



NSW GOVERNMENT  
**Department of Planning**

# ENVIRONMENTAL ASSESSMENT Gosford Wyong Water Supply Desalination Scheme

Environmental Assessment Report  
Section 79C of the  
*Environmental Planning and Assessment Act 1979*

June 2007

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# 1. BACKGROUND

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Wyong Shire Council (the Proponent) jointly operates the Gosford Wyong Councils' Water Authority (GWCWA) with Gosford City Council, and is responsible for the operation and management of the Joint Water Supply Scheme (JWSS). The JWSS currently includes a series of water storages, treatment plants and major water transfers systems for the supply of water to residences and commercial and industrial enterprises on the Central Coast.

Since 1993, below average rainfalls have resulted in substantial decreases in water storages which, as at the date of this report, are at approximately 15-16% of total capacity. Reduced water storages have been exacerbated by increased demand for water, driven by significant population growth on the Central Coast. Projections for population growth and the possibility that current drought conditions may continue or worsen in the future have led the GWCWA to develop and release Water Plan 2050, which sets the strategic direction for enhancing and securing water supply in the region. Water Plan 2050 was finalised and released in May 2007. The Plan focuses both on enhancing water supplies and managing demand for water.

The strategy presented in Water Plan 2050 focuses on immediate water supply and demand management measures, including enhancement of existing water supply systems (linking Mardi Dam and Mangrove Creek Dam, and proceeding with the new Tillegra Dam), reduction in demand (including water efficiency standards, education programs, stormwater harvesting and expansion of recycled water use for non-potable uses) and additional short-term water sources (such as groundwater, a new connection with the Hunter Water System, and retrofit of rainwater tanks). The Plan recognises that if the current drought conditions continue, and the regional population grows further, longer-term water supply measures may need to be implemented. These longer-term options include a permanent 20-megalitre per day desalination plant, and possible use of highly-treated effluent as a water source.

The Proponent has sought approval for the permanent desalination plant as a contingency measure, should it be required over the next 45 years to secure reliable water supplies to the Central Coast. The proposed desalination plant would be co-located with the existing Toukley sewage treatment plant. Seawater to supply the plant is proposed to be sourced from under Lakes Beach, with seawater concentrated produced through the reverse osmosis process being discharged to the ocean with the existing treated effluent stream from the sewage treatment plant.

The proposed desalination plant is expected to involve capital investment in the order of \$75 million and as such is considered State Significant Development under the then *State Environmental Planning Policy (State Significant Development) 2005*. The proposed development therefore requires development consent from the Minister for Planning under Part 4 of the *Environmental Planning and Assessment Act 1979*.

## 1.1 Description of Proposed Development

The proposed development includes the following components:

1. a 7,000 megalitre per annum (nominal 20 megalitre per day) reverse osmosis desalination plant located on the existing Toukley sewage treatment plant site;
2. a three or four caisson and horizontal collector well system beneath Lakes Beach with an associated raw water pumping station and chlorine dosing facility;
3. a raw water transfer main to connect Lakes Beach raw water pumping station to the desalination plant;
4. a pipeline from the desalination plant to Toukley sewage treatment plant to allow discharge of approximately 30 megalitres per day of saline reject water via the existing Norah Head ocean outfall; and
5. a product water pumping station and main connecting to the existing water supply system.

The proposed development involves a capital investment of approximately \$75 million and would employ 10 people during operation. Construction of the development is expected to take approximately 21 months. Figure 1 indicates the location of the proposed development and generally configuration of its component parts.

Figure 1 – Configuration and Location of the Proposed Development



## 1.2 Proposed Development Site

The development is proposed to be located on the existing Toukley sewage treatment plant site. The site covers an area of approximately 20 hectares, of which three hectares will be developed as part of the proposal. The existing Toukley sewage treatment plant occupies a further six hectares of the site. Land in the southern part of the site is temporarily being used for stockpiling earthwork spoil from roadworks. Vegetated buffer zones also exist on the eastern and western boundaries of the site. The site is surrounded by Wilfred Barrett Drive, vacant crown land, Evans Road, Darren Kennedy Oval, Noraville cemetery and Oleander Street.

The construction and operation of the Seawater Intake, Raw Water Pumping Station and associated infrastructure are proposed on beach and dune areas of Lakes Beach. The discharge of saline water will be through the existing North Head Outfall tunnel, which passes under developed areas of Norah Head.

## 1.3 Need and Justification

The need and justification for the proposed development mirrors the need and justification for the Kurnell desalination plant proposed by Sydney Water to a significant degree. In both cases, the relevant authorities have developed a comprehensive plan to address the water supply and demand balance of the particular region, and have detailed a broad suite of measures to be progressed in unison in order to secure a reliable and sustainable water supply. In Sydney and on the Central Coast, desalination has been proposed as an option to be pursued in the event of on-going drought conditions and as a 'last line of defence'.

The Department considers that an assessment of the justification for the proposed desalination plant must begin at first principles and be undertaken in the context of the essential nature of water and a robust approach to risk management. It is true to say that water supply is of such fundamental importance that it cannot be done without. Unlike most other resources or commodities whose depletion or scarcity can be accommodated, albeit with potentially significant adaptation, the absence of water or insufficient supply would not only have a considerable adverse impact on the economy but would also affect human health. In the most extreme cases, a loss of sufficient potable water supply would undermine basic human needs and survival.

In the context of risk, therefore, insufficient water supply has the potential to generate significant adverse consequences. The probability of these consequences being realised is difficult, if not impossible, to accurately quantify principally as a result of uncertainties in the prediction of future weather patterns, the timing and success of demand management measures, and the timing and success of the implementation of possible alternative water supply measures. What can be said, however, is that the probability of significant adverse consequences is elevated at this time, as evidence by trends in rainfall and consumption on the Central Coast. The combination of significant adverse consequences, and elevated probability of realisation, has resulted in the current situation of a significant risk of water supply shortages for the region.

Given the broad implications of this risk across the entire Central Coast population, the risk is appropriately characterised as a societal risk (as compared with an individual risk affecting a smaller, defined subset of the population). An elevated societal risk, with potential for significant adverse consequences is most appropriately managed through a suite of mitigation measures. To rely solely on a single approach does not reliably alleviate the risk, but would instead simply shift the focus of the risk. By taking a multi-focus approach, the risk to the Central Coast from water shortages would be spread across many potential mitigation measures, with the success or failure of a single measure would automatically equate to the success or failure of the mitigation strategy overall. In short, the old adage of not placing all of one's eggs in one basket is the most prudent approach to dealing with the risk of water supply shortages in the Central Coast region. This is the approach that has been applied through Water Plan 2050, which details a broad suite of measures aimed at addressing the water demand-supply balance and mitigating against the risk of water supply shortfalls.

The question is therefore not whether the proposed desalination plant itself is justified. It is whether the desalination plant, in the context of the full suite of water management measures outlined in the Water Plan 2050, is justified. Without this context, any single component of the Plan is without the full complement of considerations necessary to inform an objective view on the issue of justification. No single component of the Plan is sufficient to fully address the risk of water supply shortages in the Central Coast region, and should not be

considered in isolation of all other measures to address the supply-demand balance. In this full and appropriate context, the Department considers that the desalination plant, as part of the comprehensive Water Plan 2050 is justified as:

- a measure of last resort in the event of an imminent water supply deficit, below what is required to sustain the Central Coast region;
- a measure to be applied in addition to prior demand management, recycling and alternative water supply options;
- a relief measure in the event that timeframes for other water management measures extend beyond the necessary timeframes for correcting water supply-demand imbalances; and
- an appropriate contingency measure should the effectiveness of other water management options not succeed in fully addressing the risk of water supply shortages.

The Department cautions that a large part of the justification of the proposed desalination plant, as only one component of Water Plan 2050, rest on a vigorous pursuit of the other components of the Plan. Justification of the desalination plant is generated where demand management, recycling and alternative water supply approaches have been aggressively sought, but have not fully mitigated risks of water supply shortages. Both the community and Gosford Wyong Council's Water Authority must continue to view the Plan as an integrated whole, with a clear hierarchy of priorities to be applied, rather than resting on a single measure as providing the entire solution to longer-term water supply sustainability. Given the need for a secure and sustainable water supply on the Central Coast, the Department considers that the proposed development is justified and in the public interest.



## 2. STATUTORY CONTEXT

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### 2.1 Environmental Planning Regime

The subject development application was lodged on 12 July 2005 as State Significant Development under part 4 of the *Environmental Planning and Assessment Act 1979*. The State Significant Development provisions of the Act have since been repealed and replaced with the introduction of Part 3A. However, savings and transitional provisions stipulate that the development application is to continue to be assessed and determined as if the changes to the Act brought in through Part 3A did not occur and that the State Significant Development provisions of Part 4 remain unaffected.

### 2.2 Permissibility

The desalination plant component of the development is to be located on land zoned 5a (Special Uses) under the *Wyong Local Environmental Plan 1991*, in which the plant is permissible with development consent. The seawater intake, raw water pumping station and associated infrastructure down to the high water mark are located on land zoned 6a (Open Space and Recreation) in which those development components are also permissible with development consent.

Works below the high water mark lie outside the *Wyong Local Environmental Plan 1991* and land use zonings. Ordinarily these works would be subject to assessment and approval under Part 5 of the *Environmental Planning and Assessment Act 1979*. However, these works are State significant development by virtue of the operation of section 76A(8) of the Act and therefore require development consent from the Minister.

### 2.3 State Significant Development

The proposal is State Significant Development under *State Environmental Planning Policy (State Significant Development) 2005* (now *State Environmental Planning Policy (Major Projects) 2005*) because it is development for the purpose of a desalination plant with a capital investment in excess of \$10 million for drinking water supply. The project will therefore be assessed and determined by the Minister for Planning as State Significant Development under Part 4 of the *Environmental Planning and Assessment Act 1979*.

