The Waterways Authority
Towra Beach Nourishment Project

Director General's Report
Section 115C of the
Environmental Planning
& Assessment Act

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DISCLAIMER

FOREWORD

The Waterways Authority, on behalf of the Department of Environment and Conservation (DEC – formerly NSW National Parks & Wildlife Service) is proposing beach nourishment works to restore Towra Beach, located on the Kurnell Peninsula on the southern shore of Botany Bay, Sydney. It is anticipated the proposal will realign the foreshore, ameliorate the impacts of accelerated foreshore recession on the ecologically significant Towra Point Nature Reserve, and prevent potential impacts on Towra (Stinkpot) Bay. Towra Point Nature Reserve is listed as a wetland of international significance under the RAMSAR Convention and supports a number of migratory bird species. A breeding colony of the endangered Little Tern is also located within the project area.

The Waterways Authority's proposal involves dredging sand from the adjacent sites of Spit Island and Towra Spit and placing it along the most severely eroded section of Towra Beach to form a dune. Once the dune is constructed, the beach will be re-shaped and the dune will be stabilised by progressive revegetation. The dune, however, will only be a medium term measure as it is anticipated to have a life span of 10 years dependant on storm frequency and changes in wave energies.

The specific objectives developed for the Towra Beach proposal were to:

- prevent saltwater inundation of Towra (Captain Cook) Lagoon and associated significant freshwater wetlands behind Towra Beach;
- protect the habitats of Towra (Stinkpot) Bay by restoring the natural tidal exchange to Botany Bay and maintaining seawater salinity levels; and
- provide a buffer to erosion that threatens the terrestrial vegetation and habitats of the Nature Reserve.

This report was prepared in accordance with Section 115C of the *Environmental Planning and Assessment Act 1979* which requires that the Minister obtain a report from the Director General of the Department of Infrastructure, Planning and Natural Resources prior to making a decision. The report assesses the environmental impact statement, issues raised in representations made in response to its exhibition, the submission from the Waterways Authority in response to the representations, and other relevant matters about the potential environmental impacts of the proposal. It concludes that the proposal, while achieving the main objective of providing protection to the freshwater and terrestrial communities of the Nature Reserve, would have a number of positive impacts including the protection of habitat for the endangered Little Tern and restoration of the natural tidal exchange of Towra (Stinkpot) Bay.

Potential environmental impacts associated with the project can be mitigated by adopting further measures and safeguards referred to in this report and in the recommended conditions of approval.

The proposal is recommended for approval subject to the recommended conditions.

Jennifer Westacott
Director General

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GLOSSARY OF TERMS

CAMBA	China and Australia Migratory Bird Agreement
Department, The	Department of Infrastructure, Planning & Natural Resources
DEC	Department of Environment & Conservation (formerly NPWS and EPA)
Director General, The	Director General of the Department of Infrastructure, Planning and Natural Resources (or delegate)
EIS	environmental impact statement
EMP	environmental management plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999*
ha	hectare
JAMBA	Japan and Australia Migratory Bird Agreement
Minister, The	Minister for Infrastructure & Planning
NPWS	National Parks & Wildlife Service
TSC Act	*Threatened Species Conservation Act 1995*

EXECUTIVE SUMMARY

Background to the Proposal

Past developments in Botany Bay have contributed to accelerated geomorphological changes in the bay's shoreline. This has included foreshore recession at Towra Beach on Kurnell Peninsula which has exposed Towra Lagoon and its surrounding freshwater communities to saltwater incursions. The erosion at this location now threatens to degrade the environmental attributes of the larger Towra Point Nature Reserve and adjacent Towra Bay.

Towra Point Nature Reserve has significant ecological, cultural and historical values which have been recognised through its listing as an internationally significant wetland under the Ramsar Convention. Previous studies have indicated that the rate of erosion has accelerated, and that without appropriate intervention this erosion will continue and ultimately eliminate or seriously degrade these values. The Waterways Authority proposes to protect the Nature Reserve by addressing the erosion along some of the most severely eroded section of Towra Beach.

The Proposal

Beach nourishment works have been proposed by the Waterways Authority at Towra Beach. The works entail the construction of a sand barrier between the bay and the nature reserve effectively recreating the beach and barrier dune. The Waterways Authority will manage the project on behalf of the Department of Environment and Conservation (DEC – formerly National Parks & Wildlife Service) and has received funding from the Environmental Trust to undertake the proposed works.

It is anticipated that this will protect the freshwater wetlands and terrestrial vegetation from any further saltwater incursions and scouring. The works will also create a more secure breeding habitat for the endangered Little Tern at Spit Island by removing a land bridge – one of the sources of sand for the proposed works.

The proposed works aim to restore the foreshore alignment to that which existed in the early 1970s. Along the most severely eroded section of Towra Beach, 60,000 cubic metres of sand will be placed to form a dune. This sand would be dredged from the adjacent sites of Spit Island and Towra Spit and piped to Towra Point with the assistance of a booster pump.

Eroded sediments have been deposited at the end of the Elephant's Trunk at Towra Spit restricting the tidal exchange between Botany Bay and Towra (Stinkpot) Bay. Dredging these deposits will restore the tidal flushing regime with Botany Bay to that which existed before the deposited sediments from the eroding foreshore acted to block this exchange. This will help to maintain the dominant marine characteristics of this embayment.

At Towra Beach, a bund will be progressively re-created using a geotextile bag to channel the dredge water from the received slurry of sand and water and to create a dune along the beach. Once this is achieved, the beach will be re-shaped and the dune will be stabilised by progressive revegetation using native plant species. It is anticipated that the dune would have a life span of 10 years but this is dependant on storm frequency and changes in wave energies that could result from future developments within Botany Bay.

The estimated total cost of the proposal is $805,000 with construction works expected to take approximately 17 weeks.

Need, Justification and Benefits

The proposal, as outlined above, aims to:

- obviate saltwater inundation of Towra (Captain Cook) Lagoon and associated significant freshwater wetlands behind Towra Beach;
- reinstate the tidal flushing regime between Botany Bay and Towra (Stinkpot) Bay in order to maintain the dominant marine characteristics of this embayment; and
- provide a buffer to erosion that threatens the terrestrial vegetation and habitats of the Nature Reserve.

The beach nourishment works are important for the conservation of Towra Point Nature Reserve, a Ramsar Wetland, and a number of migratory birds which inhabit the area. Australia has obligations under the Japan and China Migratory Bird Agreements (JAMBA and CAMBA) and the Ramsar Convention to protect these species and the nature reserve. In addition, the removal of the land bridge connecting Spit Island to the mainland is also likely to significantly benefit the breeding colony of the endangered Little Tern at Spit Island by providing a more secure nesting habitat.

Seagrasses will be lost along Towra Beach from the construction of the dune and from dredging activities at Spit Island and Towra Spit. This impact is not considered significant given the species to be removed is a rapid coloniser, the cover of seagrasses in the area and the creation of suitable substrate that seagrasses could potentially colonise as a result of the proposal.

Overall, the proposal is an important medium term measure to protect the environmental attributes of the area which have been recognised in its status as a Nature Reserve and an area subject to international treaties.

