Fox, endangered ecological communities, including Freshwater Wetlands on Coastal Floodplains, Swamp Oak Forest on Coastal Floodplains, Sclerophyll Forest on Coastal Floodplains and Kurnell Dune Forest. These need to be considered for both plant construction and construction of the distribution network.

Impacts on sensitive groundwater dependent ecosystems must be considered, including potential for alteration of groundwater levels on site and downgradient areas, and interruption of the saline freshwater interface at Quibray Bay.

Issues of proximity to Botany Bay National Park and the RAMSAR listed Towra Point Aquatic Reserve must be addressed, including edge impacts and connectivity issues.

Towra Point RAMSAR Wetlands
The proposed desalination plant is to be located within 250m of the internationally listed RAMSAR wetlands at Towra Point. The proposal has the potential to change water flows within the wetland which could in turn impact on the wetlands ability to act as a nursery area for fish within Botany Bay. This could impact on the many migratory species that use the bay and form part of the fish population found in Commonwealth waters.

Migratory Species
In relation to potential impacts on migratory species which utilise Towra Point Aquatic Reserve, Sydney Water indicates that "measures will be implemented to limit indirect impacts on species of ... downstream effects associated with changes to drainage patterns and runoff from the site". NCC has serious concerns about the ability of Sydney Water to implement the required measures within the proposed 'development area" of the site.

Other areas which are utilised by migratory waders, which also have the potential to be impacted by these works, do not appear to have been adequately considered. These include the beach area at Cooks Park Kyeemagh, and the beach at Foreshore Road Botany. In particular the area at Foreshore Road Botany, which is in close proximity to the Botany Wetlands, provides extensive habitat for migratory waders. Consideration of impacts at these sites appears to have been minimal or neglected. Migratory species recorded in this area include the Terek Sandpiper *Xenus cincereus*, Black-tailed Godwit *Limosa limosa*, Great Knot *Calidris tenuirostris*, and the Little Tern *Sterna albifrons* (source NSW NPWS Wildlife Atlas).

NCC notes that on page 19 of the document Sydney Water concludes that "the ecological assessments conducted show that the Great Sand Plover (*Charadrius leschenaultia* at Kyeemagh) would be impacted significantly". Accordingly the proposal is likely to significantly impact on migratory species.

Potential Significant Impacts on the Grey Headed Flying Fox
Grey-headed flying foxes (*Pteropus poliocephalus*) are listed as a vulnerable species under the EPBC Act.

The Grey Headed Flying Fox is a colonial species which roosts in large aggregations (referred to as camps) in the branches of canopy trees. Although camp populations fluctuate, and camps may be deserted for limited periods, they are generally stable over time. The vast majority of Grey Headed Flying Foxes are confined to the coastal region of south-eastern Australia in a band extending from Bundaberg in the north to Geelong in the south. The population decline of Grey Headed Flying Foxes within the last 70 years is largely due to the loss and degradation of foraging and roosting habitat. Camps free of undue stress are essential to the flying-foxes for successful breeding and the raising and weaning of young. There is a serious risk that the construction and operation of yet another major industrial installation in close proximity to the Kurnell colony will result in further loss of Grey Headed Flying Fox habitat.

Sydney Water notes that a large Grey Headed Flying Fox colony is present within the proposed development site, but is to be conserved within an area managed as conservation area. Sydney Water says that this is consistent with Local Council approved subdivisions in this area. However, the scale of the development proposed by Sydney Water is not consistent with that approved by Local Council. The Council approved subdivision works provided for significant buffer areas, between the industrial development and the Conservation area, to limit the impacts of the proposed industrial subdivision. In addition to this, the scale of the buildings were also considerably different. The Sydney Water proposal has buildings of larger bulk, scale and height than those approved by Local Council.

Potential Significant Impacts on the Green and Golden Bell Frog
The Green and Golden Bell Frog (Litoria aurea) is listed as vulnerable under the EPBC Act and has been recorded on the proposed desalination plant site. It is noted that this species is recorded within the conservation area of the site. However, the maps provided with the proposal show that the plant will be built on top of part of the wetland where the frog is recorded.

It is thus possible that the proposed desalination plant is likely to have a significant impact on this species.

Heritage Values of Listed National Heritage Areas
The proposal notes the proximity of the proposed works to the Kurnell Peninsula Headland, an item of National Heritage. Despite this proximity, Sydney Water indicates that the proposed plant and infrastructure will not have a significant impact on this item as they will be tunnelling/boring underneath it for the intake and outlet infrastructure. The proposal notes that the final layout of the form, fabric and finish of the plant is yet to be finalised, as are the construction methods. Tunnelling through some of the substrates on the Kurnell peninsula, including those found within the Kurnell Peninsula Headland, has proved difficult.

Previously, during the upgrade of the Cronulla Sewage Treatment Plant and Outlet, Sydney Water had indicated that they would tunnel under sensitive Council land at the Charlotte Breen Reserve. Sydney Water then commenced open excavation through this area, without Local Council permission, as the contractor informed them that tunnelling through that substrate was not possible. These works resulted in significant degradation of the conservation values of this area, which has still not recovered.

Statements such *as "will tunnel and not impact, and that construction methods will be found to avoid impacts"* are not sufficient to conclude that impacts will be acceptable or that acceptable solutions to potential impacts are practical and available.