### 2.4 Integrated Development

Under section 91 of the *Environmental Planning and Assessment Act 1979* the proposal is classified as integrated development because, in addition to development consent, it requires:

- a licence from the Department of Environment and Conservation under the *Protection of the Environment Operations Act 1997*; and
- an approval from Wyong Shire Council (with the concurrence of the Roads and Traffic Authority) under the *Roads Act 1993*.

Both integrated approval bodies have issued their General Terms of Approval, which have been incorporated into the recommended instrument of consent.

### 2.5 Relevant Environmental Planning Instruments

The assessment of the proposed development is subject to the following environmental planning instruments:

- *State Environmental Planning Policy No. 71 – Coastal Protection*;
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*; and
- *Wyong Local Environmental Plan 1991*.

The Statement of Environmental Effects provides a detailed consideration of the proposed development against the relevant provisions of these environmental planning instruments. The Department has reviewed this consideration and is satisfied that the proposed development is generally consistent with applicable instruments.

## 2.6 Relevant Development Control Plans

The assessment of the proposed development is subject to the following development control plans:

- *Development Control Plan No. 14 – Tree Management;*
- *Development Control Plan No. 30 – Wyong Shire Wetland Areas;*
- *Development Control Plan No. 61 – Carparking;*
- *Development Control Plan No. 69 – Controls for Site Waste Management; and*
- *Development Control Plan No. 77 – Coastal Hazards.*

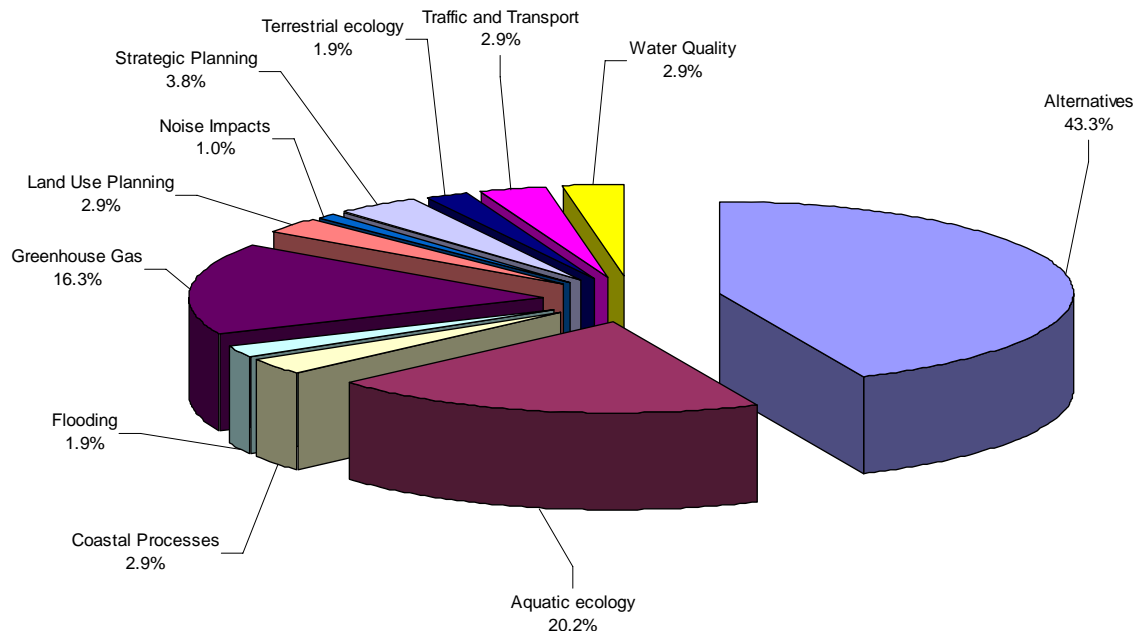
The Statement of Environmental Effects provides a detailed consideration of the proposed development against the relevant provisions of these development control plans. The Department has reviewed this consideration and is satisfied that the proposed development is generally consistent with applicable plans.

### 3. CONSULTATION AND ISSUES RAISED

The Department received 26 submissions in response to the public exhibition of the application and Environmental Assessment. Five of these submissions were received from State and local government authorities (the then Department of Environment and Conservation, the then Department of Natural Resources, the Department of Primary Industries, the Roads and Traffic Authority and Wyong Shire Council), with the remaining 21 submissions made by private individuals and special interest groups.

A single public submission supported the proposed development, while 19 public submissions stated opposition to the proposal. Submissions received from State and local government authorities, as well as a single public submission, did not state opposition or support for the proposal, but noted a number of issues that required specific consideration during the assessment of the proposed development. A summary of issues raised in submissions is presented in Figure 2 below (as a percentage of all issues raised, rather than the number of submissions raising a particular issue).

Figure 2 - Summary of Issues Raised in Submissions



Issues raised in submissions can be generally grouped according to whether they relate to indirect or direct impacts of the project. Indirect impacts (a total of 63.4% of all issues raised) generally relate to alternatives (43.3%), strategic planning (3.8%) and the generation of greenhouse gases associated with the supply of energy to the proposed development (16.3%). With respect to alternatives, submissions generally raised concern that desalination is generally more expensive and environmentally detrimental compared with other water supply options. Alternative water supply options suggested in submissions include the construction of a new dam, water recycling, installation of rainwater tanks, stormwater harvesting, extraction of groundwater and demand management. Strategic planning issues raised in submissions were generally related to arguments in relation to alternatives, and specifically focused on longer-term planning for a secure water supply. In particular, submissions argued that the proposed desalination is strategically unjustified compared with alternative water supplies, and in one circumstance, that population growth on the Central Coast should be capped commensurate with existing sustainable water supply, rather than looking at alternative water supply options to facilitate population growth. Submissions concerned with greenhouse gas impacts reinforced the fact that desalination is a

relatively energy intensive process, and by its very nature would exacerbate greenhouse gas emission problems and global warming.

Key issues raised in relation to direct impacts associated with the project focused on water quality, particularly the effects of saline discharges from the development and resultant impacts on aquatic ecology. Submissions also raised concern over the potential impingement and entrainment of aquatic biota in the proposed intake point. The proposed intake point also raised concern in relation to coastal process, including the potential for increased coastal erosion and the potential for groundwater-dependent ecosystems to be impacted by groundwater draw-down around the intake point.

General concern was also raised with respect to traffic and transport impacts, flooding and noise impacts, with emphasis placed on the need to ensure compliance with established environmental criteria, guidelines and design standards. Land use planning concerns focused on potential land use conflicts, particularly the view that the industrial nature of the proposed development would not be consistent with the urban nature of the locality.

### 3.1 Department of Environment and Conservation

The Department of Environment and Conservation required the Applicant to provide further information during the assessment process with respect to water quality and aquatic ecology. The Applicant duly provided this information. As a result, the DEC has no outstanding issues relating to the proposal and has issued its General Terms of Approval accordingly. The General Terms of Approval have been incorporated in the recommended instrument of consent.

Subsequent to the formal assessment process, the DEC provided further comment to the Department suggesting that greenhouse off-sets for the proposal should be set at 100%, consistent with the outcome specified for the Kurnell desalination plant.

### 3.2 Department of Primary Industries

The Department of Primary Industries did not raise any object to the proposed development in its submission. DPI has suggested that the proposal will have a minimal ecological impact on the aquatic environment and will be beneficial to the local environment by reducing the current impacts of the freshwater discharges from the sewage treatment plant.

### 3.3 Department of Natural Resources

The submission made by the Department of Natural Resources during the exhibition period noted that the proposed development did not lie within the Coastal Zone and did not trigger the provisions of the *Coastal Protection Act 1979*. However, during the assessment process, the Coastal Zone was mapped in the Wyong Shire, inter alia, and as a result, the development application was further referred to DNR under the *Coastal Protection Act 1979*.

DNR has raised concern that the location of the proposed caissons below Lakes Beach could adversely impact on coastal processes, but added that this concern could be alleviated by burying the proposed caissons at a greater depth, and below the anticipated scour depth on the active profile. This approach has been incorporated in the recommended conditions of consent. DNR also confirmed that those components of the development located seaward of the low water mark (ie not the proposed caissons) would have a minimal environmental impact and the concurrence of the Minister for Natural Resources under the *Coastal Protection Act 1979* could be assumed.

### 3.4 Roads and Traffic Authority

The RTA has indicated it has no objections to the proposal, provided its requirements with respect to construction works within the road reserve are met. These detailed requirements have been reflected in the recommended conditions of consent. The RTA also noted that no reliance should be given to on-street parking in Wilfred Barrett Drive and Budgewoi Road in the determination of parking needs relating to the proposed development.

