



**Planning &
Infrastructure**

**STATE SIGNIFICANT
INFRASTRUCTURE ASSESSMENT:
Marine Aquaculture Research Lease
Providence Bay, Port Stephens NSW
(SSI-5118)**



Director-General's
Environmental Assessment Report
Section 115ZA of the
Environmental Planning and Assessment Act 1979

May 2013



Cover Photo: Southern bluefin tuna (*Thunnus maccoyii*) in South Australian sea cages (Source: Ian Gordon, Auscape International)

Inside Photo: a floating double collared sea cage off the coast of South Australia (Source: Dr Daryl McPhee)

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NSW Government

Department of Planning & Infrastructure

EXECUTIVE SUMMARY

The New South Wales Department of Primary Industries (DPI) is proposing to establish a new aquaculture research lease on the State's mid north coast to investigate finfish species which may be suitable for sustainable seafood production. The proposed offshore research lease would consist of up to 8 floating sea cages on a 20 hectare (370 metres x 530 metres) lease area in the open ocean at Providence Bay, around 4 kilometres off the coast of Hawks Nest, near Port Stephens.

The research lease (the Project) aims to extend the marine fish hatchery research currently undertaken at the Port Stephens Fisheries Institute. The proposed Project would conduct research on a number of fish species, including Yellowtail Kingfish and Mulloway to validate their commercial potential. Other species including Southern Bluefin Tuna and Snapper may also be trialled. The Project would also provide an analysis on the latest sea cage technology in the high energy coastal waters of NSW and conduct monitoring to determine the potential environmental impacts, focussing in particular on marine fauna behaviour and water quality.

The trial would run for a period of five years, and DPI is hoping that the research will lead to the development of a secure, viable and sustainable aquaculture industry for NSW to reduce reliance on imported seafood and wild fish stocks.

The Project has a capital investment value of approximately \$300,000. It would employ around 10-15 people during construction and deployment, and up to 20 people for ongoing monitoring and management including research scientists, farm assistants, hatchery and nutrition staff and administration support officers.

Under the *Environmental Planning and Assessment Act 1979*, the DPI is considered to be a determining authority for the proposal. However, as the DPI considered that the development required an Environmental Impact Statement (EIS), the Project is considered to be State significant infrastructure, and as such requires the approval of the Minister for Planning and Infrastructure.

The Department exhibited the EIS for the proposal from 26 October 2012 until 29 November 2012 and received 27 submissions, including 9 from public authorities and 18 from the general public and special interest groups. All agencies generally supported the Project in principal and provided recommended conditions for inclusion in the approval. From the general public and special interest groups submissions, 8 objected to the Project, 6 supported and 4 provided comments for the Department's consideration.

Key issues raised in submissions included the potential impacts of the Project on marine fauna (particularly entanglement), impacts on local business (particularly tourism) and water quality/chemical use. Other issues raised included the structural integrity of the lease infrastructure, visual impacts, and disease management. To address the issues raised in submissions, the DPI prepared a Response to Submissions Report (RtS) which provided additional information and clarification on the issues raised.

The Department engaged an independent marine ecology and aquaculture expert to review the EIS and RtS (Dr Daryl McPhee of Bond University, Queensland). Dr McPhee advised that he was generally satisfied that the EIS and RtS provided a comprehensive and generally accurate assessment of the potential impacts of the Project and that the recommended conditions would provide an appropriate means to manage and monitor any potential impacts of the Project.

The Department has included the recommendations of Dr McPhee as well as additional conditions recommended by other agencies relating to chemical use, navigation, lighting, construction, deployment and decommissioning. The Department is satisfied that the potential impacts of the proposal have been adequately mitigated and managed.

On balance, the Department considers that the Project is in the public interest as it could potentially generate a number of long term social and economic benefits from the development of an offshore sea cage seafood industry, with potential for flow-on regional economic benefits. Consequently, the Department has recommended that the Project should be approved subject to the recommended conditions.

1. BACKGROUND

1.1 Aquaculture in Australia

National and international research indicates that seafood consumption (per capita) is growing. The research suggests that this is due to a number of reasons, including increases in dining outside the home, changing demographics, a greater focus on healthy eating, greater diversity in food intake and the increasing availability of fresh seafood.