Groundwater is close to the surface in many of the proposed areas for the route of the intake and outlet pipework within the Kurnell Peninsula Headland. This groundwater is expressed at the surface in several areas through the proposed route. Other areas where surface wetlands are present occur in areas where perched aquifers are present. The tunnelling has the potential to require significant dewatering of tunnel excavations, leading to drawdown of the aquifer in the vicinity. There is also the potential for tunnelling operations to disrupt perched and confined aquifers leading to their drainage.

This has the potential to impact on the groundwater dependent ecosystems within the area, including those within the Kurnell Peninsula Headland. There has been no information provided by Sydney Water in relation to this matter, again it is a case of leaving this detail to a later date, when no acceptable solution may be available. While Sydney Water indicate that the boring will be through rock, this is unlikely to be the case for the entire length of the pipe, as bedrock is in excess of 22m deep in several areas in this locality (Rocla Sand Mining EIS 2005).

Sydney Water also provides no information as to the location of staging and works areas, apart from the offshore barges. Such areas will be required along the proposed route, and have the potential to cause significant impacts. Further detail is required to assess the impact of these staging areas on the Kurnell Peninsula Headland.

Visual Impacts
The proposal must address the issue of visual impacts associated with the construction and operation of the desalination plant and associated infrastructure, including feed and delivery systems. Such consideration shall include the visual impact when viewed from public areas such as the Botany Bay National Park, adjoining ocean frontage and Bate Bay beaches, including temporary barges and structures.

Transport
Specific detail needs to be provided over proposed transport routes for materials supply and disposal during construction and operation. Detailed consideration of the impact of additional truck movements and road closures must be provided within the assessment.

Site Management
Details of site management procedures, such as staging and storage areas, soil and water controls, and scheduling of works must be provided within the assessment documentation. Such procedures must be designed so as to minimise environmental impacts and disruption to affected communities.

Land and Soils
The proposal must address the contamination status of work zones including soil, sediments and groundwater, at each site, including the plant site, intake and outlet structures and distribution network. The proposal must also address the management of acid sulfate soils during the construction of the plant and associated infrastructure.

Potentially Significant Marine Impacts

The proposed desalination plant will be built on Kurnell peninsula with the water intake and outlet values in the ocean waters and infrastructure for the plant located within Botany Bay. The intake and outlet valves are proposed to be on rocky reef areas which have high biodiversity value and may be an important food source for whales, dolphins and birdlife. The potential impacts on marine environments that could result from the construction of a desalination plant are summarised below.

Fish Populations – Intake and Discharge

Intake
Intake of water directly from the ocean usually results in loss of marine species as a result of impingement (i.e. the mortality of larger animals that are trapped and killed on the intake screens) and entrainment [occurs when smaller organisms (e.g. larvae and eggs) slip through the intake screens and are killed during standard plant processes]. The intake of feedwater can also affect marine resources by altering natural currents in the area of the intake structure.

Open ocean intake entrainment & impingement impacts.
Most regulators assume 100 percent mortality for organisms entrained, and there are currently no methods of screening out small fish and larvae*.
*Dr. Pete Raimondi, Professor and Chair, Dept of Ecology and Evolutionary Biology, UC, Santa Cruz

Results of a study of impingement at Morro Bay (in the USA) conducted from 1999 to 2000, reported a yearly rate of impingement of ***55,000 invertebrates*** and ***78,000 fish***. "Estimation of ecological impacts due to use of seawater in a desalinization facility (in a NEPA/CEQA context) Impingement, Entrainment."

The death of large numbers of fish in this area will potentially impact on the food source for whales, dolphins and migratory birds.

The water intake can also alter natural currents in the area.

Brine Discharge
The high salt concentration of the discharge water and fluctuations in salinity levels may kill organisms near the outfall that cannot tolerate either high salinity levels or fluctuations in the levels (similarly, if a temporary desalination plant is shut down, the organisms that have become accustomed to high salinity levels and/or salinity fluctuations may be killed). In addition, discharges from desalination plants will be denser than seawater and could sink to the bottom, potentially causing adverse impacts to benthic communities.

Fish tend to aggregate in areas with increased temperatures making any impacts more concentrated and fish populations (such as bream) more susceptible to capture. Changes in salinity and/or temperature may also affect migration patterns of fish along the coast. If some fish species sense a change in salinity or temperature, they may avoid the area of the plume and move further offshore.

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used during defouling of plant equipment and pretreatment, and toxic metals (which are most likely to be present if the discharge water was in contact with metallic materials used in construction of the plant facilities).

Temperature fluctuations also result from the discharge. Fish tend to congregate in areas with increased temperatures (e.g. hot water outlets), therefore, any localised increases in temperature could result in aggregations of certain species (e.g. bream), which would make them more susceptible to targeting from anglers.

Plankton and Fish Larvae
Desalination requires chemicals and metals to treat the seawater and clean the plant. The metals can become concentrated near the discharge point which would be toxic to fish eggs (such as yellowfin bream), plankton, and larvae in the vicinity. This could force larval fish that feed on the phytoplankton into deeper waters, where they may not survive. A plume of toxic material could also be driven by wind or currents to become concentrated in the nearby intertidal zone impacting species such as saltmarsh (an endangered ecological community).