### 3.5 Wyong Shire Council

Wyong Shire Council, as a separate arm of the Applicant, made a detailed submission raising concern over the detail and quality of information provided in the Statement of Environmental Effects for the proposal. Council's concerns can be summarised as follows:

- Council is also the Roads Authority for public and classified roads; however the RTA is required to give concurrence for works on classified roads. Council is therefore required to approve any works on public and classified roads and will impose conditions in this regard once GTA are sought;
- The Statement of Environmental Effects makes no reference to Evans Road where the large 500mm potable water off take main is proposed. Conditions relating to any works within this road reserve will be imposed once General Terms of Approval are sought;
- Section 2.3 of the Statement of Environmental Effects should make reference to Council's Development Control Plan No. 67 – Engineering Requirements for Development. Council will impose a condition ensuring compliance with this document once General Terms of Approval are sought;
- Section 2.6.6 of the Statement of Environmental Effects does not mention Council's Flood Policy. The proposed transfer pumping station and associated chemical storage/feedlines at Lakes Beach appear from Council's topographical information (no levels provided on plan) to be below the 1% AEP flood level of 2.2 metres AHD for Budgewoi Lake and may be affected by flooding. In this regard, Council requires machinery, pumps and electrical installations which are non-flood compatible to be placed at a minimum of 500 mm above the height of the 1% AEP flood. Additionally, the storage of all toxic or pollutant substances of other products which, in the opinion of Council, may be hazardous or pollute floodwaters, are to be placed at a minimum of 500 mm above the height of the 1% AEP flood. Council will impose conditions relating to flooding once General Terms of Approval are sought;
- Figure 5-3 of the Statement of Environmental Effects indicates a "coping" at RL of 2.4, which only provides 200 mm freeboard from the Budgewoi Lake 1% AEP flood level. This height should be increased to a minimum 500 mm freeboard;
- In relation to Drawing No. 831-001456-G102:
  - it is questionable whether access road geometry is adequate for the design maintenance vehicle to be able to perform all manoeuvres including access to and from Budgewoi Road.
  - it is questionable whether the proximity of the access road is close enough to permit gantry/crane from maintenance vehicle to reach the well components.
  - the proposed kerb lines of the "transfer pump station" present a safety issue by providing a physical structure located within and close to an unlit carpark and access.
- There are concerns regarding what security measures are proposed for the construction areas and permanent facilities to avoid vandalism, theft, etc. If lighting proposed, what will be the impact of security lighting on nocturnal animals?
- The Construction Methodologies are very simplified. Section 5.5.1.2 of the Statement of Environmental Effects does not mention preparation of a Construction Management Plan that should include, but not be limited to, the provision of:
  - Traffic Control Plans (this is mentioned in a later section for other works);
  - Erosion/Soil and Water Management;
  - Work compound and material delivery/stockpile areas;
  - Dilapidation;
- Section 5.5.3.1 of the Statement of Environmental Effects – the desalination plant building should be insulated to minimise noise emission, especially given the plant will be running 24hrs per day;
- Section 5.5.3.3 of the Statement of Environmental Effects does not mention the type of chemicals that will be used, proposed bunding, storage or other specific requirements;
- Section 8, Table 8-1 of the Statement of Environmental Effects – Impacts on traffic will be assessed by the RTA and Council. The Statement of Environmental Effects only indicates that traffic will be impacted by pipeline construction. Traffic will also be impacted by material deliveries, construction traffic, driver hesitation due to construction and alteration to carparks, etc;
- How will ongoing annual maintenance (excavation) of the intake lines be controlled? Will there be an annual or open approval given?

- The zone of drawdown is mostly sited on dune and back dune. The frontal dune is dominated by Bitou and *Acacia sophorae* and appears to have been re-established post-mining or have undergone some other disturbance. This area is therefore generally of low conservation value.
- There have been verbal reports of the endangered *Chamaesyce psammogeton* existing in this general area, which was not recorded in the field survey by SKM;
- Any effect in the abstraction area (on the communities present) would be most likely on the back dune, on the low lying area. There appears to be no specific quantification of how Endangered Ecological Communities were determined. How this was done should be clarified so that Council is in a position to fully explain this point if required;
- Of the species present on page 140 of the Statement of Environmental Effects, *Syzygium paniculatum* was not found by SKM in their survey but occurs south of the abstraction zone (west of the roadway);
- The survey work was carried out in March, which is unsuitable for the detection of a number of orchid species. The Statement of Environmental Effects should clarify this aspect by referring to Council's Flora and Fauna Survey Guidelines. The seasonality of *Chamaesyce psammogeton* is unknown; however the report would be improved by related the survey effort to the seasonality / detectability of this species;
- There are many unknowns about groundwater changes on ecosystems:
  - Data quality (effects are measured as 0.2m or 0.05m with no errors reported or feeling for the data accuracy in the main report).
  - Measurements are not taken under "extreme circumstances" – these may be infrequent but critical.
  - There is no discussion on the effects the 'change' to groundwater flows on the potentially affected plant communities.
  - There is no discussion on the effects of altering groundwater flows to the Tuggerah Lakes.
  - There is no discussion on the scale of effects (time-scales of decades are possibly relevant; spatial scales are relevant).
- There is no discussion on any monitoring of potential effects of groundwater changes to the surrounding vegetation. Ongoing monitoring (with remedial plan) must be conditioned.
- There appears to be no environmental reason for choosing the Lakes Beach intake site, identifies that the immediate hazard zone extends to the area on the foredune where the vegetation meets the sand. This is the area that the caissons are proposed to be located. Although this hazard study does not cover the desalination intake site, it can be assumed that the site will probably lie within the hazard area and that they would be exposed more often than once in the next 50 years. Once the caissons are exposed they may increase the erosion risk for the surrounding area.
- There is an acknowledgement that the caissons will be exposed (although the number of times is questionable); however there is no discussion about how long they would be exposed for and what (if any) remedial actions would take place once they are exposed.
- There is no discussion of the likely effects of the quality of the reject saline water on the receiving water – the Statement of Environment Effects only provides a table showing what the likely variables would be. There have been no threshold or guideline values provided. There is also no discussion on how far the potential effects of the reject water would reach.
- The Statement of Environment Effects discusses a widening of the access track on the dune; however there is no discussion of the impacts of this activity on the dune system.
- Additionally to the above comments, it was observed that the application form had the 'no' box for Mine Subsidence ticked, despite the proposal to lay pipelines in the Swansea North Entrance Mine Subsidence District.

Following the public exhibition period for the subject development application, the Department sought General Terms of Approval and recommended conditions of consent from Council. Council provided both General Terms of Approval and other conditions, which have been reflected in the recommended instrument of consent.

## 4. ASSESSMENT OF ENVIRONMENTAL IMPACTS

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Key issues raised in the submissions in response to the public exhibition of the project and/or identified during the Department's assessment include:

- greenhouse gas emissions;
- impacts on coastal processes;
- water quality impacts;
- ecological impacts;
- noise impacts;
- traffic impacts;
- water quality impacts; and
- spoil management and disposal.

All other issues are considered to be minor and have been addressed as part of the Statement of Environmental Effects and additional information provided by the Applicant during the assessment process.

### 4.1 Greenhouse Gas Emissions

#### Issue

The Statement of Environmental Effects highlights that the principal greenhouse gas impact associated with the proposed development is indirect, through the consumption of electricity sourced from the grid. The generation of this electricity at the power station source results in the emission of greenhouse gas emissions.

The Applicant has undertaken an assessment of the greenhouse gas implications of the development, taking into account a commitment to achieving a 6% 'green' electricity usage and estimated a net greenhouse gas emission factor of 3.97 kilograms of CO<sub>2</sub> for every 1000 litres of desalinated water produced. Based on an estimated daily energy consumption of 80,000 kWh (28,000,000 kWh per annum, assuming 350 days of operation), the Applicant predicts an annual greenhouse gas impact of 27,762,336 kilograms of CO<sub>2-e</sub> (annual average over 100 years). Compared with the existing greenhouse gas intensity of water supply to the Central Coast (0.65 kg CO<sub>2-e</sub> per kilolitre of water), the calculated greenhouse gas intensity of the proposed development (3.97 kg CO<sub>2-e</sub> per kilolitre of desalinated water), the impact of the proposal is significant. Assuming operation at full capacity, the proposed desalination plant will result in an increase in greenhouse gas emissions associated with total water supply in the order of 148% in 2011, falling to 100% in 2051 as water supply from other sources increases.

The Applicant suggests that the proposed development would meet approximately 22% of the water needs of the Central Coast. This translates to the consumption of 0.5kWh of energy consumed per household as a result of the operation of the development, or equivalently, the emission of an additional 0.6 kilograms of CO<sub>2-e</sub> per household. The Applicant equates this impact to continuous operation of a 100 watt light globe for five hours per household per day, or driving 2.2 kilometres per household.

The Statement of Environmental Effects presents arguments that it is not economically feasible to further off-set greenhouse gas emissions through the use of renewable energy sources (above the 6% green energy already committed by the Applicant). The Applicant has, however, committed to maximising the use of energy recovery systems to reduce the energy intensity of the proposal.

#### Submissions

Concern over the energy consumption of the desalination process and the associated greenhouse gas implications of generating that energy represent 16.3% of all issues raised in submissions. Submissions generally opposed the proposed development on the basis on its greenhouse gas implications, or the fact that desalination is relatively energy intensive compared with alternative water supply options.

The Department provided the recommended conditions of consent to the then DEC for comment, to ensure that its General Terms of Approval had been accurately reflected. In response, the then DEC suggested that the greenhouse gas off-set proposed by the Department through the conditions of consent (33%) should be

increased to a 100% off-set (use of renewable energy or equivalent), in line with the approach taken for the Kurnell desalination project.

### Consideration

The Department is generally satisfied with the methodology applied by the Applicant to calculate the likely magnitude of indirect greenhouse gas emissions associated with the operation of the proposed development. Further, the Department concurs with the Applicant's assertion that the principal and dominant greenhouse gas impact associated with the proposal relates to the emission of greenhouse gases at the point of electricity generation, and that emissions generated through construction of the proposal are comparably small.

However, the Department considers that the Applicant's intention to source 6% of electricity from renewable energy sources should not have been included in the initial calculation of greenhouse gas emissions. Instead, the Department suggests that it would have been more appropriate to present unmitigated emissions figures, with the implications of proposed mitigation measures considered separately and subsequent to emissions estimates for an unmitigated scenario. In effect this issue does not significantly affect the outcome of the assessment, and the Department notes that removal of mitigation from the initial emissions estimates would increase the Applicant's calculation from 27,762,336 kilograms of CO<sub>2-e</sub> per annum to approximately 29,500,000 kilograms per annum. Emissions estimates remain within the same order of magnitude, and the Department considers that the increase is generally within the range of uncertainty associated with the assumptions applied to the greenhouse gas calculations (eg the uncertainty associated with average emissions for grid electricity from various sources). Further, the Department notes the Applicant's conservative assumption that the proposed development would operate continuously over a 350-day year represents a worst case, particularly if the proposal is to operate as a supplementary water source rather than the principal source of water for the region.