Aquaculture (the farming of aquatic organisms) is expanding and developing in almost all regions of the world at a rate three times higher than for traditional land-based farming of meat. Currently, around half of the world's fish consumption comes from aquaculture, while aquaculture is also increasingly being used to provide jewellery (i.e. pearls), chemicals and pharmaceuticals (i.e. fish oil).

To improve national and state food security and reduce the reliance on seafood imports, the DPI considers that the gap between capture fishery supply and the growing demand for seafood can be supplied by sustainable aquaculture.

Sea cage aquaculture is identified as the form of aquaculture that is most amenable to the production of large volumes of marine finfish. However, the potential growth of aquaculture in general is slowing, partly owing to public concerns about practices (i.e. use of chemicals, waste products, diseases and escapees), product quality and changing economics which influences the cost of production and the supply chain. The Seafood Industry Importers Association considers that in Australia, aquaculture has been constrained by 'the cost of regulation and lack of community support in some regions'.

In 2009-10, the gross value of fisheries in NSW was approximately \$133 million (including both wild fisheries and aquaculture). Of this, the aquaculture sector was worth approximately 39% or \$52.4 million, with Sydney rock oyster aquaculture alone worth \$40 million. Other species currently being cultivated include tiger prawns, silver perch and rainbow trout.

In other states such as Tasmania and South Australia, there is a strong, successful sea cage based industry (cultivating species such as Atlantic Salmon, Southern Bluefin Tuna and Yellowtail Kingfish).

A commercial sea cage fish farm near the proposed Project site (see section 1.4) was approved by the then Minister in 2001. This fish farm (known as the 'Pisces' farm) had limited success and is currently not operational.

The value of NSW aquaculture is lagging behind other states (it represents only around 6% of the Australian Industry), and the DPI considers that a major factor contributing to this is the lack of a significant sea cage industry for the production of marine finfish.

1.2 DPI and PSFI

The Port Stephens Fisheries Institute (PSFI) is located at Taylors Beach approximately 10 km from Nelson Bay in the Port Stephens local government area (see Figure 1). The PSFI is a multi-disciplinary centre with staff from five divisions within the NSW Department of Primary Industries (DPI). The aquaculture management and policy group within PSFI aims to support and develop environmentally sustainable and profitable aquaculture industries.

The PSFI has been working in marine finfish research since the early 1990's, and has focused on Snapper, Mulloway and more recently Yellowtail Kingfish and Southern Bluefin Tuna. Figure 2 shows researchers at the PSFI inspecting fish and collecting data from the broodstock tanks.