EIS Exhibition

The EIS was exhibited from 30 September 2003 to 31 October 2003. A total of 10 representations were received, five of which expressed general support for the proposal. There were two objections to the proposal proceeding. Concerns raised included the need for a more permanent solution, impacts arising from dredging on seagrasses and shorebird habitats, and a lack of contingency planning.

Section 3 of this report provides an overview of the main issues raised in the representations.

Key Issues

The Director General's overall assessment of the proposal is provided in Sections 4 and 5 of this report. The key issues identified from the EIS, Representations Report and the Department's review related to the temporary nature of the proposal and the need to ensure careful management of construction activities to address, in particular:

- loss and smothering of seagrasses;
- spread of *Caulerpa taxifolia*; and
- construction disturbances on migratory and threatened bird species.

Request for Approval

The Waterways Authority sought the approval of the Minister for the project on 22 December 2003.

Conclusions and Recommendations

The preferred option has an expected life of 10 years and there are certain risks associated with it. These risks include:

- the uncertainty of its effectiveness in preventing further inundation;
- the potential for exacerbating shoreline erosion elsewhere; and
- uncertainty that the works will be effective in returning the lagoon to its former freshwater state.

However there are environmental and up-front cost advantages over permanent engineering measures that were examined. These include:

- limited disturbance to seagrasses;
- ecological benefits to the surrounding area including an increase in security to the breeding population of the endangered Little Tern at Spit Island through the removal of the land bridge;
- no navigation hazard; and
- no interfere with fish hauling activities.

The justification for the project has been adequately substantiated through a balance between the key environmental impacts of the proposal and the identified benefits. The Department considers that the preferred option for beach nourishment of Towra Beach will afford reasonable benefits to the ecological environment of the Towra Point Nature Reserve and has a good potential to provide an effective barrier to prevent the inundation from Botany Bay.

It is concluded that the environmental impacts associated with the proposal could be managed to an acceptable level.

1. INTRODUCTION

The Waterways Authority is proposing to undertake beach nourishment works to restore Towra Beach in order to protect the environmental attributes of the larger Towra Point Nature Reserve, located on the Kurnell Peninsula, Botany Bay (see Figure 1).

1.1 Purpose of the Report

The purpose of this report is to review the Waterways Authority environmental impact statement (EIS) for the Towra Beach Nourishment project, the issues raised in representations made in response to the exhibition of the EIS, and the Waterways Authority's consideration of these representations.

This report is prepared in accordance with Section 115C of the *Environmental Planning and Assessment Act 1979* (EP&A Act) which requires the Director General of the Department of Infrastructure, Planning and Natural Resources (Director General) to assess and report to the Minister for Infrastructure and Planning, prior to him deciding to approve or disapprove of the project.

1.2 Statutory Provisions

The proposal is subject to Part 5 of the EP&A Act. As the Waterways Authority is both the proponent and determining authority for the proposal and an EIS was prepared, Division 4 of Part 5 of the EP&A Act applies. As such, the approval of the Minister for Infrastructure and Planning is required for the proposal to proceed.

An assessment report on the proposal must be prepared by the Director General before the Minister may make a decision. The Director General's report, together with the Minister's decision, is to be made publicly available.

Application of Section 5A of the EP&A Act concluded that the proposal was unlikely to have a significant effect on threatened species, populations, ecological communities or their habitats. Consequently, a Species Impact Statement was not required.

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) was enacted on the 16 July 2000. The EPBC Act is administered by the Department of Environment and Heritage (formerly Environment Australia) and introduces a number of new environmental requirements and processes. On the 1 July 2003, the Commonwealth determined that the proposal was likely to have a significant impact on two matters of national environmental significance – Wetlands of International Importance and Listed Migratory Species, and was determined to be a controlled action under the EPBC Act. Consequently, approval from the Commonwealth is required subsequent to any State approval.

1.3 Preparation and Exhibition of the Environmental Impact Statement

The Waterways Authority first wrote to the Director General on 31 January 2003 seeking requirements for the form and content for an EIS. The Director General's requirements were issued in a letter dated 26 February 2003.

An EIS was prepared in accordance with Section 112 of the EP&A Act and was exhibited between 30 September 2003 and 31 October 2003 inclusive.

Copies of all representations made to the Waterways Authority were forwarded to the Department. On 22 December 2003 the Waterways Authority forwarded a report (hereafter referred to as 'Representations Report') to the Department addressing the issues raised in representations from the public exhibition of the EIS.

1.4 Request for the Approval

The Waterways Authority sought the approval of the Minister on 22 December 2003.

An assessment report on the proposal must be prepared by the Director General of the Department of Infrastructure, Planning and Natural Resources before the Minister may make a decision. The Director General's report and the Minister's decision are to be made publicly available.

2. THE CURRENT PROPOSAL

This section provides a background to the proposal and a description of the project as outlined in the EIS. It also describes the current proposal for which the Waterways Authority is seeking the Minister's approval. Details of supplementary information and advice provided by the Waterways Authority are included.

2.1 Background to the Proposal

The project area is located on Kurnell Peninsula in Botany Bay and encompasses Towra Lagoon and the larger Towra Point Nature Reserve, Towra Bay, Spit Island and the surrounding Towra Aquatic Reserve (Figure 1).

Past development in Botany Bay has contributed to accelerated geomorphological changes to its shoreline. At Towra Beach on Kurnell Peninsula, this has resulted in foreshore recession which has exposed Towra Lagoon and its surrounding freshwater communities to saltwater incursions. These changes threaten to degrade the environmental attributes of the larger Towra Point Nature Reserve, and the adjoining Towra Bay and Towra Point Aquatic Reserve.

The two reserves together represent the largest and most diverse estuarine wetland complex in the Sydney Region. The adjacent area, Spit Island and Towra Bay, have been recognised as important bird habitats and are protected under SEPP 39 – Spit Island Bird Habitat. The significant ecological, cultural and historical values of Towra Point Nature Reserve have also been recognised as an internationally significant wetland under the Ramsar Convention[1].

Beach nourishment works have been proposed at Towra Beach to mitigate the impacts of beach erosion on the nature reserve and the surrounding area. The works will provide a barrier between the bay and the nature reserve. These works aim to obviate saltwater inundation, buffer erosion and protect the areas important habitats.

The Waterways Authority is managing the project on behalf of Department of Environment and Conservation (DEC – formerly National Parks & Wildlife Service). DEC manages the nature reserve under the *National Parks & Wildlife Act 1974* while the Waterways Authority owns all land below the current mean high water mark excluding submerged areas around Spit Island. Funding to undertake the proposed works has been granted from the NSW Environmental Trust.

2.2 Need, Benefit, Project Justification and Consequences of Not Proceeding

The proposed beach nourishment works at Towra Beach seek to reverse some of the geomorphological shoreline impacts of past development in Botany Bay. Foreshore recession occurring at Towra Beach has exposed Towra (Captain Cook) Lagoon and its surrounding freshwater communities to saltwater incursions during storm events. The lagoon supports the endangered ecological community Sydney Freshwater Wetlands in the Sydney Basin Bioregion.