While the Statement of Environmental Effects presents examples of household electricity consumption and associated greenhouse gas emissions equivalent to the impacts of the proposed development, the Department considers it more appropriate to view these impacts at a national and global level. In particular, it is important to assess greenhouse gas impacts at this level given that emissions and effects such as climate change are a global rather than a local issue. In this context, the Department notes that the Australian Greenhouse Office has estimated that total greenhouse gas emissions in Australia in 2004, as carbon dioxide equivalents, were 387.2 million tonnes, up by 2.3% from 1990 levels. The major contributor to this increase came from the stationary energy sector, which alone grew in emissions by 43.0% to 279.9 million tonnes CO<sub>2-e</sub>. Recorded total greenhouse gas emissions in New South Wales have generally remained stable during the period 1990 to 2004, although national accounts strictly suggest a reduction from 160.6 million tonnes in 1990 to 158.7 million tonnes in 2004. Reduced emissions in other sectors have offset a recorded increase in emissions from the New South Wales stationary energy sector from 60.4 million tonnes of CO<sub>2-e</sub> in 1990 to 75.9 million tonnes in 2004 (approximately 26% increase). Globally, the Energy Information Administration in the United States has estimated that total recorded emissions from the consumption and flaring of fossil fuels was in the order of 27,043 million tonnes of CO<sub>2-e</sub> in 2004, increasing by 26.2% over 1990 figures. Based on these figures, and with reference to 2004 emissions, the impact of the proposed development would (at an unmitigated level of approximately 29,500,000 kilograms of CO<sub>2-e</sub> per annum):

- increase total New South Wales emissions by approximately 0.017%, and within the stationary energy sector by 0.036%;
- increase total Australian emissions by approximately 0.007%, and within the stationary energy sector by 0.010%; and
- increase global fossil fuel emissions (consumption and flaring) in the order of 0.0001%.

The figures presented above suggest that the proposed development will have a minimal, if not negligible effect on total greenhouse gas emissions at a national and global level. Notwithstanding, the Department considers that given the relative greenhouse gas intensity of desalination compared with other water supply measures, it is appropriate to mitigate or off-set emissions to the greatest extent economically feasible. In this first instance, this would include maximising the use of energy efficient equipment and energy recovery systems with the proposed development. To this end, the Department has recommended a condition of consent that requires the Applicant to include these measures during the detailed design of the proposal.



In addition to design considerations, the Department considers that there is scope to off-set emissions through a formal off-set package (in the form of a Greenhouse Gas Reduction Plan). As part of the Statement of Environmental Effects and during the assessment process, the Applicant has argued that the use of 6% green power is an appropriate approach to off-setting the greenhouse gas implications of the proposal. While the Department is supportive of the Applicant's commitment in this regard, the Department required the Applicant to further consider the potential to off-set a greater percentage of emissions from the proposal. In response, the Applicant undertook further assessment of this issue during the assessment process and has proposed an increased off-set, in the order of 33% of the energy consumption of the base reverse osmosis membrane design. The Applicant has successfully argued that given the scale of the proposal, this off-set is the greatest that could be reasonably and feasibly applied to the proposal without making it economically unviable. The Department highlights that this is a significant improvement from the originally-proposed 6% off-set and is expected to reduce the net greenhouse gas intensity of the proposal to 2.0 kg CO<sub>2-e</sub> per kilolitre of desalinated water produced. This off-set requirement is reflected in the recommended conditions of consent, which require the Applicant to develop a Greenhouse Gas Reduction Plan to detail how this off-set will be achieved, including management and reporting of implementation.

The then Department of Environment and Conservation has noted that a 100% greenhouse gas off-set was required by the Minister through the project approval for the Kurnell desalination plant, and has suggested that a similar off-set approach should be considered for the subject development proposal. As the Department highlighted in the Director-General's report for the Kurnell desalination plant, it considered that a 100% greenhouse gas off-set was well above what the Department considered reasonable or necessary for that project. However, the Department supported a 100% off-set in that case because the off-set was committed to Sydney Water and the Government, as distinct from imposing such a requirement simply based on the outcomes of the assessment process. In comparison, the proposed desalination plant at Toukley is only 4% of the capacity of the full-scale Kurnell desalination proposal (20 megalitres per day, compared with 500 megalitres per day at Kurnell) and this difference in scale must be taken into account when determining what level of greenhouse gas off-set would be appropriate. Not only are the economics of construction and operation of the two desalination plants significantly different, but the customer base across which the expense of greenhouse gas off-sets may be borne is significantly smaller in the case of the Toukley proposal. The Department considers that it would be unreasonable to require a 100% off-set for the subject development proposal, and as the Applicant has highlighted, such a requirement would make the proposal unviable. Further, and as the Department has noted above, the net greenhouse gas implications of the proposed development are minimal in the context of a national and global view. The required 33% off-set will further reduce the greenhouse gas impacts of the proposal, with the result being an impact within acceptable limits.

## 4.2 Impacts on Coastal Processes

### Issue

The Applicant proposes to install the seawater intake infrastructure associated with the proposed development under Lakes Beach, including location of caissons on the seaward side of the Beach dunes. The Applicant has indicated that caissons would be located approximately 2.5 metres below the beach under normal conditions. However, in the event of major storm events and large rip conditions, the Applicant has predicted that the caissons may become exposed. The Statement of Environmental Effects presents data that suggests that the frequency of caisson exposure could be in the order of once every 15 years under current conditions, and in future (30 years time) this frequency could increase to once every two years. The Applicant notes, however, that further detailed studies would be required to confirm these predictions.

### Submissions

The submission received from the Department of Natural Resources (DNR) during the exhibition period highlights that the Coastal Zone at the time was not mapped within the Wyong local government area, and as such, the provisions of the *Coastal Protection Act 1979* did not apply to the proposed development. However, DNR indicated that should the Coastal Zone be mapped in the local government area in future, it would have significant residual concerns over the impacts of the development on coastal processes (particularly erosion and exposure during extreme weather events) in the context of heads of consideration under the *Coastal Protection Act 1979*. DNR also suggested in its submission that it considered that the Applicant had underestimated the potential

impacts of the proposed development on coastal processes and recommended that further consideration be given to this issue as part of the assessment of the proposal.

The Coastal Zone was in fact mapped within the Wyong local government area during the assessment of the subject development application. The Department strongly encourage the Applicant to refer the application for concurrence from the Minister for Natural Resources under the *Coastal Protection Act 1979*, and eventually made the referral on the Applicant's behalf. In response to this referral, DNR reiterated its previous concerns about the potential for the proposal to adversely impact on coastal processes, but added that this concern could be alleviated by burying the proposed caissons at a greater depth, and below the anticipated scour depth on the active profile. DNR also confirmed that, following more detailed consideration of the preliminary design of the project, that those components of the development located seaward of the low water mark (ie not the proposed caissons) would have a minimal environmental impact and the concurrence of the Minister for Natural Resources under the *Coastal Protection Act 1979* could be assumed.

### Consideration

The Department generally concurs with statements made by DNR in its submission that the Applicant's assessment of effects on coastal process has been underestimated. This is particularly relevant given that increase erosion cause by the location of caissons could have a significant adverse impact on Lakes Beach, and further, could jeopardise the structural integrity of exposed caissons and associated infrastructure.

Throughout the assessment process, the Department encouraged the Applicant to review design options that included location of the proposed caissons behind the dune line. While the Applicant acknowledge that this approach was possible in an engineering context, it maintained concern that location of the caissons behind the due line would have a greater impact with respect to groundwater drawdown and as a consequence, an adverse impact on groundwater dependent ecosystems in the area.

The option presented by DNR of burying the proposed caissons at greater depth represents a further option to address concerns over coastal process impacts, without increase potential adverse effects on groundwater dependent ecosystems. The Department presented this option to the Applicant, who confirmed that the option was feasible and accepted as an economically feasible means of addressing and minimising environmental impacts. As such, the Department has recommended that should the Minister grant development consent, the Applicant be required to install and maintain the caisson infrastructure below the anticipated scour depth. The Department also considers it appropriate to provide design flexibility and permit installation of the caissons above this level if the Applicant can produce further independent, qualified assessment to clearly and conclusively demonstrate that this design approach would not impact on coastal erosion rates. The Applicant has accepted this approach.

To ensure that potential erosion impacts along Lakes Beach are minimised and mitigated to an acceptable level during construction of the proposed development, the Department has recommended conditions of approval that require installation of sleepers and chains on construction traffic routes. In addition, the Department recommends imposition of a condition of consent that explicitly requires stabilisation and revegetation of disturbed dune areas with locally endemic species as soon as practicable following conclusion of relevant construction works.

## 4.3 Water Quality Impacts

### Issue

The proposed development involves a seawater intake below Lakes Beach, and combined discharge with the existing Toukley sewage treatment plant off Norah Head.

The Toukley sewage treatment plant discharges treated effluent via an outfall at Norah Head. Surface water quality monitoring was undertaken at Norah Head and compared with an 'unpolluted' water reference sample from Pelican Point. The results found that average nutrient concentrations 100 metres from the rock platform at Norah Head exceeded the ANZECC (2000) default trigger values for slightly disturbed marine waters. However, the water sample monitored from 200 metres from the rock platform at Norah Head displayed similar results to the unpolluted sample taken from Pelican Point, with both samples exceeding trigger values for total nitrogen and oxidised nitrogen concentrations. The Pelican Point sample also exceeded the trigger value for orthophosphorus.