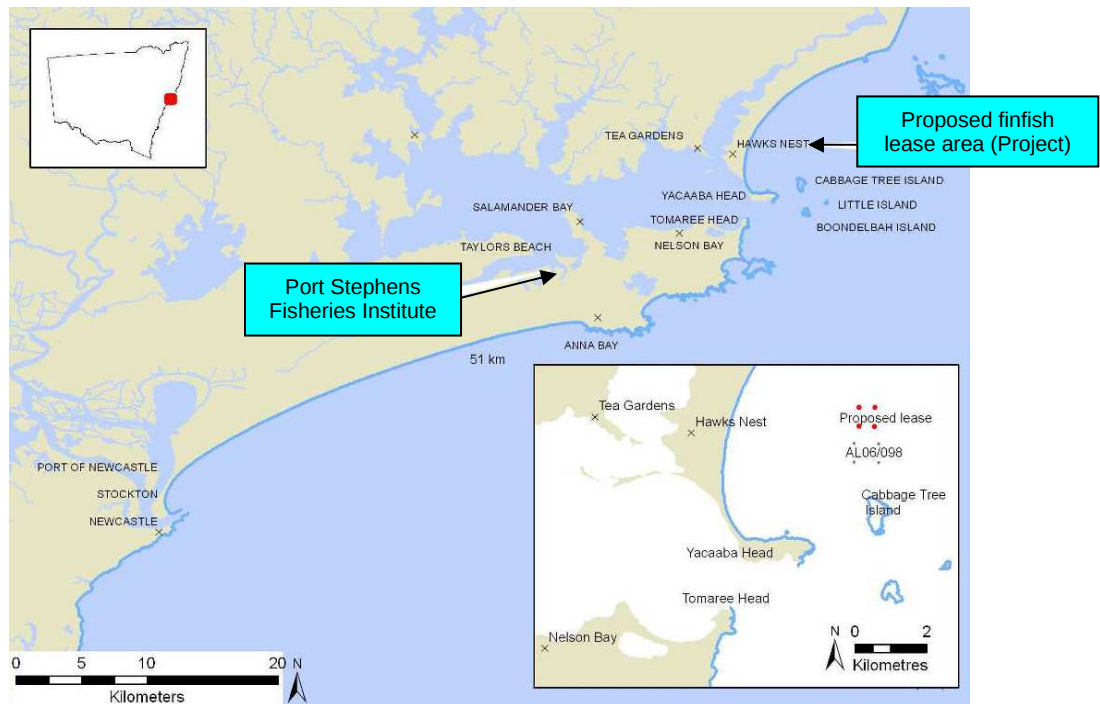


Figure 1: Location of the Existing PSFI and Proposed Project, offshore from Hawks Nest, NSW



Figure 2: The Marine Hatchery at the PSFI

DPI now intends to extend its hatchery (where fish eggs are hatched in artificial laboratory conditions) and nursery research into sea cages in the marine environment.

1.3 Need for further marine aquaculture research

DPI is proposing a five year sea cage research Project to examine the suitability of certain finfish species, validate equipment and technology and monitor the potential impacts of sea cage farming on the marine environment. Overall, it aims to provide information (acquired by research) for the planning and development of a sustainable sea cage aquaculture industry.

Importantly, DPI considers that the research can inform the community about the actual environmental impacts from marine aquaculture, address current concerns, and create new aquaculture policy in NSW informed by well founded and geographically relevant research.

Previous attempts at commercial scale finfish aquaculture in NSW (i.e. the Pisces farm) have not been successful. From this perspective, the Proponent indicates that the Project would enable a true total cost of production to be calculated from hatchery to market to determine whether this type of industry can be profitable in NSW, and identify the important 'drivers' of profitability. In addition, there could also be potential future economic benefits through local jobs and sales, and end product export. DPI also considers that a marine aquaculture lease could become a potential tourism site of interest.

DPI considers that a research lease represents a vital step towards developing best practice in sustainable marine aquaculture, and that the impacts of not proceeding with the Project in the long term may hinder the development of sustainable finfish seafood production in NSW. This would leave seafood supply in NSW dependent on the dwindling supply of Australian 'wild' caught product and imported product.

1.4 Proposed Project location

The proposed Project site would occupy an area of approximately 20 hectares (370m by 530m) in Providence Bay, approximately 4 kilometres offshore from Hawks Nest on the mid-north coast of NSW. The site is close to the Great Lakes and Port Stephens Local Government Area (LGA's) and the waterways of Port Stephens (see Figure 3).