The erosive forces during storm events which overtop Towra Beach also degrades the environmental values of the greater area, in particular the range of vegetation communities and fauna habitats within Towra Point Nature Reserve and Towra Bay.

[1] The official name of the treaty is *The Convention on Wetlands of International Importance especially as Waterfowl Habitat* although the scope of the treaty has now been broadened to include all aspects of wetland conservation and wise use.

The nourishment works along Towra Beach will provide a barrier between Towra Point Nature Reserve and Botany Bay. The reserve and its surrounds provide important habitat for several migratory species, a range of vegetation communities including the endangered Sydney Freshwater Wetlands, and indigenous and non-indigenous cultural values[2].

These attributes have been internationally recognised with the nature reserve being listed as a wetland of international importance under the Ramsar Convention. International obligations under the JAMBA, CAMBA and Bonn Convention[3] also extend to the protection of migratory species which utilise the reserve and its surrounds. Ramsar wetlands and migratory species are matters of national environmental significance enforced through the Commonwealth EPBC Act.

The proposed dredging activities to source the sand for the nourishment project will also remove a land bridge connecting Spit Island to the mainland. This will enable a more secure nesting habitat to be established for the breeding colony of the Little Tern at Spit Island i.e. the land bridge enables land predators to access the colony. The Little Tern is protected as a migratory species under the EPBC Act and an endangered species under the *Threatened Species Conservation Act 1995* (TSC Act).

Seagrasses will be lost along Towra Beach from the construction of the dune and from dredging activities at Spit Island and Towra Spit. However, these losses are not considered significant given the species to be removed is a rapid coloniser, the extensiveness of seagrasses in the area and the creation of suitable substrate that seagrasses could potentially colonise as a result of the proposal.

It is anticipated that the constructed dune at Towra Beach would have a life span of 10 years but this is dependant on storm frequency and changes in wave energies that could result from future developments within Botany Bay. Although this is only a medium term measure it is considered important to protect the ecological and cultural heritage attributes of the area and to fulfil international obligations afforded under the Ramsar Wetland and JAMBA and CAMBA.

2.3 Objectives

The Waterways Authority has identified that the key objectives of the proposal are to:

- obviate saltwater inundation of Towra (Captain Cook) Lagoon and associated significant freshwater wetlands behind Towra Beach;
- protect the habitats of Towra (Stinkpot) Bay; and
- provide a buffer to erosion that threatens the terrestrial vegetation and habitats of the Towra Point Nature Reserve.

2.4 Alternatives Considered

The EIS examined twelve options using technical studies that considered engineering, environmental, and economic and financial aspects. In addition to the 'do nothing' option, the options considered feasible could be divided into 'hard' and 'soft' engineering options. Hard engineering options considered

[2] The site is where the first recognised scientific study in Australia, by Captain Cook, was undertaken and a number of indigenous cultural heritage relics occur within the reserve.

[3] The Bonn Convention was established to protect those species of wild animals that migrate across or outside national boundaries. Adopted in Bonn, Germany, on 23 June 1979, it entered into force on 1 November 1983. Parties to the Convention agree to restrict harvesting, conserve habitats, and control other adverse factors. The species covered include marine mammals, sea turtles and sea birds.

were groynes, breakwaters and foreshore seawalls. Soft options considered were beach nourishment with sand replacement through dredging (the preferred option) and configuration dredging in Botany Bay to alter wave conditions.

All options were reviewed by the Towra Point Steering Committee. As a result of this review, the Waterways Authority commissioned further investigations on the preferred option specifically to assess sand source options.

2.5 The Proposal Described in the EIS

The preferred option to address foreshore recession at Towra Beach is beach nourishment with sand replacement through dredging.

The proposed construction works involves placing 60,000 cubic metres of sand to form a dune along the most severely eroded section of Towra Beach. This sand would be sourced from the adjacent sites of Spit Island and Towra Spit where it will be dredged. Sand extraction is proposed to commence in the southern section of Spit Island and proceed in a south easterly direction.

As sand is extracted from the cutter-suction dredge it will be pumped as slurry through a 200mm diameter pipeline along Towra Spit to Towra Point. The piping of slurry will be aided by a booster pump located at Towra Spit.

At the nourishment site, a bund will be continuously re-created to channel the dredge water from the received slurry of sand and water and to create a dune along the beach. To form an adequate barrier, 5,000 cubic metres of sand would be initially used to create a temporary bund along part of Towra Beach by filling a geotextile bag. This bag's fabric will be removed once an adequate bund has been formed.

Once the dune is created, the beach will be re-shaped to a specific profile. The reshaped dune will then be stabilised by progressive revegetation using native plant species indigenous to the Towra Point area.

2.6 Project Cost

The estimated total cost of the proposal is $805,000. Construction works are expected to take approximately 17 weeks and is programmed to occur between the months of April and August to minimise adverse impacts on migratory birds.

2.7 Changes Made to the Proposal Subsequent to the Exhibition of the EIS

No changes have been made to the proposal subsequent to the exhibition of the EIS.

3. SUMMARY OF REPRESENTATIONS

3.1 Categories of Representations Received

A total of 10 representations were received in response to the exhibition of the EIS.

The sources of the representations are categorised below:

Representation Type	Number of Representations
Individual Residents	1
Local Government	1
Government Departments	3
Community/Neighbourhood Groups	5
Total	**10**

3.2 Overview of Issues Raised in Representations

The Waterways Authority forwarded copies of all representations to the Department following the close of the EIS exhibition period in accordance with the requirements of the EP&A Act. These were summarised in the *Towra Beach Nourishment Project Representations Report* (dated 19 December 2003).

The issues raised by representations included:

- the timing of the work to avoid disturbance to migratory wading birds;
- direct and indirect impacts on seagrasses;
- spread of *Caulerpa taxifolia*;
- need for monitoring during construction;
- the temporary nature of the project and the recurrent costs involved;
- need for an alternative sand source to maintain the dune; and
- contingency planning for spills and leaks.

The Department has undertaken an independent assessment of the representations and is satisfied that the Waterways Authority has adequately addressed all the issues raised.

4. ASSESSMENT OF KEY ISSUES

This section outlines the Department's consideration of issues (other than those discussed in the next section) relating to the current proposal having regard to information presented in the EIS, representations received in response to its exhibition and other additional information obtained by the Department. The Waterways Authority has also provided the Department with its assessment of the issues raised in representations. This has been reviewed by the Department and, where required, further information has been sought and obtained. Where considered appropriate, recommendations are made with regard to the manner in which a particular issue should be addressed during construction and/or operation.

4.1 Effects on Seagrasses

It is important to minimise the losses to those seagrasses directly affected by the proposal and protect the remaining seagrasses from any cumulative losses.

4.1.1 Background

Three species of seagrasses occur in project area – *Zostera capricorni, Posidonia australis* and *Halophila ovalis*, with the former being the most common.

The EIS estimates that a minimum of 67 ha of seagrass is present to a distance of 500 metres off Towra Beach. It is inevitable, given the widespread occurrence of seagrasses at this locality, that some losses will occur at both the nourishment site (Towra Beach) and at the sand source sites (Spit Island and Towra Spit).