Seagrasses
Seagrasses are valuable as nursery, feeding and shelter areas for many fish, molluscs and crustaceans, including juvenile sand whiting, blue swimmer crabs and weedy seadragons. Juvenile fish in turn provide food for the internationally important migratory wading birds that use Towra Point wetlands. Seagrasses are fragile plants that are slow to recover when destroyed. It is proposed to dredge areas in Botany Bay, including seagrass beds, to construct pipelines to connect the desalination plant with existing Sydney Water infrastructure. In addition to damaging seagrasses dredging will impact on water quality; potentially damage or destroy mangroves and other riparian vegetation as well as shallow reefs and snags. Dredging can also create sediment blooms that can impact on animals such as sponges, crabs and worms and has the potential to help spread *Caulerpa taxifolia* in the bay.

Botany Bay - Dredging for Pipeline
Dredging is an activity that can reduce water quality; damage/destroy marine vegetation, including mangroves, seagrasses, and wetlands; riparian vegetation, gravel beds, reefs, or snags. Dredging disturbs and displaces the seafloor, with potentially serious impacts to benthic communities, which include sessile organisms (such as sponges and oysters), creeping organisms (such as crabs and snails), burrowing animals (like many clams and worms), and many other life forms.

Productive estuarine habitats, such as seagrass beds may be destroyed by the removal of the underlying sediment or degraded by associated turbidity and sedimentation. Seagrass (*Posidonia australis* - strapweed) is prevalent in areas of Botany Bay where the distribution route of freshwater to Potts Hill is proposed. This proposal would directly impact on seagrass beds at both the southeastern and northwestern parts of Botany Bay (Rob Williams, Senior Research Scientist, pers. comm. 18 August 2005). This is of particular concern because strapweed does not readily recolonise areas when it has been eliminated.

Seagrasses are particularly valuable as nursery, feeding and shelter areas for many aquatic animals, including recreationally important fish, mollusc and crustacean species. Like other estuarine vegetation, seagrasses contribute organic matter to the food chain, and remove nutrients from the water. They also baffle water currents, causing them to drop their sediment loads, thus maintaining water quality.

In addition to the ecological issues that would impact on recreational fishing, the infrastructure required to construct the pipeline, as well as the dredging activities themselves, may also interfere with, and displace, recreational fishing activities, particularly on weekends and over the summer months, for the duration of the project.

Another issue to consider is the fact that there are serious concerns about a major contamination event occurring in Botany Bay, as a direct result of a toxic chemical leak from the Orica chemical plant in Banksmeadow. Dredging has the potential to expose heavy metals, such as concentrations of mercury and hexachlorobenzene (HCBs) in sediments in and around Port Botany. Toxic chemicals, including ethylene dichloride, vinyl chloride, tetrachloroethene, trichloroethene, carbon tetrachloride and chloroform have been leaking from the Orica plant into a local groundwater aquifer. The chemical leak is now affecting local residential and Council properties that access bore water. There is also evidence that the large toxic ground water plume is heading towards Penrhyn Estuary and Botany Bay. This plume potentially poses a very serious threat to public health and the surrounding aquatic environment.

Spread of the Noxious Marine Weed *Caulerpa taxifolia*

The proposed action has a significant potential to spread the noxious weed Caulerpa, which may have a significant impact on the ecological character of Towra Point Nature Reserve due to direct impacts on the seagrass beds at Weeney Bay and indirectl impacts on listed threatened species and migratory bird species that depend on the ecological functions of the seagrass beds at Weeney Bay.

Seagrass beds at Weeney Bay (comprising *Posidonia australis*, *Zostera capricorni*, *Halophila ovalis and Halophila decipiens*) are a component of the ecological character of Towra Point Nature Reserve. The Towra Point Nature Reserve Plan of Management ('PoM') specifically identifies the importance of seagrass beds to the ecological character of the reserve, stating that they 'provide nutrients and shelter for fish, invertebrates, wading birds and other wetland animals at Towra Point'. In addition, the seagrass beds at Weeney Bay are specifically identified as a key feeding habitat for migratory wading birds recorded at the reserve. Approximately 34 of the 80 species of migratory birds listed under the CAMBA and JAMBA agreements have been recorded at the reserve.

Caulerpa is listed as noxious marine vegetation Class 1 (representing the highest level of threat posed to the aquatic environment) under the *Fisheries Management Act 1994* (NSW). Evidence from overseas and anecdotal evidence from Australia strongly indicates that Caulerpa can significantly impact seagrass beds due to its ability to grow extremely quickly and out compete and smother native flora and the production of toxic substances that deter epiphytes and herbivores (Creese *et al.* 2004 Ch 3; NSW Fisheries p 5). Coverage may increase by a factor of 10 in a single summer growing season (NSW Fisheries). NSW Fisheries is particularly concerned about the impacts of Caulerpa on *Posidonia australis*, and has identified protection of this species from invasion as a high priority (NSW Fisheries 2004 p 16).