The Applicant argues that these results suggest that elevated background concentrations of nutrients are more likely to be a local water quality characteristic, rather than as a direct result of discharges from the sewage treatment plant.

Surface water quality monitoring was also undertaken at Lakes Beach and within Cabbage Tree Harbour. The results of monitoring found that water quality within Cabbage Tree Harbour was good and generally complied with ANZECC and Australian Drinking Water Guidelines (ADWG, 2004). Total nitrogen levels, however, were elevated and are most likely associated with stormwater runoff rather than as a result of the effluent outfall. Surface water quality at Lakes Beach, in the vicinity of the proposed saltwater intake location, was also considered to be good, complying with both ANZECC and ADWG guidelines. Low levels of faecal coliforms and enterococci were detected however the Applicant has indicated that the desalination treatment process and disinfection would remove all faecal contamination from the raw water.

The Statement of Environmental Effects presents dilution modelling to demonstrate the likely impact of seawater concentrate discharges through the Norah Head outfall. The Applicant highlights that the Norah Head outfall is distinctive in achieving a relatively high dilution in excess of 30:1 at 10 metres from the outfall, aided by an initial discharge velocity in the order of  $3.8 \text{ ms}^{-1}$ . The dilution modelling presented in the Statement of Environmental Effects assumes continued growth in the volumes of effluent discharged from the Toukley sewage treatment plant from a base case in 2001, to a medium-term scenario (2021) and ultimately to a longer-term outcome (2051). Table 1 summarises the outcomes of consideration of dilution presented in the Statement of Environmental Effects, including predicted near- and far-field dilutions.

**Table 1 - Predicted Dilutions for Base and Future Cases**

Year	Initial Dilution		Dilution at 300 metres
	Dilution	Distance from Discharge Point (m)	
2001	21	9	198
2021	28	14	216
2051	36	20	255

Further modelling presented in the Statement of Environmental Effects includes addition of the proposed saline reject water from the desalination plant (approximately 30 megalitres per day). The modelling concludes that the discharge velocity from the outfall of  $3.8 \text{ ms}^{-1}$  aids in dilution and this, together with the vertical angle of the port increases the time available for three-dimensional mixing and results in the outfall being more hydrodynamically efficient than poorer performing outfalls in NSW. Model predictions found that salinity would be within 2 ppt of the background levels of 34 ppt by the time the discharge plume reaches 25 metres from the release point. The model also concluded that given that the proposed intake is located 4.5 km north-west of the Norah Head outfall it is unlikely that the discharge from the outfall would have an impact on the water quality of Lakes Beach.

During the assessment process, the DEC required the Applicant to provide a more detailed consideration of dilution effects and water quality impacts, taking into account various credible discharge scenarios. In particular, the DEC was concerned to ensure that acceptable water quality outcomes could be achieved for scenarios involving reduced discharges from the sewage treatment plant, combined with maximum flows from the proposed desalination plant. In response, the Applicant confirmed that it would not be possible to discharge saline reject water in the absence of flows from the sewage treatment plant, and that a 'worst-case' minimum flow from the sewage treatment plant would be approximately 8 megalitres per day. Consequently, the Applicant provided further modelling data for existing, worst-case and average flow scenarios, as summarised in Table 2.

**Table 2 – Dilution under Various Discharge Scenarios**

Scenario	Volume of Treated Effluent (MLd <sup>-1</sup> )	Volume of Saline Reject Water (MLd <sup>-1</sup> )	Total Volume of Discharge (MLd <sup>-1</sup> )	Salinity of Discharge (ppt)
Current Situation (Dry Weather)	22	-	22	0.5

Worst Case	8	33	41	~63
Average	22	~30	52	35.2
Peak Effluent Discharge	38	~30	68	27.0

Based on current normal operating conditions, the Applicant highlights that discharge salinity would only lie above 43 ppt (the level above which salinity impacts may occur) about 5% of the time. This correlates with periods of low effluent discharges from the sewage treatment plant (between 8 and 12 megalitres per day). Similarly under worst case conditions (maximum desalination plant discharges, and minimum sewage treatment plant discharges), the Applicant predicts that combined discharge salinity would only exceed 43 ppt for 6% of the time (noting that worst case conditions are only expected to occur 10% of the time). The Applicant further highlights that these salinity concentrations are at the point of discharge and do not account for dilution effects.

The Applicant has presented further modelling results that predict that if only saline reject water were discharged, salinity impacts would return to 15% of the ambient salinity within 10 to 15 metres of the discharge point. A combined effluent and saline reject water discharge would result in a 2ppt salinity impact at 25 metres from the point of discharge (ie 5.8% of the 34 ppt ambient salinity concentration). The Applicant argues that these impacts are minimal, and confined to a relatively small area immediately surrounding the discharge point.

With respect to the use of treatment chemicals within the proposed desalination process, the Applicant has confirmed that it intends to use in the order of 455 kilograms per day of iron salts and 10 kilograms per day of flocculants (such as polyacrylamide) for the purpose of pre-treatment coagulation and flocculation. Additional chemicals would also be used for chlorination and dechlorination, as well as pH adjustment.

The Applicant has argued that the discharge of these treatment chemicals would not result in any additional water quality impacts to the receiving environment taking into account the added concentrations of some metals, and in particular iron. In terms of operational mitigation measures, the Applicant has stated that the current water quality monitoring undertaken as part of the operating licence for the Norah Head Ocean Outfall would be reviewed to ensure that a sampling regime is adequate and that appropriate parameters are analysed. A Water Quality Management Plan would be prepared as part of the operation of the scheme which would include details of water quality monitoring proposed to be undertaken and appropriate management measures to implement to prevent impacts from the discharge of saline reject water on surrounding water quality.

The Applicant has also committed to undertake further studies to determine the number and alignment of nozzles required to maximise the mixing and dilution of the discharge.

### **Submissions**

Water quality issues raised in submissions relate to the potential impacts of the saline discharge from the proposed development, and represent 2.9% of all issues raised.

The then DEC has indicated that it is generally satisfied with the water quality modelling and impact assessment undertaken with respect to the proposed development, based on preliminary design of the proposal. The then DEC has, however, reinforced the need to revisit and confirm predictions from the modelling once detailed design has been completed to ensure that the outcomes presented in the Statement of Environmental Effects and additional information and achieved once the proposal is operational.

### **Consideration**

The Department is satisfied that the Applicant's assessment of the potential water quality impacts associated with the proposed development is appropriate, and that predicted impacts are sufficiently conservative to account for worst-case scenarios.

In considering the water quality impacts of the proposal, it is important to bear in mind that seawater concentrate from the desalination plant would be combined with treated effluent from the Toukley sewage treatment plant prior to discharge. The Applicant has confirmed that discharges would not occur in isolation and that in all cases, a minimum effluent flow from the sewage treatment plant would be maintained. Compared with an ambient

salinity in the order of 34 ppt, existing effluent discharges have a relatively low salinity (0.5 ppt) and as a result are currently having an impact on water quality through the emission of a low salinity discharge into a saline environment. Under average flow conditions, the addition of the desalination plant discharge will reduce the existing impact on the environment by increasing the salinity of discharges to close to ambient conditions (35 ppt at the point of discharge). Under peak sewage treatment plant flows, the mitigating effect of the desalination plant with respect to water quality impacts will be reduced, but will nonetheless represent an improvement over the existing situation (peak effluent discharges combined with desalination plant emissions will result in a predicted discharge salinity of 27 ppt). The Department recognises that these scenarios will result in a water quality impact, but that this impact is an improvement on current practice.

The worst-case discharge scenario would result where full flows from the desalination plant are combined with minimum effluent discharges from the sewage treatment plant. Under this scenario, salinity at the point of discharge (63 ppt) will be elevated relative to ambient conditions and has the potential for a noticeable water quality impact. However, dilution modelling undertaken by the Applicant suggests that salinity levels under a worst-case scenario would return to background levels generally within 25 metres of the point of discharge. The Department is satisfied that the area of affectation is acceptable and is minimised as a result of good mixing in and around the discharge point. As noted by the Applicant, this worst-case scenario does not represent a typical operational mode and would generally not occur for more than 10% of the time. The Department highlights that this fact acts to further reduce the overall water quality impact of the proposal.

Notwithstanding, the Department considers it important for the Applicant to minimise potential water quality impacts during the detailed design of the proposal. In particular, the Department recommends that the detailed design of the proposed development be progressed with the aim of minimising the extent of the near field mixing zone and to achieve relevant ANZECC water quality standards at the mixing zone boundary. The DEC expressed a similar view in its submission and suggested that these outcomes be applied during detailed design. The Department therefore recommends a condition of consent that requires the Applicant to design the proposal to ensure that ANZECC criteria are met and that measures are implemented to minimise the potential for acute ecotoxicological effects within the near field mixing zone. The Department is satisfied that this approach is achievable in reality, and may include refinement of the design of discharge infrastructure, appropriate selection of treatment chemicals and consideration of effective mixing of discharges from the desalination plant and sewage treatment plant prior to release to the environment. In addition, the Department recommends imposition of conditions that reflect a maximum discharge flow rate from the desalination plant and a prohibition of discharges without initial mixing with the sewage treatment plant effluent stream. These conditions will ensure that impacts above those predicted in the Statement of Environmental Effects and additional information are not exceeded.

It will be fundamentally important for the Applicant to monitor the water quality impacts of the proposed development, both as a means to ensure that acceptable water quality outcomes are met, but also to confirm that the discharge and dilution performance of the proposal is as has been predicted in the Statement of Environmental Effects. As such, the Department has recommended that the Minister require the Applicant to develop and implement a Marine Monitoring Program to validate and calibrate modelling presented during the assessment process. The Plan should include calibration methods including oceanographic monitoring and the use of tracers applied to near field numerical modelling to make robust diagnostic and prognostic predictions of discharge plume geometry and dimensions. This approach will assist in identifying any areas of concern with respect to design of the proposal, with further modification of discharge configuration if necessary. The Plan will also be used to confirm that ANZECC water quality criteria are being met at the edge of the near field mixing zone, as required under the recommended conditions of consent.