At the nourishment site, the EIS estimates that 0.82 ha of *Z. capricorni* will be removed as a result of the construction of the dune while a further 2.93 ha may be subject to smothering by sand during storm events. At the sand source sites, minimal losses (0.093 ha) of mostly *Z. capricorni* will occur in the process of extracting sand and a further 3 ha may be affected by increases in the turbidity of the water column during dredging.

Seagrasses in the southern part of Botany Bay are protected by the Towra Point Aquatic Reserve, declared under the *Fisheries Management Act* in 1987. The Aquatic Reserve together with the Towra Point Nature Reserve forms the largest and most diverse estuarine wetland complex remaining in the Sydney Region. The Aquatic Reserve encompasses an area of approximately 1400 ha and includes a Sanctuary Zone and Refuge Zone. The Aquatic Reserve, among other things, provides a level of protection for seagrasses, mangroves and marine animals by restricting public uses within the declared zone.

The marine and intertidal zones of the project area are located within the Aquatic Reserve. Aquatic Reserves are dealt with under Part 7, Division 2 of the *Fisheries Management Act*. Dredging works normally cannot be carried out without a permit from the Minister for Fisheries. However, as the proposed dredging works are to be carried out or authorised by a relevant public authority a permit will not be required.

Nevertheless, the proposed dredging activities are inconsistent with the objectives of the Towra Point Aquatic Reserve because it will result in the loss of some seagrasses.

4.1.2 Discussion

Seagrasses are given a high conservation value in NSW for they are considered ecologically important components of the aquatic environment[4]. They fulfil a range of ecological functions including stabilising sediments, maintaining water quality, and providing food, shelter and 'nursery' habitat critical to the survival of a wide variety of aquatic biota including commercially important fish species.

Large areas of seagrasses have been lost over the long history of development in Botany Bay. Although some changes were a result of natural processes, human-induced activities including residential and industrial development, relocation of the mouth of the Cooks River, and dredging have been shown to be the major cause. The bay's remaining seagrasses are therefore considered to be of great conservation significance[5].

NSW Fisheries' Fish Habitat Protection Plan No.2 notes that while some species of seagrass such as *Zostera spp*. are comparatively hardy, having an ability to easily recolonise disturbed areas, seagrasses in general are fragile habitats. *Posidonia australias*, which occurs in Botany Bay is particularly susceptible to impacts, recovering from damage very slowly.

The EIS identified that the proposed works are likely to halt the accumulation of downdrift sand from Towra Beach. This will have a beneficial effect on preserving seagrasses as downdrift smothers seagrasses and is attributed with an approximately 4 ha decline in seagrass coverage in the project area in recent times. If the proposed works are successful in halting the downdrift then this will help to offset any anticipated seagrass losses resulting from the proposal.

Some losses to seagrasses will be unavoidable if the range of positive environmental outcomes of the proposal is to be achieved. However, these impacts are likely to be easily mitigated given the temporary nature of the activities, the ability of *Z. capricorni* to re-colonise disturbed sites, and the avoidance of any disturbances to the more sensitive species of *P. australis* in the project area. In particular, there is an abundance of seagrasses in the vicinity of the project area which will be available to promote natural recolonisation of disturbed sites following construction.

It will be important to protect the seagrasses in adjacent areas from construction activities in order to avoid any cumulative losses, and to minimise the losses to those seagrasses directly affected by the proposal. This matter is a construction management issue.

It is also important that the seagrasses are monitored post construction in order to validate the assumptions in the EIS that the dredging and nourishment works will not cause detrimental impacts to the important habitats of the project area and the larger Towra Point Aquatic Reserve.

4.1.3 Conclusion

In order to ensure a high level of protection for the seagrasses within the study area it is recommended that the Flora and Fauna Management Sub Plan of Recommended Condition of Approval No.18 identify specific techniques for protecting these communities. The sub plan will be required to identify measures for locating the dredge in areas that will create the least impact on seagrasses and minimise impacts on *P. australis*. NSW Fisheries has also recognised the importance of construction management in order

[4] Smith AK & Pollard DA (1999) *Policy and Guidelines Aquatic Habitat Management and Fish Conservation: 1999 Update*. NSW Fisheries, Port Stephens Research Centre.

[5] NSW Fisheries and NSW National Parks & Wildlife Service (2000) *Information: Towra International Wetlands*. NPWS, Hurstville.

to protect seagrasses. The Department recommends that the sub plan be prepared in consultation with NSW Fisheries[6].

Recommended Condition of Approval No.8 requires the Environmental Impact Audit Report to document the anticipated seagrass recolonisation in the project area and to identify any unforeseen impacts on seagrasses in the aquatic reserve. The monitoring data may be useful for any future remediation works at this location.

4.2 Spread of *Caulerpa taxifolia*

Construction activities such as dredging, boat and dredge movements need to avoid areas infested with *C. taxifolia* as these activities could "fragment" the alga and help to spread it.

4.2.1 Background

Caulerpa taxifolia was recorded at six locations during the investigations conducted for the EIS. One patch occurs near the sand source sites while the remaining infestations are within the vicinity of the nourishment site. However, all recorded locations of this species in the vicinity of this proposal are outside the areas proposed to be disturbed by dredging or nourishment works.

While direct contact with *C. taxifolia* from the proposed works is unlikely, the spread of this noxious alga is still of concern. The boats and dredge that will be used during construction have the potential to accidentally traverse infested areas, and may spread the alga to other areas within the aquatic reserve.

4.2.2 Discussion

Caulerpa taxifolia is a fast growing alga that can reproduce by vegetative means i.e. parts of the alga that break off can grow into the mature plant. It threatens coastal ecosystems in NSW by smothering and degrading marine habitats such as seagrasses ultimately threatening biodiversity. It is believed to have been introduced from the aquarium industry and is extremely difficult to eliminate once it is established in the wild[7]. *Caulerpa taxifolia* has been declared a Class 2 noxious species in all NSW waters under the *Fisheries Management Act 1994*.

4.2.3 Conclusion

In order to help prevent the spread of *C. taxifolia* within the Towra Point Aquatic Reserve it is recommended that the Flora and Fauna Management Sub Plan of Recommended Condition of Approval No.18 identify appropriate mitigation measures, including the periodic inspection of anchors and chains, and requires vessels to avoid known infested areas on route to the project area. These measures are to be developed in consultation with NSW Fisheries.

4.3 Disturbances to Migratory and Threatened Bird Species

Migratory and threatened bird species may be disturbed by certain construction activities if these coincide with their use of this area.

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[6] NSW Fisheries is a determining authority by virtue of the requirement to issue a permit under section 205 of the *Fisheries Management Act 1994* prior to the commencement of any works that may harm marine vegetation including seagrasses. NSW Fisheries has indicated that it is prepared to issue a permit subject to conditions.

[7] Anon. *Fishnote* – Caulerpa taxifolia. NSW Fisheries, Port Stephens Research Centre

4.3.1 Background

The Towra Point Nature Reserve and adjacent areas are known to support habitat for a number of migratory waders and shore birds. Many of these species utilise the area for foraging and roosting, while on route to large summer feeding grounds in the south. The Little Tern, *Sterna albifrons*, also utilises the area for breeding during the spring and summer months[8]. Many migratory bird species are protected under the international agreements of JAMBA, CAMBA and the Bonn Convention. They are further recognised as matters of national environmental significance under the EPBC Act.