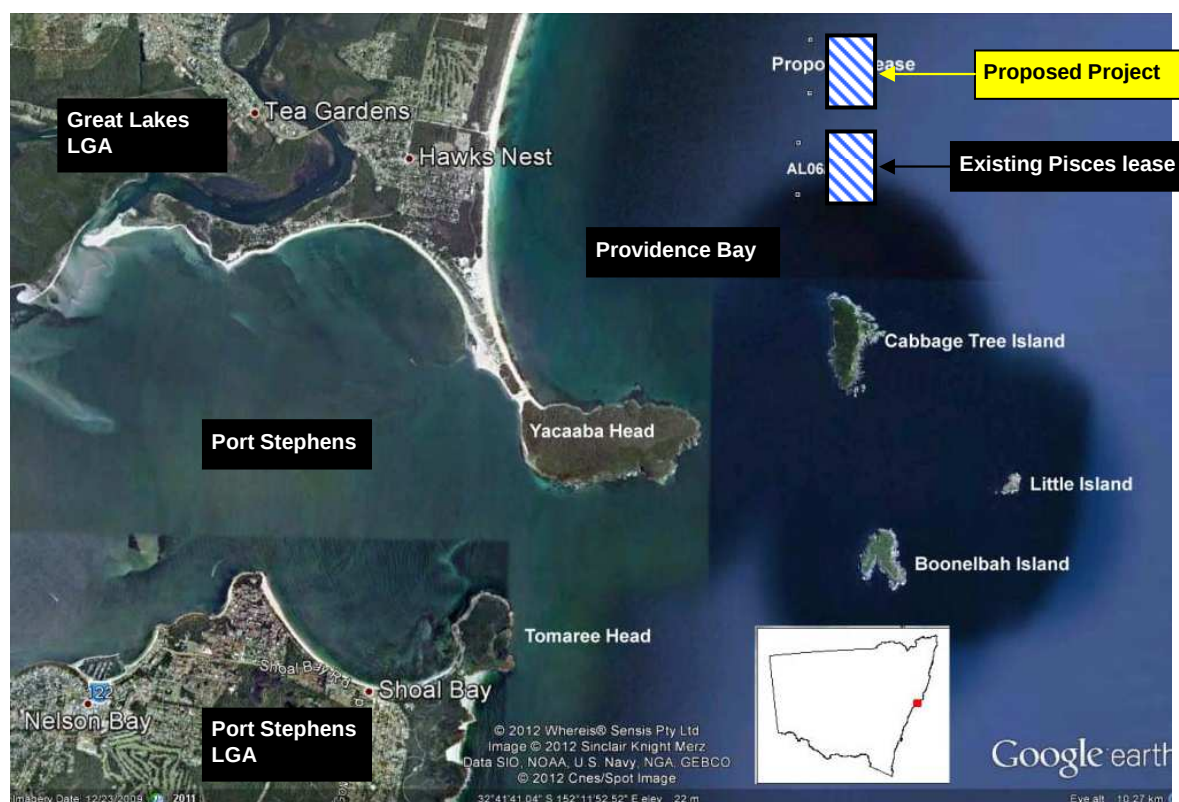


Figure 3: Approximate Location of the Proposed Lease Area and Nearby "Pisces" Lease Area

Tourism is one of the main industries in both the Port Stephens and Great Lakes LGA's. There are a number of marine tourism operators working out of townships such as Hawks Nest, Nelson Bay and Shoal Bay, offering activities such as charter fishing, wildlife observations (i.e. dolphin and whale cruises), interactions (swimming with the dolphins) and diving. Recreational fishing and sailing are also popular in the area, and there are as many as 200 vessels in the Port Stephens waterways per day during the summer months (and as few as 20 vessels per day during winter).

The proposed Project site is located in the Habitat Protection Zone of the Port Stephens-Great Lakes Marine Park (see Figure 4). The Park's diverse marine life includes threatened species such as the Gould's petrel, little tern, grey nurse shark, great white shark and green turtle. Humpback whales also travel along the marine park coastline during their annual

migration north to breeding grounds. The Port Stephens-Great Lakes Marine Park also contains a variety of habitats including oceanic islands, some of which are protected as critical habitat under the *Fisheries Management Act 1994* and the *Threatened Species Conservation Act 1995*. The Sanctuary Zone around Cabbage Tree Island is 1.5km from the Project site (see Figures 3 and 4).

A range of activities are allowed in the park, including aquaculture and commercial fishing, with five fishing businesses reporting fish caught from the proposed Project site.

There is an existing 30 hectare aquaculture lease approximately 500 metres south of the proposed Project site. This lease is owned by Pisces Marine Aquaculture Pty Ltd (Pisces) which obtained approval from the then Minister for Planning on 6 August 2001, for a commercial snapper farm with associated land-based facilities at Oyster Cove (in Port Stephens).

A modification to add additional fish species to farm at the Pisces lease (namely Yellowtail Kingfish and Yellowfin Bream), was approved on 24 February 2009, however this fish farm is not currently operating and the infrastructure was removed from the lease site around 5 years ago.