The Department maintains concern with the proposed discharge of backwash solids and lime sludges from the proposed development for similar reasons to those presented in the assessment of the Kurnell desalination plant. As was the case in that assessment, the Department considers that the Applicant has not conclusively demonstrated that discharge of the materials would meet acceptable environmental outcomes. The Department therefore recommends that based on information currently available, that the discharge of backwash solids and lime sludges not be permitted. In the case of lime sludges, the Department suggests that there are alternative reuse opportunities available, and as such, discharge of the sludges to the environment is not appropriate. In the case of backwash solids, the Department's principal concern relates to the potential for the backwash solids to

generate an elevated water quality impact that has yet to be demonstrated as acceptable, and in the Department's opinion is potentially avoidable. There are four key aspects related to the discharge of backwash solids that the Department considers support its position that backwash solids should not be permitted to be discharged along with seawater concentrate:

- significant uncertainty remains in relation to the ecotoxicological effects of the backwash solids on marine biota;
- significant uncertainty remains in relation to the physical effects of backwash solids, particularly the potential for gill occlusion and smothering of benthic organisms through the settling of solids on the seabed and reef structure;
- significant uncertainty remains in relation to the potential for re-entrainment of backwash solids, with the potential for suspended materials to generate an amenity impact through discoloured plumes and deposition of backwash solids on foreshore areas or more sensitive marine ecosystems; and
- it is questionable whether discharge of backwash solids is an appropriate and acceptable waste management approach in the absence of a robust analysis of whether the alternative (removal and disposal to landfill) is reasonable and feasible.

With the remaining uncertainties over the impacts of the backwash solids discharge, the Department considers it inappropriate to permit discharge of the solids, having regard to the Precautionary Principle. The Applicant's proposal to discharge the solids is not considered an appropriate course of action and inconsistent with good environmental practice and the Precautionary Principle. As such, the Department recommends that the Minister require, through conditions of consent that backwash solids be prohibited from discharged. Notwithstanding, and consistent with the approach taken for the Kurnell desalination plant, the Department suggests that the Minister also include conditions of consent that permit the Applicant to demonstrate the acceptability of discharge whether from an alternative technology or from the processes proposed. If detailed design of the desalination plant includes an alternative pre-treatment process, with different backwash qualities (for example, different solids materials with different physico-chemical characteristics), or the Applicant considers it can further justify the current proposal, then the Applicant should be provided with the opportunity to demonstrate that discharge of backwash is consistent with acceptable environmental outcomes. The demonstration presented by the Applicant would need to address the key outstanding issues listed above, focusing on ecological impacts, water quality impacts and amenity issues. The Department considers it important that an international peer review of the Applicant's arguments be undertaken prior to permitting any alternative discharge to ensure a robust assessment of the merits of the approach.

The Department is satisfied that with the imposition of the recommended conditions of consent, that the water quality impacts of the proposed development can be minimised and maintained within acceptable environmental limits.

#### 4.4 Ecological Impacts

##### Issue

The proposed development has the potential to impact on terrestrial ecology, principally as a result of construction works, and on aquatic ecology, as a consequence of the on-going operation of the proposal involving discharges of saline reject water to the environment.

##### *Impacts on Terrestrial Ecology*

The Statement of Environmental Effects provides an outline of the vegetation communities present within the study area and discusses the impact of the proposal on fauna habitats and endangered ecological communities.

The study area comprises a mix of modified and natural habitats for fauna. Four general fauna habitats are present within the study area and include swamp forest habitats, dune heath, freshwater aquatic habitat and cleared and disturbed habitats. Much of the vegetation comprises remnant vegetation with specific portions containing attributes of significance to local fauna species such as dense vegetation cover, foraging and breeding areas, refuge and movement opportunities. The swamp forest areas fringing Budgewoi Lake at the northern end of the study area contain dense vegetation and would provide locally important habitat for restricted species such as the Swamp Rat (*Rattus lutreolus*) and Brown Antechinus (*Antechinus stuartii*). Small freshwater depressions also exist in the dune areas between the beach car parks and these areas would provide habitat for frogs.

Large areas of the study area are disturbed and degraded and dominated by weeds such as bitou bush and exotic grasses. Open beach and shoreline habitat as well as tidal estuarine habitats associated with coastal lakes also exist.

Research undertaken regarding threatened species to potentially occur within 10 kilometres of the study area revealed 12 threatened flora species and 41 threatened fauna species. From this list, potential subject species considered likely to occur within the habitats present in the study area were then derived and targeted surveys of these species then formed part of the flora and fauna field investigations undertaken. Targeted surveys for flora were undertaken for the following species:

- *Angophora inopinata*;
- *Melaleuca biconvexa*;
- *Syzygium paniculatum*;
- *Eucalyptus camfieldii*;
- *Callistemon linearifolius*;
- *Chamaesyce psammogeton*;
- *Grevillea parviflora subsp. parviflora*; and
- *Acacia bynoeana*.

Targeted surveys for fauna were undertaken for the following species:

- Squirrel Glider;
- Eastern Chestnut Mouse;
- Eastern Bentwing Bat and Little Bentwing Bat;
- Large footed Myotis;
- Eastern False Pipistrelle;
- Eastern Freetail Bat;
- Greater Broad-nosed Bat;
- Grey-headed Flying-fox;
- Masked Owl;
- Powerful Owl;
- Green and Golden Bell Frog; and
- a number of birds including Sooty Oystercatcher, Pied Oystercatcher, Little Tern, Great Knot, Lesser Sand Plover, Broad-billed Sandpiper, Sanderling, White Tern, Black-tailed Godwit, Terek Sandpiper, and Osprey.

The results of the field surveys found 190 flora species from 74 families within the study area, with 50 of these species being introduced species. A total of 44 fauna species were recorded comprising six native and five introduced mammal species, two frog species, five reptile species and 36 bird species. No flora or fauna species currently listed as threatened were recorded within the study area although several endangered ecological communities were located including:

- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions;
- Low Woodland with heathland on indurated sand at Norah Head;
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions;
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions;
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions; and
- Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions.

The impact assessment concluded that the construction of the desalination plant would not significantly impact on local populations of threatened terrestrial fauna species. In addition, the Applicant has indicated that the impacts on endangered ecological communities is expected to be negligible due to the location of the proposed pipelines through disturbed areas, however a minor impact would potentially occur in the vicinity of Lakes Beach. The proposal would result in the removal of an isolated stand of regrowth Swamp Oak Floodplain Forest (approximately 500 m<sup>2</sup>) comprising about 20 young mature Swamp Oak trees. The Statement of Environmental

Effects states that this stand is largely infested with introduced species however large intact stands of this community are located north of the study area along the perimeter of Budgewoi Lake which would not be impacted by the proposal.

The Applicant has committed to a number of mitigation measures that would be implemented during the construction stage of the project to minimise impacts to terrestrial flora and fauna. During operation maintenance of the seawater collectors and caissons would be required which would need vehicle access to Lakes Beach. The Applicant proposes that this access would be via the northern car park and that the provision of a dedicated access track would minimise potential impacts to flora and fauna. Groundwater monitoring would also be undertaken to assess any impacts of the intake on groundwater drawdown and therefore ascertain the impact to groundwater dependent ecosystems.

### ***Impacts on Aquatic Ecology***

The Statement of Environmental Effects provided a description of the aquatic ecological environment located near Norah Head and an assessment on the potential impacts to the ecosystems from the addition of saline reject water to the existing treated effluent which is discharged from this location. Two distinct ecosystems are located in the vicinity of the outfall comprising subtidal rocky bottom and intertidal rock platform.

The existing outfall is situated at the edge of the rock platform and within the subtidal zone. A number of surveys have been previously undertaken to record the fauna and flora assemblages of these ecosystems. Within the subtidal rocky bottom, algal assemblages mainly comprise the kelp *Ecklonia radiata* with the kelp understorey consisting of a range of alga. Macrobenthic organisms identified included sponges, sea mosses, hydroids, sea anemones, barnacles, gastropods and sea squirts. The studies concluded that the aquatic ecosystems were not impacted by the discharge of treated effluent into the ocean with no reduction of species being evident when compared to a control site at Pelican Point. Intertidal communities identified within the intertidal rock platform were considered typical of those located on other rock platforms in New South Wales.

A number of bioaccumulation studies have also been undertaken to establish whether contaminants associated with the effluent discharge have been taken up by marine organisms in the vicinity of the outfall. Heavy metals were detected in tissue samples from fish and sea squirts however all concentrations were below the NHMRC recommended limits for edible fish with the exception of arsenic which was exceeded in all studies.

In terms of threatened species, the Applicant has stated that Lakes Beach and Norah Head are not known habitats for any species listed under the *Fisheries Management Act 1994* or the *Environment Protection and Biodiversity Conservation Act 1999*, however it is possible that some of these species may be found in the region.

The Applicant has indicated that potential impacts on aquatic ecology from the construction of the proposal would predominantly relate to potential impacts associated with the construction of the seawater intake system at Lakes Beach. The SEE indicates that the installation of the horizontal seawater collectors could result in the displacement and loss of habitat for sediment dwelling organisms however the horizontal collector wells would be bored directly from the caissons and therefore impacts would be restricted to localised individuals. No impacts would result to any marine vegetation.