Caulerpa is very easily spread by human induced mechanisms. It reproduces, disperses and establishes new infestations primarily by fragmentation of individual plants and subsequent attachment and re-growth in new areas (Creese *et al.* 2004 Ch 4). One single small fragment may settle and develop root-like structures and establish a new infestation (NSW Fisheries 2004 p 4-5; Creese *et al.* 2004, Ch 3). The extent of the spread of individual fragments would depend on factors such as currents and wind etc. However, current evidence strongly suggests that fragments are capable of wide natural dispersal, certainly including within estuaries and, with less risk, between estuaries (NSW Fisheries 2004 p 4-5; Creese *et al.* 2004, Ch 3).

The distribution of Caulerpa in Botany Bay has been mapped by NSW Fisheries between February 2003 and September 2004. The mapping shows that Caulerpa currently occurs and/or has previously occurred at or in the immediate vicinity of both the proposed pipeline alignment options at both the southern and northern sides of the bay. It is important to note that comprehensive surveys of the entire bay have not been undertaken and that the distribution of Caulerpa can change markedly over time (in particular, coverage can increase markedly during the summer) (NSW Fisheries 2004 p 5). Consequently, Caulerpa may occur in additional areas not shown on the maps.

Construction of either of the proposed pipeline alignment options would cause significant disturbance to areas where Caulerpa is currently known and/or was previously known to occur. This is highly likely to cause significant fragmentation of individual plants (NSW Fisheries 2004 p 16) and therefore has a significant potential to spread of the infestation to other areas within Botany Bay, including to the nearby Weeney Bay. According to NSW Fisheries mapping, Weeney Bay is not currently known to contain Caulerpa.

Elimination or control of the spread of Caulerpa has had limited success. NSW Fisheries has identified that no single method of eradication has yet been successful and that current methods may be costly, may increase the risk of fragmentation, and may cause unintended direct impacts on other native biota (NSW Fisheries 2004 p 13). The main control method used so far has been direct application of salt to infestations. However, salting measures have generally only been successful at very small scales (a few square metres) (Crease et al).

Marine Mammals

As noted by Sydney Water, the adjoining area of Botany Bay National Park (which includes the Kurnell Peninsula Headland) is a key whale watching site for New South Wales. Potential impacts have been dismissed due to this corridor being only a small part of their migratory pathway. However this is a significant portion of their migratory pathway, and provides a unique opportunity for the public to view them, which in turn impacts on the community perception and conservation value of these species.

There is an acknowledgement by Sydney Water of the potential impact of works on whale migratory pathways on page 19 where they note that that there is potential for fewer whales to be sighted off Cape Solander. There is no indication of the scale of this impact as there is insufficient detail of the project and insufficient assessment of the works to enable an accurate assessment of the potential impacts.

Assessment of the impact of the proposal on marine mammals was limited to noise impacts during construction. Sydney Water proposed to reduce any impact by using management measures including stopping or scaling down of operational works when cetaceans are approaching *as practicably as possible.* However the construction period does not allow for regular downtime during the peak migration season so it can be assumed that these measures will be found to be impractical and so not used. There are other likely impacts caused by changes to the local marine environment and fish populations outlined above that have not been assessed.

The chemicals released from the plant have the potential to bioaccumulate, or build up, in local fish populations. This could ultimately impact on whales and dolphins as there is strong evidence that whale mothers bioaccumulate toxins in their milk and this can be transferred to their first born calves leading to poisoning. Discharging toxic chemicals into a whale migration path is of particular concern.

Information Provided by Sydney Water

NCC has a concern that the ability of the applicant to obtain a 'concept approval' may result in a proposal that contains little detail on which to make accurate and informed environmental assessment.

While it may be possible to demonstrate that for some potential impacts, appropriate standards exist and that appropriate control/management technologies exist to ensure compliance with these standards (for example

industrial noise), others are more subjective and must be the subject of rigorous scrutiny up front. For example it is not sufficient to state that water inlet, outlet and distribution structures will be located so as to minimise harm to aquatic environments. Details of size, design and location of such structures must be provided so that there can be certainty as to the significance of these impacts. For example if potential distribution options provide for one location that destroys 5,000 square metres of seagrass and the other provides for destruction of 3,000 square metres of sea grass, the second option clearly has a reduced impact, however this impact while reduced may still be unacceptable.

Sydney Water has indicated that there will be considerable traffic impacts associated with the construction of the desalination plant. Again it is not acceptable to defer these considerations to a later date and say that traffic studies will be undertaken and recommendations complied with to minimise these impacts. These and other impacts need to be identified and quantified up front so that stakeholders and the community are fully aware of the potential impacts of the proposal, and that an accurate and informed decision can be made in relation to the overall acceptability of this proposal.

Conclusion

NCC considers that based on the current level of information provided by Sydney Water, it is not possible to conclude that the proposal will not have significant impact on matters of national environmental significance.

As such, NCC considers that further detailed information must be submitted to meet the requirements of the *Environmental Protection and Biodiversity Act* and that the current proposal as provided by Sydney Water requires a formal approval from the Federal Minister for the Environment as a 'controlled action.'