In NSW the Little Tern is listed as an endangered species under the NSW *Threatened Species Conservation Act 1995* (TSC Act). The threatened Pied Oystercatcher, *Haematopus longirostris*, has also been recorded roosting in the project area. This species is listed as a Vulnerable species under the TSC Act.

4.3.2 Discussion

The EIS states that the project area supports habitat for several migratory bird species including the Eastern Curlew, Whimbrel, Bar-tailed Godwit and Little Tern which were all recorded in large numbers during the summer surveys conducted for the EIS. Relatively high numbers of the threatened Pied Oystercatcher were also recorded during these surveys. Apart from the Pied Oystercatcher and the Little Tern, no other threatened species were recorded.

Noise from the operation of the dredge and other impacts from construction works such as the use of the dozer, may disturb migratory species from utilising the habitats of the project area, particularly the Little Tern which breeds on Spit Island. These potential impacts have been recognised in the EIS, and as such, construction has been planned to occur during the winter months when the majority of these species are absent.

It is noted that the Pied Oystercatcher is likely to still be affected by the proposal, as it occurs all year round in the project area. However there is an abundance of alternative sites this species could inhabit in the interim.

Despite these short term impacts, a number of positive longer term outcomes for migratory and threatened species are likely to be achieved. For example, a secondary benefit of sourcing sand from Spit Island is the removal of the Spit Island land bridge (refer Section 2.2). This will provide greater protection to the Little Tern and other migratory waders and shorebirds which utilise the island by removing access for land-based predators to the island. The nourishment works are also likely to improve the quality of the habitat within the nature reserve and may provide additional breeding habitat for the Pied Oystercatcher.

Section 5A Assessments of Significance (8-part Tests) were conducted for the Little Tern and Pied Oystercatcher. From these tests it was determined that the proposal is unlikely to have a significant effect on these species or their habitats.

DIPNR raised the importance of monitoring to gather information on migratory and threatened birds and their habitats and the need to involve the scientific community in developing an appropriate program. Table 8.2 of the EIS outlines the proposed monitoring programs.

[8] NPWS (2000) Threatened Species Profiles. National Parks & Wildlife Service, Hurstville.

4.3.3 Conclusion

Recommended Condition of Approval No.20 requires that construction (other than restoration of vegetation) does not occur during spring and summer months to minimise disturbance to migratory bird species, including the Little Tern which is known to breed during these months. These and other mitigation measures to minimise impacts to migratory and threatened bird species are required to be detailed in a Flora and Fauna Management Sub Plan (Recommended Condition of Approval No.18). This sub plan is to be prepared in consultation with relevant government agencies to assist in the plan's development, incorporate the mitigation measures outlined in Table 8.1 of the EIS, and incorporate the monitoring outlined in Table 8.2 of the EIS.

4.4 Temporary Nature of Proposal

The proposed nourishment works do not represent a permanent solution and may need to be conducted again after ten years.

4.4.1 Background

The proposed nourishment works are designed to have a lifespan of approximately 10 years. Some of the representations raised concerns regarding the temporary nature of the proposal and the cost involved in having to re-do the works after ten years, questioning why a more permanent engineering solution was not chosen.

The EIS states that 12 options for mitigating the adverse impacts of erosion of Towra Beach were assessed which consisted of permanent and temporary engineering solutions. The types of permanent solutions considered feasible were groynes and breakwaters.

The EIS documented the reasons these types of permanent solution were not favoured over the beach nourishment option. These were generally characterised as follows:

- may interfere with the natural sand transport processes;
- have the potential for significant damage to seagrasses;
- may interfere with fish hauling activities;
- are potential navigation hazards; and
- have the potential to be visually intrusive.

4.4.2 Discussion

The beach nourishment option does not involve a large, up-front capital expenditure compared to the groyne and breakwater options that were also considered. It therefore represents a cost effective solution which addresses the immediate problem of providing protection to Towra Lagoon and, more generally, the Towra Point Nature Reserve.

The beach nourishment option was also favoured because permanent engineering solutions have the potential to generate significantly greater adverse environmental impacts such as those outlined above. The monitoring proposed in Table 8.2 of the EIS should help to keep an eye on the effectiveness of the proposed works and identify any unanticipated consequences.

It should be noted that both permanent structures and, to a lesser extent the restoration works proposed here, could pose risks which may contribute to further degradation of these environmentally sensitive areas as a result of unexpected geomorphological changes. These are difficult to predict because of

the many variables that come into play in a dynamic system such as Botany Bay. These variables include wave energy changes under various climate conditions arising from past construction works (i.e. airport extension, port entrance dredging) and proposed construction activities in other areas of Botany Bay (i.e. proposed Port Botany expansion, Lady Robinsons beach stabilisation groyne field).

The preferred option has a further advantage over any permanent engineering structures to manage these risks. The EIS considers that 10 years after the nourishment works are completed the natural sand transport processes will again return Towra Beach back to its current state. That is, the temporary nature of the beach nourishment works would potentially enable any unforeseen environmental impacts to be reversed.

Botany Bay Planning & Protection Council raised concerns regarding the spending of public money for only an interim solution particularly where there was little likelihood that Towra Lagoon could return to freshwater conditions and support the same range of species[9]. There is no certainty that the freshwater communities can return however the proposal does not represent a large financial cost and will, as has been discussed, provide a number of benefits to the Nature Reserve in addition to protecting Towra Lagoon from further inundation.

4.4.3 Conclusion

It is recommended that an Environmental Impact Audit Report be prepared two years, five years and 10 years after the completion of construction in order to confirm that the proposal does not cause any unforseen environmental impacts on surrounding environmentally sensitive areas and achieves its objectives. This may prove to be useful data for making future decisions regarding additional protection works. Recommended Condition of Approval No.8 addresses this matter and requires the audit reports include the results of the mitigation and monitoring programs detailed in Tables 8.1 and 8.2 in the EIS and any actions taken or proposed to be taken in response to the results.

[9] Towra Lagoon was inundated following a storm in 1999 changing its salinity from freshwater to brackish. It is hoped that the beach nourishment works will prevent any further inundation by the bay and that the freshwater that feeds the lagoon will eventually dilute the brackish water and return it to its original freshwater state.

5. ASSESSMENT OF OTHER ISSUES

5.1.1 Indigenous Heritage

An investigation of indigenous heritage was carried out for the EIS by the Australian Museum Business Services. The study concluded that the dunes along Towra Beach and the area around the freshwater lagoon behind the beach should be considered archaeologically sensitive, and that sites could be expected to occur in the Towra Beach dunes area, especially in the vicinity of Towra Lagoon. However, due to the dynamic nature of the beach front these sites may be ephemeral in nature i.e. exposed and covered depending on erosion regime.

The NPWS Aboriginal Heritage Information Management System lists five known sites within Towra Point Nature Reserve. The beach nourishment works have the potential to impact on one of these sites, a single sandstone grinding stone. However, given its location[10], and that it is an isolated find with no documented associated subsurface potential, it will be possible to avoid the site during the proposed works.