During construction, the Applicant has stated that a Soil and Water Management Plan would be prepared and measures in the Plan would be followed by the construction contractor to minimise the impacts of erosion and sedimentation on aquatic ecology. For the operational phase, the seawater intake system would allow water to be collected using the ocean bed as a natural filter thereby eliminating the collection of any marine organisms. The saline reject water discharge would have a salinity approximately double that of seawater, under worst-case conditions (low flows from the Toukley sewage treatment plant). The Statement of Environmental Effects indicates that the components of the saline reject water discharge that may have an impact on aquatic organisms include increased salinity, additives from the water treatment process such as antiscalants and higher trace metal concentrations. The Applicant does not believe that the salinity of the saline reject water would have any impact to marine organisms as with dilution the salinity level is expected to be within 2 ppt of background levels of 34 ppt within 25 metres of the discharge point.



The antiscalent proposed for use during water treatment would include polyacrylic acid (20%) and organo-diphosphonic acid (10%). The Applicant has indicated that there is no current information available on the toxicity of the proposed antiscalent to marine species, although acute toxicity tests have been undertaken using freshwater species where concentrations resulting in mortality ranged between 2,628 to 5,967 mg/L. The Statement of Environmental Effects states that the concentration of the antiscalent in the treated effluent-saline reject water mix is predicted to be approximately 4.6 mg/L prior to discharge and 0.36 mg/L following dilution and therefore would not be present at a concentration that would be harmful to marine life. The Applicant has committed to further ecotoxicity testing during detailed design of the proposal. It has also committed to continued monitoring of ecological health prior to implementation and during operation.

### **Submissions**

Impacts on ecology were raised as 22.1% of all issues in submissions, with the principal focus on aquatic ecology (20.2%) and some concern also raised with respect to terrestrial ecology (1.9%). Key issues raised in submissions can be summarised as follows:

- the potential for marine biota to be drawn into and killed in the seawater intake infrastructure;
- the impacts of saline water discharges on aquatic ecology;
- impacts of the proposed development on the Floodplain Swamp Oak Endangered Ecological Community;
- the potential for the proposed development to generate groundwater drawdown effects with resultant impacts on groundwater-dependent ecosystems.

The submission from DPI did not raise any object to the proposed development, and indicated that the combined discharge from the desalination plant and existing sewage treatment plant is likely to mitigate the impacts of current freshwater discharges on the marine environment.

### **Consideration**

#### ***Impacts on Terrestrial Ecology***

Construction of the proposed development will occur on the existing disturbed Toukley desalination site and along road corridors. The Department concurs with the Applicant that the majority of areas to be impacted by the proposal during construction represent little terrestrial ecological value and there is little potential for the proposed development to impact on threatened terrestrial species. Similarly during operation, the Department is satisfied that the proposal is unlikely to impact on terrestrial species.

The Statement of Environmental Effects suggests that although the Applicant has endeavoured to minimise clearing of vegetation as part of the proposal, a small stand of Swamp Oak Floodplain Forest, comprising about 20 individuals. The Department notes the Applicant's observations that these individuals are regrowth and subject in infestation by weeds. In this context, the Department considers that the vegetation is not of significant value and removal of the trees during construction of the proposed development is an acceptable environmental outcome.

The presence of significant groundwater-dependent ecosystems behind the dunes of Lakes Beach presents the potential for groundwater drawdown as a result of the proposed seawater intake to negatively impact on ecological values. Modelling presented in the Statement of Environmental Effects suggests that the area affected by groundwater drawdown will not impinge on these areas of groundwater-dependent ecosystems, and the Applicant has noted that seawater intake infrastructure has been designed and located to minimise the potential for impact. However, the Department considers that given the significance of these ecosystems, it is important to ensure that the predicted avoidance of impacts is achieved in reality. To confirm predicted groundwater drawdown areas and impacts, the Department recommends that the Applicant be required to undertake groundwater monitoring around the seawater intake infrastructure. As part of the recommended Groundwater Monitoring Program, the Applicant would be required to develop contingency measures to address any divergence from the predicted extent of groundwater drawdown that may adversely affect groundwater-dependent ecosystems. The Department considers this to be an appropriate approach to ensure protection of significant terrestrial ecosystems around the seawater intake infrastructure.

#### ***Impacts on Aquatic Ecology***

During construction of the proposed development, the Department is satisfied that impacts, particularly those associated with erosion and sedimentation, can be managed in manner that prevents unacceptable impacts on aquatic ecology. The Department has recommended that the Applicant be required to prepare and implement a Construction Environmental Management Plan to detail and formalise appropriate construction methods and environmental management practices to ensure that impacts are kept within acceptable levels.

A number of public submissions raised concern over the potential for aquatic species to become entrained or impingement in the seawater intake infrastructure. However, the Department highlights that this infrastructure would be buried under Lakes Beach, and there is no opportunity for entrainment or impingement to occur. Further, the intake infrastructure would be buried sufficiently deep so as not to represent significant potential for impacts on benthic organisms within the Beach. Although there is likely to be an impact with respect to groundwater drawdown around the intake infrastructure, the Department does not consider that changes in groundwater hydrology under Lakes Beach would generate a significant impact on aquatic ecology.

Submissions also raise concern over the potential impacts of saline water discharge from the proposed development on aquatic ecology, and the Department considers that this is potentially the most significant avenue for aquatic ecological impacts. The Department of Primary Industries has suggested in its submission that the saline water discharge is in fact likely to result in a positive impact on aquatic ecology. DPI highlights that existing discharges from the Toukley sewage treatment plant are low in salinity, and addition of the saline water discharge will mitigate the 'freshwater' impacts of the existing discharge on marine biota. The Department concurs with this observation, but cautions that the 'positive' effects of the saline water discharge should not be overstated given that the desalination plant and sewage treatment plant would likely interact through a number of different operational modes. Variability in the flows from these two plants would vary, with some combined discharges having low salinity relative to ambient conditions, and others, slightly higher salinity. Overall and on average, however, the Department notes that combination of the discharge streams from the two plants would on average produce an emission with salinity closer to ambient conditions that is currently the situation. Under these circumstances, the positive effects noted by DPI are likely to result.

As noted in the assessment of water quality impacts, the Department does not support the discharge of backwash solids to the environment based on information provided by the Applicant to date. The Department has therefore recommended that the Minister not permit backwash discharges. This approach resolves one of the key concerns of the Department with respect to the impacts of discharges on aquatic ecology.

The Applicant has predicted that under worst-case conditions, discharges would be diluted to meet background salinity levels within 25 metres of the discharge point. Outside this area, the Department considers that there is unlikely to be an adverse impact on aquatic ecology as a result of the proposed development. Within this area, elevated salinity levels and effects associated with individual ions may impact on aquatic ecology. The approach taken with respect to water quality around the discharge point, and reflected in the recommended conditions of consent, is the attainment of ANZECC water quality outcomes outside the near field mixing zone, and optimisation of the mixing zone to minimise impacts within this area. In this manner, direct impacts on aquatic ecology will be confined to the near field mixing zone itself. It is important to note that ANZECC guidelines highlight that water quality criteria need not be met within the mixing zone and as a consequence there is no assurance that aquatic ecology will be protected within the mixing zone.

However, the Department considers that the worst-case 25-metre mixing zone around the discharge is minimal in the context of available habitat in the locality. Further, surveys undertaken around the existing discharge have not identified any species, populations of habitat of particular conservation value. As such, the Department considers that although impacts are possible and likely to occur within the mixing zone, the significance of impacted marine biota is not sufficient to suggest that the impact would not be acceptable. The scale and extent of any impact is capable of minimisation and management through a rigorous design process, to optimise the near field mixing zone and dispersion/ dilution of saline water discharge. It is considered important that this approach be applied during the design process and that impacts on ecological health are carefully monitored during implementation of the proposed development to ensure minimisation of deleterious effects.

To ensure that impacts on aquatic ecology in the mixing zone are minimised, the Department recommends that the Applicant be required to develop and implement a Marine Monitoring Program. As noted in the assessment

of water quality impacts, this Program would detail a design and monitoring approach aimed at minimise the extent of the mixing zone, maximising dilution and mitigating acute and chronic impacts associated with the discharge of saline water.

#### 4.5 Noise Impacts

##### Issue

An assessment of the potential noise and vibration impacts from the proposal was provided as part of the Statement of Environmental Effects in accordance with the DEC's *Industrial Noise Policy*. Background noise monitoring was undertaken at the closest residential receivers, one located in close proximity to the proposed desalination plant (Evans Street) and the other in the vicinity of the intake transfer pipeline near Budgewoi Road. Of the locations monitored, Budgewoi Road was the noisiest with a median noise level of 48 dBA during the day ( $L_{A90}$ ) dropping to 37 dBA at night while the Evans Street monitor recorded a median level of 37 dBA during the day and 30 dBA at night.

The Statement of Environmental Effects states that construction noise could impact on the local amenity through the construction of the desalination plant and as a result of construction of the Lakes Beach seawater intake, the raw water pumping station and the raw water transfer main along Wilfred Barrett Drive and Budgewoi Road. Noise emission modelling indicated that construction of the desalination plant could result in the generation of substantial noise with the daytime noise level expected to increase to 57 dBA at the Evans Road residence during worst case conditions which include several types of construction equipment operating at the same time during stable (light breeze toward the receiver) meteorological conditions. The Applicant highlights that stable meteorological conditions would not be continuous over the construction period and it is likely that lower impacts than those predicted would be experienced.

Construction of the raw water transfer main along Budgewoi Road was also predicted to result in high noise levels as a result of noisy equipment being required to operate in close proximity to residential receivers. The Statement of Environmental Effects indicates that noise levels at the nearest receivers may reach approximately 79 dBA when an excavator, haul truck and jack hammer are operating simultaneously. This is reduced to 70 dBA when a single excavator operating only, which only marginally exceeds the construction noise goal of 68 dB(A) in this area. The Applicant reinforces that peak impacts associated with the most intensive construction works would be infrequent and limited in duration.