If you require any information on any of these points or would like to discuss them further, please contact Cecile van der Burgh on 02 9279 2466 or email cvanderburgh@nccnsw.org.au

Nature Conservation Council of NSW

The voice for the environment since 1955

Level 5, 362 Kent Street, Sydney NSW 2000
Ph: 02 9279 2466 **Fax:** 02 9279 2499
Email: ncc@nccnsw.org.au
Web: www.nccnsw.org.au
ABN: 96 716 360 601

Kurnell Desalination Submissions
Major Development Assessment
Department of Planning
GPO Box 39
SYDNEY NSW 2001

3 February 2006

Dear Sir/Madam,

Re: Ref. number 05_0082 - Submission on the proposed Desalination plant for Sydney

NCC appreciates the opportunity to make a submission on the Environmental Assessment for the Desalination Plant. As the States peak environmental organisation, we are concerned about the proposal and the steps that the government is taking to ensure this plant goes ahead. We are particularly concerned with the lack of attention the government has paid to community consultation on this matter, the failure to consider alternative options and the destructive environmental impacts of the plant not only in the immediate vicinity, but on a much broader scale.

In summary we are strongly opposed to the proposed desalination plant for the following reasons:

1. The environmental assessment process is inadequate. The government is fast tracking the project without adequate environmental studies or tests. The environmental assessment (EA) currently on exhibition is based on a project concept only, not on a detailed design and it is not clear how environmental impacts will be mitigated.
2. The community has not been consulted about the need for the plant. The only opportunity given to the public to comment has been in response to the environmental assessment.
3. Alternatives to desalination have not been properly assessed or publicly discussed by the State Government or Sydney Water. $1.3 billion could be better spent on more sustainable alternatives, including water recycling projects, structural water saving programs, pricing incentives for households and business, rainwater tanks, stormwater harvesting infrastructure, the fixing of leaks in pipes and water education. All these alternatives need to be considered before approving a desalination plant.
4. Greenhouse gas emissions from the plant could add up to 1.25 million tonnes - the equivalent of 250,000 new cars on Sydney's roads.

5. The plant is likely to have major impacts on threatened plants and animals, including wetland birds, bats and frogs.
6. The plant is likely to have major impacts on marine life. Results of a study of a USA Desalination Plant reported a yearly rate of impingement on 55,000 invertebrates and 78,000 fish. The plant would also discharge salty brine/waste straight into the ocean disturbing the immediate marine environment.

Please find attached to this letter a copy of NCC's full submission in opposition to the desalination plant.

If you wish to discuss this matter any further, please contact Daniela Gambotto, NCC's Urban Sustainability Campaigner on 9279 2466.

Kind Regards,

Cate Faehrmann
Director

1. Community Consultation

The consultation process that has taken place for this project is substantially flawed. The community has not been consulted about the **need** for the desalination plant nor the viable alternatives that exist. Most of the consultation that has occurred has been by way of Sydney water informing the public of their plans as opposed to asking the community what they want.

The only opportunity given to the public to comment so far has been in response to the environmental assessment. Meanwhile the State Government appears to have made up its mind on this issue stating that it is "too important to debate."

As this proposal is being assessed under Part 3A of the *Environmental Planning & Assessment Act*, any concerns raised by the community are not required to be taken into consideration by the Minister for Planning in the assessment process.

There is serious concern relating to the proposed pre-construction consultation, which notes that communities will be consulted to ensure that appropriate measures are put in place to mitigate impacts. NCC considers that mitigation or minimisation of impacts does not always necessarily translate to the most acceptable solutions for certain problems. It would be preferable that specific standards and targets were set that would allow ongoing monitoring and evaluation of potential impacts as the project progresses.

A clear consultation framework must be established as a means of guaranteeing inclusive consultation at all stages of the development process.

2. Lack of detail

A major concern of NCC is the lack of detail within the environmental assessment. The EA states that the precise details of the proposal will not be available "until further investigation and design are undertaken as part of the project procurement strategy." It is therefore not possible to make a comprehensive submission based on an environmental assessment that only tells half the story.

As the EA is relevant to the concept plan only, there are significant shortcomings of the document. There are many references throughout the EA to 'more detailed information' being provided at a later stage. At what stage will this 'detailed information' become available and how can Sydney Water ensure that the community will be consulted appropriately?

Within the information supplied by Sydney Water there are also many statements that imply dependency on other factors in the process. It is therefore impossible to accurately determine the full extent of impacts of the proposal.

For a large-scale piece of infrastructure, one would consider that the relevant detailed data had been provided and the investigation had been conducted and appropriately presented to the community. In summary, the EA document does not provide the basis for a fully informed response from the community.

3. Consideration of alternatives

Whilst the EA provides sufficient detail on the apparent benefits of constructing a desalination plant, there is no information to compare it to the many other solutions that exist to resolve Sydney's water crisis. NCC is concerned that viable alternatives have not been considered in this discussion. Sydney has the second highest rainfall of all cities in Australia and this alone is evidence that a desalination plant should be the last option to resolve our water supply issues.

Below is a brief summary of the alternatives that NCC would advocate instead of the desalination plant:

Water recycling
The technology exists to recycle water to any standard we like and to least the standard that desalinated water would be treated.

Cities all over the world successfully recycle water for all purposes, from industrial use to drinking water. Examples of successful recycling plants can be found in the US, England and Singapore. Goulburn (NSW) and Toowoomba (QLD) are also pursuing large water recycling plants for drinking water.