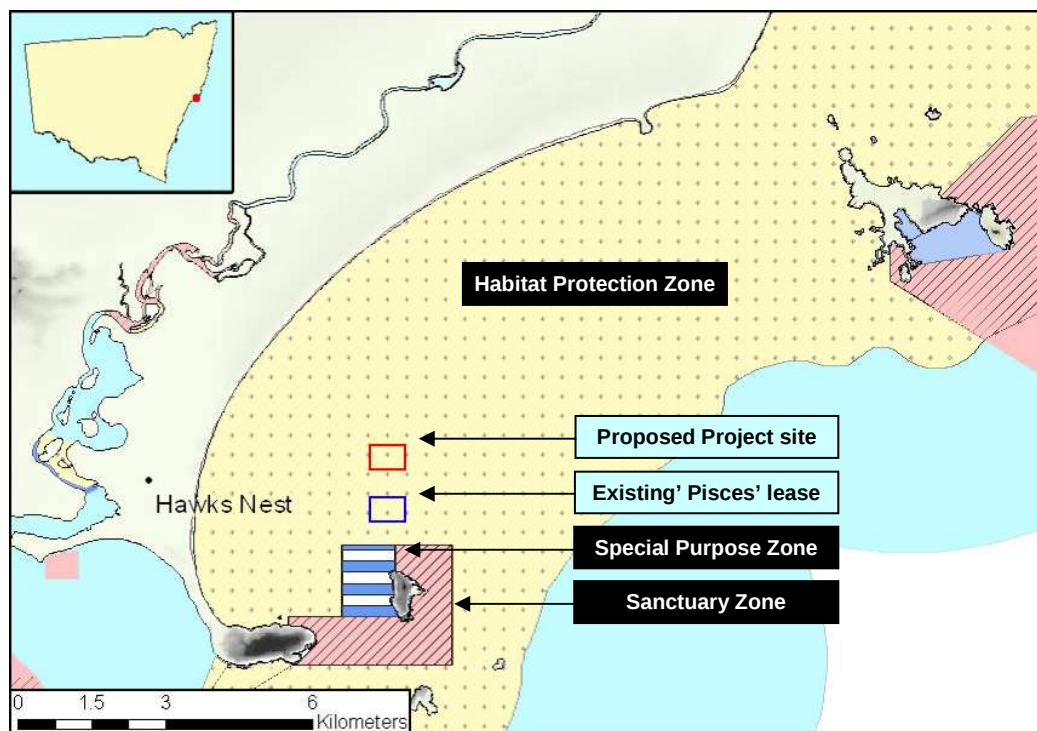


Figure 4: Port Stephens-Great Lakes Marine Park Zones

1.5 Site suitability

As part of the preparation of the EIS, the DPI commissioned the Office of Environment and Heritage (OEH) to undertake sea floor surveys of the proposed Project site.

The survey's found that the sea floor is composed of soft sediment with a fine to medium sandy substrate, which slopes gently towards the east. The depth of water is between 15 - 22m and there are no known seagrass beds, rocky reefs or substantial benthic marine communities in the lease area, with the closest significant marine communities on the reefs surrounding Cabbage Tree Island.

Water temperature at the site ranges between 18 – 23°C, with wave direction in summer predominantly from the northeast, and in winter from the southeast. Cabbage Tree Island

and Yacaaba headland provide some protection from the southerly swells in winter (see Figure 5), and ocean currents are strongest closer to Cabbage Tree Island. Figure 5 depicts the approximate location of the Project lease site, relative to Hawks Nest Beach.

The site is considered by DPI to have suitable physical characteristics for cage based aquaculture, based on a number of factors including the water quality, water temperature, sandy substrate and moderate current flow. It is also considered to a sufficient distance away from environmentally sensitive areas and within the natural distribution range for the species that are proposed to be cultured.

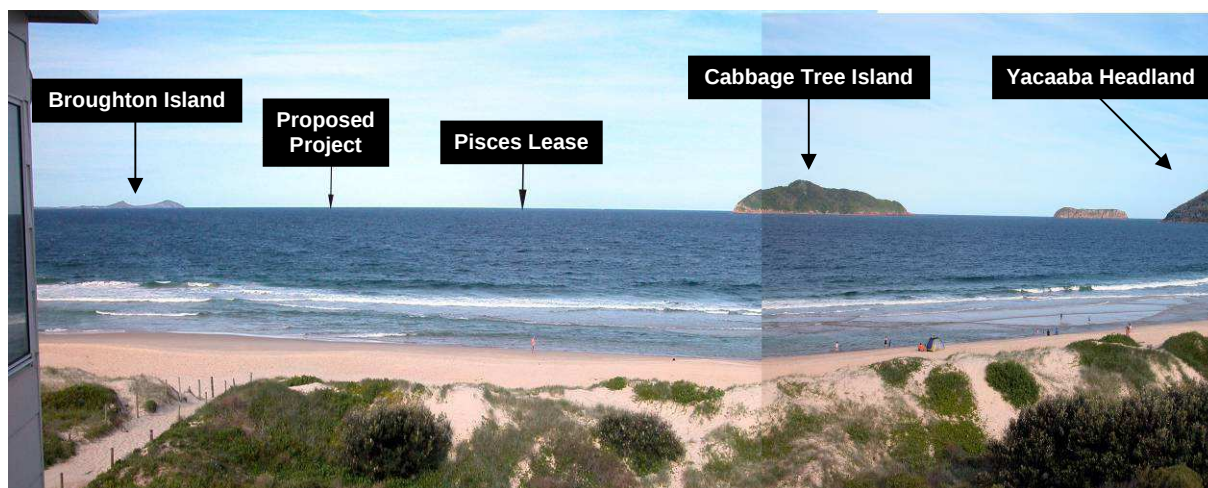


Figure 5: Approximate Location of the Proposed DPI Project and Pisces lease (View from the Hawks Nest Surf Club)

2. PROPOSED PROJECT

2.1 Research Plan

Generally, the Project involves the placement of fingerlings (juvenile fish around 3 months old) into the offshore sea cages where they would be fed and monitored until the fish reach a market size (ie around 2-3kg) which is anticipated to be within a 16 to 24 month period.