With respect to operation of the proposed development, the Applicant has derived project-specific noise criteria in accordance with the *Industrial Noise Policy* for receptors on Evans Road and Budgewoi Road. For Evans Road, these criteria are 42 dB(A), 39 dB(A) and 34 dB(A) for the day, evening and night periods respectively. For Budgewoi Road, the derived noise criteria are 53 dB(A), 48 dB(A) and 42 dB(A).

Noise modelling presented in the Statement of Environmental Effects suggests that with acoustic treatment of the product water pumping station and post-treatment chemical building, the noise impact at the nearest receptor (Evans Road) would be 37 dB(A). This impact approaches the night-time noise criterion for Evans Road of 34 dB(A), and the Applicant argues that further acoustic treatment of product water pumping station would result in the noise criteria being comfortably met. Similarly, noise modelling for the operation of the raw water pumping station suggests a noise impact at the nearest receptor (Budgewoi Road) of 24 dB(A), which is well below the night-time noise criterion of 42 dB(A).

##### Submissions

Noise impacts represented 1.0% of all issues raised in submissions. No specific or detailed noise issues were raised in submissions, except for general concern that the proposed development should be constructed and operated to comply with applicable noise standards.

##### Consideration

The Department recognises that the noise impacts associated with the construction of the proposed development would be elevated, but would be generally similar to typical noise impacts from general construction works. The Department concurs with the Applicant's observation that these impacts would be transient and limited duration,

and there is potential to schedule works to minimise peak construction works and to provide impacted receptors with periods of respite. In this context, the Department considers it appropriate to apply a management approach to construction noise, to ensure that the limited duration impacts are mitigated and managed to the greatest extent possible. The Department therefore recommends that construction activities be limited to daylight hours and prohibited on Sundays and public holidays unless there are exceptional circumstances, consistent with common construction practice. Further, the Department recommends that the Applicant be required to develop and implement a Construction Environmental Management Plan to ensure that construction impacts, including noise effects are effectively mitigated and managed.

The Department is generally satisfied with the noise impact assessment presented in the Statement of Environmental Effects and the fact that the Applicant has demonstrated that noise criteria developed in accordance with the *Industrial Noise Policy* could be met. In particular, the Department notes that the raw water pumping station is expected to generate noise impacts well below the applicable noise criteria along Budgewoi Road. As such, the principal potential noise issue associated with the proposed development would be the desalination plant itself (and associated processes also located on the proposed development site). Given that the desalination plant may operate 24 hours a day, seven days a week, the Department highlights that the night-time noise criterion would be the limiting noise standard for the development. The Applicant has derived a project-specific noise criterion of 34 dB(A) for the night-time period for receptors along Evans Road. However, the Department considers that consistent with standard practice of applying a minimum noise criterion of 35 dB(A) to developments (consistent with the *Industrial Noise Policy*), that 35 dB(A) should be applied as the applicable criterion for the desalination plant for all assessment periods. The noise modelling presented in the Statement of Environmental Effects has demonstrated that with the most basic noise treatments applied to the proposed development, a noise impact of 37 dB(A) at the most-affected receptor could be achieved. There is, however, potential to reduce this noise level further through the detailed design process, and the Department is satisfied that the proposal could be designed to comfortably meet 35 dB(A). The Applicant has confirmed that it also considers that attainment of this standard is readily achievable. The Department therefore recommends that the Minister stipulate a noise limit for the desalination plant site of 35 dB(A) under all periods.

To ensure that predicted noise outcomes are achieved in reality, the Department also recommends that the Applicant be required to undertake confirmatory noise monitoring within 90 days of the commencement of operation. In the event that elevated noise impacts are detected, the Department recommends that the Minister specify through the conditions of the development consent that the Applicant must identify and implement further noise mitigation measures to achieve the noise limit specified in the conditions.

#### 4.6 Traffic Impacts

##### Issue

The Statement of Environmental Effects presents expected traffic-generation data during earthworks, construction and operation of the proposed development. Peak impacts are expected to be experienced along Budgewoi Road, which would be the principal access route under all phases of the development. During initial earthworks, the Applicant predicts that 108 vehicle movements would be generated per day and 140 vehicle movements during construction. This level of traffic generation is less than 1% of existing traffic flows on Budgewoi Road (13,718 movements per day).

Operation of the proposed development would support 10 employees, and it is therefore predicted that operation will result in an additional 20 passenger vehicle movements to and from the site each day. In addition, the Applicant expects that a further 11 movements would be generated through deliveries to the site. This level of impact is significantly lower than existing traffic volumes and is expected to have a negligible impact on the surrounding road network.

In addition to direct traffic impacts, the proposal has the potential to impact on the road network and traffic flows during construction of the raw water transfer main along Budgewoi Road and Wilfred Barret Drive. The Applicant notes that some road closures would be required for short durations during these construction works, and has committed to construction of the transfer main in 60-metre segments to minimise potential traffic disruptions.

### **Submissions**

Both the RTA and Wyong Shire Council raised traffic issues in their submissions on the proposed development. The RTA specified design and construction requirements for works within the road reserve associated with the raw water transfer main, and highlighted that no reliance should be placed on parking on Wilfred Barrett Drive and Budgewoi Road. Council raised concern that it was not clear from the Statement of Environmental Effects that the site access had been designed in accordance with relevant standards and to accommodate vehicles likely to be accessing the site.

### **Consideration**

The Department is satisfied that the traffic impact assessment presented in the Statement of Environmental Effects is appropriate. Further, the Department concurs with the Applicant's conclusion that the proposed development is unlikely generate a significant traffic impact during earthworks, construction and operation. With respect to construction of the development, the Department highlights that the construction hours recommended to manage construction noise would also act to regulate the hours of heavy vehicle movements to and from the site, thereby resolving any concern with respect to heavy vehicle movements or traffic noise at night.

The Department supports the recommended measures presented in the submission made by the RTA, and has generally incorporated these requirements into the recommended instrument of consent. To ensure that Council's concerns over site access are addressed and resolved during the detailed design of the proposed development, the Department has recommended conditions of consent that require compliance with establish access and parking standards. The Department considers that this approach will ensure that the development is design and construction to avoid traffic conflicts at the site ingress/ egress and will provide sufficient and appropriate carparking and vehicle manoeuvring areas on the site.

## **4.7 Flooding Impacts**

### **Issue**

The Statement of Environmental Effects refers to previous studies into the hydrology and flooding characteristics of the Tuggerah Lakes system, and in particular, the predicted 1 in 100 year flood level of 2.23 metres AHD, and the probable maximum flood level of 2.70 metres AHD.

The Applicant highlights that the desalination plant, at 20 metres AHD is well above all predicted flood levels. However, there are parts of the raw transfer main that would lie predicted flood levels. The Applicant highlights that this is unlikely to be of concern given that the transfer main is pressurised and water tight.

The raw water pumping station would be located at 2.5 metres AHD, which is above the 1 in 100 year flood level, but below the probable maximum flood level. The Applicant suggests that it is not clear whether the probable maximum flood level would reach the pumping station given intervening topography. However, the Applicant has argued that location of the pumping station above the 1 in 100 year flood level is appropriate protection for the infrastructure.

### **Submissions**

Wyong Shire Council suggested in its submission that development below the 1 in 100 year flood level has the potential to affect flooding characteristics in the region. In addition, Council has indicated that all pumps, electrical equipment and hazardous materials should be stored above the 1 in 100 year flood level.

### **Consideration**

The Department considers that the appropriate standard against which the proposed development should be assessed is the 1 in 100 year flood level, and notes that all aboveground structures would be located above this level. The Department also concurs with the Applicant's assertion that because those parts of the raw water transfer main below the 1 in 100 year flood level would be sealed, pressurised and buried there is negligible potential for that infrastructure to impact on or to be impacted by any future flooding.

As highlighted in Council's submission, all pumps, electrical equipment and hazardous materials should be located above the 1 in 100 year flood level, and the Department notes that this would be the case.

## 5. CONCLUSIONS AND RECOMMENDATION

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The Department has undertaken a detailed assessment of the proposed desalination plant, Kurnell, having regard to the Statement of Environmental Effects and additional information, and issues raised in the 26 submissions received in response to the public exhibition of the application.

Based on its assessment, the Department is satisfied that if the desalination proposal is ever required in future, that it could be undertaken within acceptable environmental limits. The Department's recommended conditions place a strong focus on best environmental practice and a detailed design process focused on minimising impacts to the greatest extent possible.

Key recommended conditions of consent focus on significant issues associated with the proposed development, including greenhouse gas off-sets, mitigation of potential coastal erosion impacts, and minimisation of water quality and aquatic ecological impacts. To ensure that all other potential environmental impacts are managed consistent with best environmental practice, the Department has also recommended conditions with respect to construction and operation of the proposal, including with respect to noise, air quality, traffic management and general design of the development.

The Department highlights that location of the proposed desalination plant with the existing Toukley sewage treatment plant, and combined discharge of saline reject water with treated effluent has resulted in reduced impacts from both developments, particularly in relation to water quality and aquatic ecology. Further, the Applicant's work to design the proposal to include a seawater intake under Lakes Beach, and alignment of the raw water transfer main through disturbed areas has resulted in avoidance of many potential environmental impacts.

The proposed development represents a significant component of Water Plan 2050, and a vital last line of defence should drought conditions persist or worsen. A desalination plant may never be needed on the Central Coast, but if such a need arises in future, it is important that a desalination option be available for timely implementation. In this context, the proposed development is considered to be in the public interest, should its implementation be required in future to correct a water supply-demand imbalance.

The Department is satisfied that the project could be undertaken within acceptable environmental and safety limits. It has recommended a suite of stringent conditions to address residual impacts to ensure that the positive effects attributable to the proposed development are not derogated by elevated negative environmental effects.





## **APPENDIX A – RECOMMENDED CONDITIONS OF CONSENT**

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