In the east of Sydney, 450 billion litres of freshwater water is discharged into the ocean each year after we have used the water only once. In Western Sydney, we discharge our treated waste water into the rivers. Downstream, the water re-enters into our drinking water supply system. This treatment process could be upgraded to produce pure, clean water out of waste water. There are also many street level or household level recycling techniques available.

Permanent low level restrictions on outdoor water use and education
Most Sydney-siders now recognise that they live in a dry continent and water is a scarce resource. Residents of Sydney have also gone to great lengths in the last 12 months to reduce their water consumption. Recent figures indicate a saving of up to 6% in the last year.

Yet the government is failing to recognise this massive effort that the community has put in. The government should be rewarding the community for efforts made and support further reductions in usage. The average Sydney household uses 420 litres of water per day. Compare this to the Berlin household, which uses 160 litres of water per day. If a large city like Berlin can do it, why can't Sydney?

An education partnership and rewards program between government and community could save billions of litres of water each year.

Rainwater tanks and water efficient appliances
Only a small percentage of Sydney's households and businesses have rainwater tanks and water saving appliances installed. Currently, Sydney Water is offering rebates on rain water tanks between $150 and $650 depending on the size of the tank and water saving devices that the household installs.

Even if part of the $1.3 billion dedicated to build the desalination plant were spent on enhancing the rebates program, the results would be far reaching in terms of water saving and collection.

In addition to the above, there are many other alternative technologies and infrastructure improvements that the state government could invest in to reduce Sydney's overall water consumption and therefore the need for a desalination plant.

4. Greenhouse gas emissions

Desalination is an energy intensive process and thus will result in a huge increase in greenhouse gas emissions.

The Director General's requirements state that "where greenhouse gas offsets are proposed, appropriate details of each offset option must be included in the EA, including implementation measures for each offset option". While greenhouse offsets are a critical component of the proposed desalination plant, the Environmental Assessment contains little or no detail on the greenhouse offsets associated with this proposal. NCC would therefore argue that the Director Generals requirements on this matter have not been adequately addressed.

On this issue, the EA says that a cost effective portfolio of greenhouse gas mitigation measures will be developed to effectively reduce/offset the greenhouse gas emissions associated with operating the project from grid sourced power (coal fired) by 50%. Over the life span of the project mitigation measures proposed include:

a. purchasing renewable energy and/or lower greenhouse gas emission energy;
b. purchasing offsets mechanisms such as renewable energy certificates, forest sequestration and NSW greenhouse abatement certificates.

In response to the above, how can Sydney Water justify the offsetting of greenhouse gases by purchasing green energy when it is estimated that the amount of power required for a 500ML/day plant is almost triple the amount of green power supply currently available.

Further, gas (as an alternative and lower green house gas emission source of energy), is not currently available from the grid and is therefore not an option in terms of mitigation measures.

Gas-fired generation and renewable energy are again playing only a very minor contribution because 'the cost of gas power is greater' (Page 6.9) and renewable energy 'may prove to be technically and/or commercially unviable' (Page 6.10). Sydney Water explains that when the cost is right and hence the market and availability grows then they may consider renewable energy with other energy supply options (Page 6.10). But how will the market grow and how will gas and renewable power become a more feasible option to use if major infrastructure projects like this are not forced to switch to them and hence allow their expansion for the future?

The EA further notes, "Sydney Water is committed to investing in greenhouse gas reduction strategies for the desalination plant to effectively reduce greenhouse gas emissions by 50 per cent". This is a commitment, but it contains no detail of the mitigating measures as required in the Director General's requirements.

As an additional factor, no mention is made of the increase in vehicular movements this development will generate and the greenhouse emissions associated with those movements.

The lack of detail relating to green house gas offsetting is contrary to the requirements of the Director General. Additionally, the high energy demands of the proposed desalination plant and the associated greenhouse gas emissions, exceed trigger values, and have national and international consequences. It is therefore considered that this proposal be referred to the Department of Environment and Heritage for further consideration and assessment.

5. Site impacts

There are potentially significant impacts on many threatened animal and plant species existing on the site, including the Green & Golden Bell Frog, the Wallum Froglet, and Grey Headed Flying Fox, plus four endangered ecological communities. The proposed site is also in close proximity to Botany Bay National Park and the RAMSAR listed Towra Point Aquatic Reserve.

Four threatened ecological communities listed under the *Threatened Species Conservation Act 1995* (*TSC Act*) exist in these surroundings, of which several threatened flora and fauna species under the *TSC Act* are dependent on their very survival and well being. Nonetheless, Sydney Water implies that past surveys have considered it unlikely that these threatened populations still exist in any significant numbers. There is no consideration to possibly carry out longer term monitoring that is also seasonal to properly assess the level of possible disruption and change that could occur.

Sydney Water is also dismissing the likelihood of these species being 'impacted' upon by the proposal - 'impact' being defined as vegetation clearance, hydrological changes, runoff and sedimentation, isolation and light and noise. The EA considers these to be of minor significance and not enough to cause any major impact in this high conservation area. NCC is of an opposing opinion on this matter and considers that all the abovementioned 'impacts' are likely to be detrimental to the survival of these species and communities.

There is also a strong cultural heritage association with this land. Evidence suggests that indigenous people have used the peninsula for at least the last 5,000 years. Sydney Water has justified the proposed development of the land by stating that it 'has been modified by previous activities that have resulted in the majority of the land surface being disturbed' (Page 5.2). NCC considers this insufficient justification for the destruction of a site of national heritage significance.