It is unlikely that any impacts will arise from the proposed works since previous surveys within the project area did not reveal any additional Aboriginal sites either on the beach or in the proposed sand source areas. However should subsurface archaeological remains be uncovered at Towra Beach as a result of the proposed works, these would need to be protected.

The EIS outlines a number of mitigation measures that would be appropriate to incorporate into an Indigenous Heritage Management Sub Plan prepared as part of the Construction Environmental Management Plan of Recommended Condition of Approval No.9. These include, among others, implementation of the mitigation measures identified in Table 8.1 of the EIS, and the identification of procedures to be implemented if previously unidentified Aboriginal objects are discovered during construction. Recommended Condition of Approval No. 14 addresses this matter.

Recommended Condition of Approval No.15 also requires the Proponent to cease all work if any unexpected Aboriginal object is uncovered and to immediately contact the DEC in accordance with the *National Parks and Wildlife Act 1974*.

5.1.2 Non-indigenous Heritage

The EIS described three items of non-indigenous heritage that occur in the area. These included an abandoned oyster lease, the site of an abandoned oyster depot and the Towra Point Nature Reserve itself.

It is anticipated that the proposed works would not impact on any of these non-indigenous heritage features. Nevertheless, as a precaution, it is proposed that as part of the Construction Environmental Management Plan of Recommended Condition of Approval No.9 the Proponent prepare an Historical Relic Management Sub Plan. The sub plan would address the mitigation measures identified in Table 8.1 of the EIS and incorporate procedures to be implemented if previously unidentified historical relics are discovered. Recommended Condition of Approval No.16 addresses this matter.

[10] Due to the sensitive nature of the site, details of its exact location have not been provided in the EIS.

5.1.3 Acid Sulfate Soils

The borrow areas that are proposed to be dredged are recently deposited sands that have accumulated as a result of the continuing foreshore erosion. There are no indications that acid sulfate soils are present in these deposits.

However, the problems that could be created for the local environment if acid sulfate soils are encountered and not treated are potentially severe. It could produce sulfuric acid and lower the pH levels of the soil (ie sediments of the bay) killing the macro benthic infauna[11] and delaying any recovery until the pH returns to more favourable levels. The lower pH may potentially mobilise toxic metals which occur naturally, making them available to enter food chains.

It would therefore be prudent to prepare an Acid Sulfate Soil Management Sub Plan as part of the Construction Environmental Management Plan of Recommended Condition of Approval No.9. The sub plan would be prepared and be consistent with the Acid Sulfate Soils Manual and include a contingency plan to deal with any unexpected discovery of actual or potential acid sulfate soils. Recommended Condition of Approval No.21 addresses this matter.

5.1.4 Re-vegetation

No shrubs or living trees would be cleared during the nourishment works. However some dead trees lining Towra Beach in front of Towra Lagoon may need to be felled to facilitate the works. Ultimately approximately 12,000 square metres of dune and hind dune will be created.

The EIS identifies that the reshaped dune and hind dune areas would be stabilised by re-vegetation using appropriate native species. It identifies a process for reshaping the dune, collection and propagation of material, planting process, weed management, and monitoring of progress.

It is recommended that the Flora and Fauna Management Sub Plan, prepared as part of the Construction Environmental Management Plan of Recommended Condition of Approval No.9 incorporate those matters outlined in Sections 3.3.4 (Dune Re-vegetation) and 3.3.5 (Monitoring) of the EIS (as summarised in Tables 8.1 and 8.2 of the EIS).

[11] A collective term referring to the general assemblage of bottom dwelling invertebrate animals.

6. CONCLUSIONS AND RECOMMENDATIONS

It is recognised that the preferred option is only a medium term solution with an expected life of 10 years and that there are certain risks associated with it. These risks include the uncertainty of its effectiveness in preventing further inundation, the potential for exacerbating shoreline erosion elsewhere and uncertainty that the works will be effective in returning the lagoon to its former freshwater state.

However it has environmental and up-front cost advantages over permanent engineering measures that were considered. These include limited disturbance to seagrasses, it does not pose a navigation hazard, and will not interfere with fish hauling activities. It also has ecological benefits to the surrounding area including an increase in security to the breeding population of the endangered Little Tern at Spit Island through the removal of the land bridge.

The proposal will provide an opportunity to monitor how effective this method is and should help when making any future decisions regarding remediation works at Towra Point.

On balance, the Department considers that the preferred option for beach nourishment of Towra Beach will afford reasonable benefits to the ecological environment of the Towra Point Nature Reserve and has a good potential to provide an effective barrier to prevent inundation from Botany Bay.

It is recommended that the proposal as described in the EIS proceed subject to a number of recommended conditions. These are specified in the following section and are based on the extent of issues raised in representations and by the Department.

These conditions, to ensure that the proposal occurs in an environmentally acceptable manner, relate to:

- ensuring seagrasses and migratory and threatened bird species are not adversely affected by construction works;
- preventing the spread of the noxious weed *Caulerpa taxifolia*;
- ensuring an appropriate level of environmental management is undertaken during construction; and
- verifying whether the actual environmental impacts of the proposal reflect the predictions made in the EIS particularly in relation to the effectiveness of the beach nourishment works in addressing saltwater inundation to the Towra Lagoon and scouring to the larger Towra Point Nature Reserve.

It is considered that the environmental impacts of the proposal could be managed to an acceptable level on the basis of the safeguards and mitigation measures identified in the EIS and the associated documentation.

7. RECOMMENDED CONDITIONS OF APPROVAL

This section provides the Department's recommended Conditions of Approval for the project under Section 115B(2) of the EP&A Act. These are based on the Department's assessment of the EIS, the representations made to the Waterways Authority and supplementary information and advice provided.

The EIS and representations report contains extensive information on procedures and mitigation strategies to be implemented to ameliorate impacts of the proposal. The recommended conditions should therefore be implemented in conjunction with those procedures and mitigation strategies.

DEFINITIONS

Activity	The activity described in Schedule 1 of this Approval.
Ancillary Facility	Temporary facility for Construction such as office and amenities compound, concrete batch plant, materials storage compound.
Approved Activity Area	The footprint of the Activity covered by the Conditions of Approval.
Conditions of Approval	The Minister's Conditions of Approval for the Activity
Construction	Includes all work in respect of the Activity **other than** survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing site compounds (in locations meeting the criteria of the Conditions), or other activities certified by the EMR to have minimal environmental impact (e.g. minor access roads, minor adjustments to services/utilities, etc.).
Department, the	Department of Infrastructure, Planning and Natural Resources
Director General, the	Director General of the Department or delegate
Director General's Agreement	A written advice from the Director General (or delegate).
Director General's Approval	A written approval from the Director General (or delegate). Where the Director General's Approval is required under a Condition the Director General will endeavour to provide a response within one month of receiving an approval request. The Director General may ask for additional information if the approval request is considered incomplete. When further information is requested the time taken for the Proponent to respond in writing will be added to the one month period.
Director General's Report	The report provided to the Minister by the Director General of the Department under section 115C of the *Environmental Planning and Assessment Act 1979*.
EIS	Towra Beach Nourishment Environmental Impact Statement (August 2003)
Minister, the	Minister for Infrastructure and Planning.
Post-Construction	Means after the Activity is constructed, but **does not** include commissioning trials of equipment or temporary use of parts of the Activity during Construction.