Sydney Water claims that these places of ecological and indigenous significance are 'limited to conservation areas' (Page 5.2). However, habitat for threatened fauna species would certainly still make use of land outside the conservation area (i.e. migration, searching for food etc.). Directional drilling/boring and layering of pipework and tunnels in the land would surely impact the natural hydrological regime that the identified groundwater dependent ecosystems (GDEs) and associated flora and fauna populations and communities rely on.

The 'conservation area' identified in the EA equates to approximately 34 per cent of the total land Sydney Water wishes to use for their desalination development. However there is no guarantee that this part of the land will be adequately maintained in its present condition. Nor is there any guarantee that the desalination plant will not expand into this land in the future.

The proposal is likely to have impacts on sensitive groundwater dependent ecosystems, including potential for alteration of groundwater levels on site and down gradient areas, and interruption of the saline freshwater interface at Quibray Bay.

The local delivery route from Kurnell to Caringbah 'could pass through and adjacent to features of conservation significance.' Ultimately, this would result in the necessary removal of vegetation some of which has been identified as endangered ecological communities.

As the environmental assessment (EA) is based on a project concept only, not on a detailed design, and it is not clear how environmental impacts will be mitigated, NCC is concerned that the government is fast tracking the project without adequate environmental studies or tests. As the project is deemed 'critical infrastructure' under part 3A of the *EP&A Act,* the proposal bypasses the *National Parks & Wildlife Act,* the *Fisheries Management Act and* the *Local Government Act.* These legislative mechanisms would normally trigger

the full environmental assessment required for such large projects on sensitive sites.

NCC considers it critical that further investigation of the environmental significance and impacts are detailed prior to any approval being issued.

6. Marine impacts – uptake, output and impacts of related infrastructure on sea grass beds, etc.

The proposed desalination plant is likely to damage our marine environment in a number of ways.

Water Intake

Intake of water directly from the ocean will result in the loss of marine species. Larger animals may get trapped and killed on the intake screens and entrainment occurs when smaller organisms e.g. larvae and eggs slip through the intake screens and are killed during standard plant processes. Results of a recent study of a USA desalination plant reported a yearly rate of impingement on 55,000 invertebrates and 78,000 fish. It is not clear how this threat is mitigated.

NCC urges Sydney Water to supply additional information about the technology used for intake for the desalination scheme, as every existing desalination technology to date does have significant impact on marine life. No scientific papers on the issue have been quoted or used in your report addressing this issue.

Waste/brine outlet

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used during defouling of plant equipment and pre-treatment of water, and toxic metals. The water may also be of higher temperature. The plant will discharge this warm, salty brine/chemical waste straight into the ocean. It is possible that these chemicals will be concentrated where the ocean current takes them and that they will harm marine life. The chemicals released from the plant also have the potential to bioaccumulate, or build up, in local fish populations and impact on larger animals that eat these fish.

The pollution from disposal practices is not properly assessed. There is not sufficient information provided in the EA to conclude that the discharge will not have adverse impacts on the marine environment. Clearly additional scientific research is required.

NCC urges Sydney water to undertake appropriate and detailed environmental assessments of all potential impacts of seawater intake and brine disposal that the proposed development would have on marine life.

Whales

There is an acknowledgement by Sydney Water of the potential impact of site works (particularly noise) on whale migratory pathways (page 19). It is noted that there is potential for fewer whales to be sighted off Cape Solander as a result of the works. Again, there is no indication of the scale of this impact, and it is therefore difficult to provide adequate comment.

Seagrass beds

Seagrass beds are valuable as nursery, feeding and shelter areas for many fish, molluscs and crustaceans, including juvenile sand whiting, blue swimmer crabs and weedy seadragons. The proposed pipeline in Botany Bay would see seagrass beds cleared.

The EA clearly indicates the negative impacts of the clearing of sea grass beds in Botany Bay:

> *'Construction of a pipeline across Botany Bay will involve dredging which could disturb the seagrasses and the bed of Botany Bay' (Page 8.9).*
>
> *'Other impacts could include increased turbidity and the effect on aquatic ecology...spreading of aquatic weeds such as Caulerpa taxifolia' (Page 8.9).*

The invasive green alga, Caulerpa taxifolia, may be disturbed by the installation of the pipeline and this

> *'...could enhance the spread of this pest species' and potentially wipe out large areas of adjacent seagrass habitat' (A3, Page ix).*

The EA tries to reassure the reader that ...

> *'A program of seagrass restoration will be established to compensate for the loss of seagrasses during the construction phase' (Page xvii, Summary).*

But it is well known that seagrass restoration is complex and difficult and will take a long while to restore and re-establish. This in turn will affect commercial fishing as marine life will likely migrate elsewhere and may not return and re-colonise the area. A review of information on seagrasses at Silver Beach found that to the 'east of Groyne 7, the seagrasses have become fragmented' with 'bare sand, *Halophila ovalis* and *Zostera capricornii*....this fragmented habitat is where the desalination pipeline will go' (Page 8.10).