Proponent	The Waterways Authority
Publicly Available	Available for inspection by a member of the general public (for example available on an internet site or at a display centre)
Reasonable and Feasible	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. **Feasible** relates to engineering considerations and what is practical to build. **Reasonable** relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
Relevant Councils	City of Botany Bay and Sutherland Shire Council
Relevant Government Departments	Generally one or more of DEC, NSW Fisheries, the Heritage Office, and DIPNR.
Representations Report	Towra Beach Nourishment Project Representations Report (December, 2003)

DIRECTOR GENERAL'S AGREEMENT

The phrase "agreed to by the Director General" in these Conditions of Approval means provision of written advice from the Director General.

ABBREVIATIONS

CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation
DIPNR	Department of Infrastructure, Planning and Natural Resources
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP&A Act	*Environmental Planning and Assessment Act 1979*
NPWS	National Parks and Wildlife Service

ADMINISTRATIVE CONDITIONS

The Activity

1. The Activity must be carried out consistent with:

   (a) the procedures, safeguards and mitigation measures identified in the EIS, as modified by the Representations Report; and
   (b) these Conditions.

These Conditions prevail in the event of any inconsistency with the requirements for the Construction and Post-Construction of the Activity arising out of the documents described in (a) above.

2. These Conditions of Approval do not relieve the Proponent of the obligation to obtain all other approvals and licences required under any other Act. The Proponent must comply with the terms and conditions of such approvals and licences.

Compliance

General

3. The Proponent must notify in writing the Director General, Relevant Government Departments and Relevant Councils of the start of the Activity's Construction. Such notification must be provided at least four weeks before the relevant start date unless otherwise agreed to by the Director General.

4. It is the responsibility of the Proponent to ensure compliance with all of these Conditions and to implement any measures arising from these Conditions of Approval.

5. The Proponent must comply with any requirements of the Director General arising from the Department's assessment of:

   (a) any reports, plans or correspondence that are submitted to satisfy these Conditions of Approval; and
   (b) the implementation of any actions or measures contained in such reports, plans or correspondence.

Staging Report

6. The Proponent may elect to construct the Activity in discrete work packages or defined stages provided that such stages or work packages are consistent with these Conditions of Approval. Where discrete work packages or defined stages are proposed, the Proponent must submit a Staging Report to the Director General at least four weeks before Construction commences (or within any other time agreed to by the Director General). The Staging Report must:

   (a) describe the work packages or defined stages; and
   (b) identify how the Conditions will be addressed in each work package or defined stage.

Pre-Construction Compliance Report

7. The Proponent must submit a Pre-Construction Compliance Report to the Director General at least four weeks before Construction commences (or within any other time agreed to by the Director General).

   The Pre-Construction Compliance Report must include:

   (a) details of how the Conditions of Approval required to be addressed before Construction were complied with;

(b) the time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates; and
(c) details of any approvals or licences required to be issued by Relevant Government Departments before Construction commences.

Environmental Impact Audits

Environmental Impact Audit Report – Post-Construction

8. An Environmental Impact Audit Report – Post-Construction must be submitted to the Director General two years, five years and 10 years after the Practical Completion of Construction of the Activity. The Environmental Impact Audit Report – Post-Construction must also be submitted to other government departments upon the request of the Director General.

The Environmental Impact Audit Report – Post-Construction must:

(a) summarise the main environmental management plans and processes implemented during Construction and assess their effectiveness;
(b) compare the Post-Construction impact predictions made in the EIS, Representations Report and any supplementary studies with the actual impacts;
(c) assess the effectiveness of implemented mitigation measures identified Table 8.1 of the EIS and identify where action has been taken or proposed to be taken in response to the results of these measures;
(d) assess any unforeseen environmental impacts and implement appropriate mitigation measures;
(e) summarise the results of the monitoring programs outlined in Table 8.2 of the EIS, and
(f) be made Publicly Available.

The Proponent must comply with all requirements of the Director General concerning any measures arising from, or recommendations in, the Environmental Impact Audit Report – Post-Construction.

ENVIRONMENTAL MANAGEMENT

Construction Environmental Management Plan

9. A Construction Environmental Management Plan (CEMP) must be prepared and implemented in accordance with these Conditions of Approval, all relevant Acts and Regulations and accepted best practice management procedures. The Proponent must obtain the Director General's Approval for the CEMP before Construction commences or within any other time agreed to by the Director General. The CEMP must be certified by the EMR to comply with the Conditions of Approval before the Proponent seeks the Director General's approval for the CEMP.

The Proponent must ensure that the mitigation measures identified in the EIS, Representations Report and in these Conditions are incorporated into the CEMP.

The CEMP must:

(a) identify the Construction activities associated with the Activity including Construction sites and the staging and timing of proposed works;
(b) identify where Ancillary Facilities will be located to avoid sensitive areas;
(c) cover any relevant environmental elements identified by the Proponent, or its contractor, from their environmental due diligence investigations;
(d) contain the Construction Sub Plans required by the Conditions of Approval;
(e) be prepared following consultation with Relevant Government Departments and Relevant Councils;
(f) be Publicly Available;
(g) include environmental management details such as:
    i identification of statutory obligations which the Proponent is required to fulfil during Construction, including all approvals and licences;
    ii an environmental management structure indicating the responsibility, authority and accountability for personnel relevant to the CEMP;
    iii the role of the EMR;
    iv details of the Construction personnel induction and training program;
    v emergency response procedures;
(h) include implementation details such as:
    i identification of relevant environmental elements;
    ii measures to avoid and/or control environmental impacts;
    iii the tools to be used to implement the CEMP such as plans, schedules and work instructions;
(i) include monitoring and review details such as:
    i performance monitoring methods for all environmental elements;
    ii auditing and corrective actions procedures;
    iii CEMP review procedures.

Environmental Management Representative

10. The Proponent must request the Director General's Approval for the appointment of an Environmental Management Representative (EMR) at least one month before Construction commences (or within any other time agreed to by the Director General). In its request the Proponent must provide the following information, the:

    (a) qualifications and experience of the EMR including demonstration of general compliance with *ISO19011:2002 - Guidelines for Quality and/or Environmental Management Systems Auditing* (or update) or equivalent experience;
    (b) role and responsibility of the EMR;
    (c) authority and independence (from the Proponent or its contractors) of the EMR including details of the Proponent's internal reporting structure; and
    (d) resourcing of the EMR role. The EMR must be available:
        i for sufficient time to undertake the EMR role. This timing shall be agreed between the Proponent and the EMR and advised to the Department in the request for approval;
        ii at any other time requested by the Department; and
        iii during any Construction activities identified in the CEMP to require the EMR's attendance.

11. The Director General may at any time immediately revoke the approval of an EMR appointment by providing written notice to the Proponent. Interim arrangements for EMR responsibility

following the cancellation notice must be agreed in writing between the Department and the Proponent.

12. The Department may at any time conduct an audit of any actions undertaken by the EMR. The Proponent must:

    (a) facilitate and assist the Department in any such audit; and
    (b) include in the conditions of the EMR's appointment the need to facilitate and assist the Department in any such audit.

13. The EMR is authorised to:

    (a) consider and advise the Department and the Proponent on matters specified in these Conditions of Approval and compliance with such;
    (b) certify that work does not fall within the definition of Construction where clarification is requested by the Proponent;
    (c) certify the CEMP;
    (d) certify the OEMP (if required);
    (e) review the Proponent's induction and training program for Construction personnel and monitor its implementation;
    (f) periodically monitor the Proponent's activities to evaluate the compliance of Construction activities with the CEMP. Periodic monitoring must involve site inspections of active work sites at least fortnightly;
    (g) provide a written report to the Proponent of non-compliance with the CEMP. Non compliance must be managed as identified in the CEMP;
    (h) direct the Proponent to stop work immediately if, in the view of the EMR, an unacceptable impact on the environment is occurring or is likely to occur. The EMR may also require that the Proponent initiate reasonable actions to avoid or minimise adverse impacts;
    (i) review corrective and preventative actions to ensure the implementation of recommendations made from audits and site inspections;
    (j) certify that minor revisions to the CEMP are consistent with the approved CEMP; and
    (k) provide regular (as agreed with the Department) reports to the Department on matters relevant to carrying out the EMR role including notifying the Director General of any stop work notices.

    The EMR must immediately advise the Proponent and the Director General of any incidents relevant to these Conditions resulting from the Construction or Post-Construction of the Activity that were not dealt with expediently or adequately by the Proponent.

HERITAGE

Indigenous Heritage Management

14. An Indigenous Heritage Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the relevant Local Aboriginal Land Council and DEC and include:

    (a) mitigation measures including those identified in Table 8.1 of the EIS to be implemented;
    (b) details of the archaeological investigations to be undertaken and any associated licences or approvals required;

(c) procedures to be implemented if previously unidentified Aboriginal objects are discovered during Construction; and
(d) an education program for all personnel on their obligations for Aboriginal cultural materials.

Aboriginal Objects

15. If during the course of Construction the Proponent becomes aware of any unexpected Aboriginal object(s), all work likely to affect the object(s) must cease immediately and the DEC informed in accordance with the *National Parks and Wildlife Act 1974*.

Historical Relics

16. An Historical Relic Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the Heritage Office and Relevant Councils and include:

(a) mitigation measures including those identified in Table 8.1 of the EIS to be implemented;
(b) details of any investigations to be undertaken and any approvals required;
(c) procedures to be implemented if previously unidentified historical relics are discovered during Construction; and
(d) an education program for all personnel on their obligations for historic relics.

17. If during the course of Construction the Proponent becomes aware of any unexpected historical relic(s), all work likely to affect the site(s) must cease immediately and the Heritage Council notified in accordance with the *Heritage Act 1977*.

FLORA AND FAUNA

18. A Flora and Fauna Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments, Relevant Councils and other relevant stakeholders and include:

(a) methods to reduce and manage impacts on flora and fauna species (terrestrial and aquatic) and their habitat which may be directly or indirectly affected by the Activity including those mitigation measures and monitoring identified in Tables 8.1 and 8.2 of the EIS;
(b) performance goals against which to measure the success of the methods;
(c) ecological details including:
    i plans showing: vegetation communities highlighting important fauna habitat areas and threatened species locations; areas to be cleared; and a clearing program. The plan must cover the Approved Activity Area and extend to vegetation in adjoining areas where this is both contiguous with the Construction footprint and contains important fauna habitat areas and/or threatened species;
    ii procedures for vegetation clearing and soil management during Construction;
    iii strategies for minimising vegetation clearance within the Approved Activity Area and protection of vegetated areas outside that area;
    iv where possible, strategies for re-using individuals or populations of any threatened plant species or endangered ecological communities in rehabilitation works;
(d) methods to reduce and manage impacts on seagrasses which may be directly or indirectly affected by the Activity. These shall include, but not limited to:

i safeguards to minimise turbidity and sedimentation, including channelling supernatant waters from beach nourishment works to areas where seagrasses are not established;
ii techniques for locating the dredge in areas which limits disturbance to seagrasses, and specifically avoids *Posidonia australis,* as identified in the EIS;

(e) strategies to prevent the spread of the noxious weed *Caulerpa taxifolia* including the requirement for all marine vessels used for the Activity to:
i undergo periodic inspection of anchors and chains;
ii avoid all known infestations of *C. taxifolia*, as identified in the EIS, on route to the Approval Activity Area;

(f) detailed plans showing: distribution of seagrass species; areas to be affected; and location of all known *C .taxifolia* infestations. The plan must cover the Approved Activity Area and extend to seagrasses in adjoining areas where this is contiguous with the Construction footprint.

(g) rehabilitation details including:
i identification of the locally native species to be used in rehabilitation and landscaping works, including flora species suitable as a food resource for threatened fauna species;
ii the source of seed or tubestock to be used in rehabilitation and landscaping works including the identification of seed sources within the Approved Activity Area. Where possible, seed of locally native species within the Approved Activity Area should be collected before Construction commences to provide seed stock for revegetation;
iii methods to re-use cleared vegetation;
iv a program for the active management and maintenance of all preserved, planted and rehabilitated vegetation (including aquatic vegetation) including watering regimes, fencing, replacement of vegetation that may have died and weed management;

(h) a Weed Management Strategy including:
i weed identification;
ii weed eradication methods and protocols for the use of herbicides;
iii methods to treat and re-use weed infested topsoil;

(i) a program for reporting on the effectiveness of terrestrial and aquatic flora and fauna management measures against performance goals, including monitoring identified in Table 8.2 of the EIS. Management methods must be reviewed where found to be ineffective.

19. If during the course of Construction, the Proponent becomes aware of the presence of threatened species not identified and assessed in the EIS or Representations Report and which are likely to be affected, the Proponent must:

(a) immediately cease all work likely to affect the threatened species;
(b) inform the Director General of the DEC and/or Director of NSW Fisheries as relevant; and
(c) not recommence work likely to affect the threatened species until receiving advice from the DEC and/or NSW Fisheries to do so.

20. Construction, other than revegetation works of the Approved Activity, shall not occur for the six months between September and February.

ACID SULFATE SOILS

21. An Acid Sulfate Soil Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments. The Sub Plan must:

    (a) be consistent with the *Acid Sulfate Soils Manual* (ASSMC, 1998); and
    (b) include a contingency plan to deal with the unexpected discovery of actual or potential acid sulfate soils.

MISCELLANEOUS REQUIREMENTS

Hazards and Risk Management

22. As part of the Construction EMP, the Proponent must prepare and implement Hazards and Risk Management Sub Plan(s). These Sub Plans must include:

    (a) details of the hazards and risks associated with the Activity; and
    (b) pro-active and reactive mitigation measures including contingency plans to be implemented in the event an identified hazard occurs.

8. FIGURE –LOCATION MAP