Studies have also taken place in Botany Bay near Sydney airport, where seagrass, *Zostera capricornii*, was removed and did not recolonise and hence trends in abundance of juvenile fish in seagrass beds along an estuarine gradient had been greatly affected (Upston & Booth 2003). 'Despite its (*Zostera*) ability to colonise bare areas of sediment, transplantation, especially on a large scale, has proved problematic so far....with very limited success' of

Zostera transplantation around the Mascot runway and Lady Robinsons Beach (A3, Page 44).

The 'northern foreshore of Botany Bay is an area with a history of high recruitment of several commercially important fish species' (Bell & Westoby 1986). The location of seagrass beds in an estuary can also be important towards the settlement and recruitment of fish (Jenkins et al. 1998). Various other studies have found the size of natural seagrass beds to be important in terms to the number of species of fish and macro-invertebrates present (McNeill & Fairweather 1993). Furthermore, there are many factors after settlement that could alter recruit abundances, such as suitability of habitat and species interactions (Risk 1997).

This research indicates the sensitivity of the sea grass beds and the potential environmental and financial loss that may occur as a result of their disturbance.

Contaminated and Acid Sulfate soils

Acid sulphate soil is expected to be exposed within the Caringbah area and 'the route from the desalination plant to Silver Beach' (Page 9.2). Page 9.4 unveils that apart from 'occasional mixed construction waste', asbestos waste is also expected to be found on the site during excavation activities. High concentrations of hydrocarbon contamination is also to be found, the extents of these contaminations are all unknown. There is potential that contaminants could have migrated onto the site from adjacent heavy industrial premises' (Page 9.4). Perhaps a contamination assessment and hazardous materials survey of these neighbouring heavy industrial premises should be performed to get a clearer idea of the level of contamination in the area.

The EA states that 'Sediment in the dredged hole adjacent to the runways in Botany Bay is known to be contaminated' (Page 9.5). Once dredging of the Bay commences many fish could potentially bio-accumulate disturbed contaminates on the bed of Botany Bay and hence come through the food chain via local fisheries.

Migratory Species

Attention must also be made to the close proximity of Towra Point Aquatic Reserve (over 1 km from the proposed route) and Aquaculture (400 metres off Silver Beach) when assessing potential impacts. 'Towra Point provides important habitat for a number of migratory species.... 31 of the 66 species presently listed in the Japan-Australia Migratory Birds Agreement' (Page 10.9). Page 10.9 insists however, that the 'site of the desalination plant does not provide habitat for these species.' However, the indirect impacts of the desalination plant (i.e. increased noise, light and pollution) will interrupt breeding and roosting tendencies in this reserve.

7. The cost

The cost involved in building the plant ($1.3 billion) does not address the ongoing costs of running the plant. The EA does not provide any detail on this matter.

Desalinated water will therefore be more expensive for consumers than any other water supply system – Sydney Water estimates around $60 per household per annum. The community has had little say in this process and will simply have the additional costs of unwanted infrastructure thrust upon them.

Surely this money could be better spent on alternative options that are less environmentally destructive and more socially acceptable.

Conclusion

In conclusion NCC considers that there is insufficient detail in terms of the exact nature and form of the proposal on which to base an accurate and informed comment. The documentation presented by Sydney Water relies heavily on works yet to be undertaken and defers the consideration of assessment of impacts to a later date. Sydney water relies on statements such as works will avoid these areas, or management strategies will be implemented to avoid/minimise these impacts. We are concerned that where such assessment considerations are deferred suitable sites and management strategies to avoid impacts may no longer be available.

NCC also considers that in several areas, the threshold required to trigger an approval from the Department of Environment and Heritage has been reached. In particular the high energy demands of the proposed desalination plant and the associated greenhouse gas emissions, exceed trigger values, and have national and international consequences.

Once again, we would like to strongly express our opposition to this proposal and demand a more comprehensive approach to resolving Sydney's water crisis that would include many of the alternatives suggested in this submission. An essential component to this is the engagement and support of the Sydney community.

References

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From wastewater (no stars) to six star or highly purified water

No Stars
Wastewater
- Domestic sewage and trade waste
- **USES:**
  - No discharge or use without treatment

One Star
Effluent
- Treated to remove large particles
- **USES:**
  - No discharge or use without further treatment

Two Star
Effluent
- Most biodegradable organic material has been removed
- Usually has been disinfected
- **USES:**
  - Discharge into some waterways
  - Apply to land in controlled conditions

Three Star
Effluent
- Nearly all biodegradable organic material has been removed
- Nutrient content has been reduced
- Usually has been disinfected
- **USES:**
  - Discharge to land or waterway with approval of regulating authority

Four Star
- Has received further treatment such as artificial wetlands, conventional, or membrane filtration so that its quality is fit-for-purpose for its intended use
- **USES:**
  - Industrial processes
  - Irrigation of public areas
  - Crops for consumption
  - Dual reticulation

Five Star
Drinking water
- Treated sufficiently for human consumption
- Conforms to Australian Drinking Water Guidelines
- Monitoring must conform to specified quality assurance procedures
- **USES:**
  - Can be blended with other drinking water supplies or used directly

Six Star
Purer than drinking water
- Treated to a very pure quality
- Lacks nutrients and minerals
- **USES:**
  - Kidney dialysis
  - Industrial processes such as pharmaceutical manufacturing
  - Can be blended with fresh water supplies