The fingerlings would be spawned at the PSFI (or accredited hatchery) from local broodstock and then reared to a size suitable prior to stocking in the sea cages (i.e around 5-10g or 10cm). Once the fingerlings reach the suitable size, they would be transported by vessel to the lease area where they would initially be placed in smaller sea cages until they reach around 20-40g where they would then be transferred to larger cages to grow. Any fish product obtained through the research trials would be sold through the local Fisherman's Cooperative.

The Project is proposed to be implemented over a 5 year period, which during this time, the DPI would be assessing growth and feed requirements, monitor fish health and assess any potential environmental impacts.

The major components of the Project are summarised in Table 2 and illustrated in Figures 6 & 7, and described in full in the EIS attached at Appendix A.

Table 2: Major Project Components

Aspect	Description
Project summary	<i>The placement of fingerlings sourced from the PSFI or an accredited hatchery, into sea cages. The finfish would be fed pellets and grown until market size is reached. DPI would also undertake various researches into fish growth and feed requirements, health and monitoring of any potential environmental impacts.</i>
Sea cages	The research lease itself would consist of up to eight floating sea cages, ranging in size (from 18 – 40 m diameter). The culture nets containing the finfish would be held afloat by circular metal 'double

Aspect	Description
	collar' pipes, filled with either air or polystyrene foam. The nets would drop from the surface to a depth of around 10 m. Small buoys would assist with the mooring of the cages, and these would be held secure by mooring lines and anchors weighing between 1 and 5 tonnes.
Navigation	Navigation buoys would be positioned on the four corners of the lease in accordance with NSW Maritime and International Association of Lighthouse Authorities requirements.
Land based sea cage construction	There are no new land based sites to be developed as part of the proposal, with existing marina space and resources being used for the mooring of service vessels.
Source of fingerlings	Juvenile fish (fingerlings) would be sourced from the PSFI or another hatchery accredited under the NSW Hatchery Quality Assurance Scheme, or hatcheries that have similar protocols in place.
Cultivation – sea cages	Young fingerlings would be raised in smaller cages (between 18 – 25 m in diameter) and then transferred into larger cages (up to 40m diameter) to be grown out.
Feed	Commercially manufactured pellets would be used to feed the fish, either by hand or a 'feed hopper' attached to a blower. To prevent excessive pellets being wasted, underwater remote sensors or cameras may be used to assess feeding responses and validate any feeding models.
Fish Health	Fish health would be monitored daily (weather permitting), therapeutic medicines would be used only when necessary and following approval from the Australian Pesticides and Veterinary Medicines Authority (APVMA) or a veterinarian.
Vessel movements	During the construction stage, up to six vessel return trips per day may be required between the research lease site and the wharf facilities (possibly PSFI wharf, the Port of Newcastle or the Nelson Bay Commercial Fishermans Co-operative). During the operation of the research lease, vessel movements are expected to be between 1 and 3 return trips per day for feeding, net changing, repairs and maintenance and net cleaning.
Operation hours	Staff would only access the lease during daylight hours, usually to check the fish. Night time access will be prohibited (out of consideration for nocturnal sea birds) unless required to attend an emergency.
Employment	Construction - around 10-15 people directly employed, such as marine engineers, divers, vessel operators, land and marine based construction staff. Operation – around 8-15 staff at the DPI and around 3 research staff. There is also potential for honours/doctoral students to participate through tertiary institutions (with academic supervisors).
CIV	The Project has a CIV of around \$300,000.

In terms of the research component of the Project, the DPI have outlined that the overall aim would be to:

- evaluate the suitability of key fish species for sustainable aquaculture;
- evaluate the use of different protein and energy (fish food) sources and develop dietary research to a commercial level;
- determine impacts of water temperature on the growth of various species;
- investigate potential environmental impacts of a marine aquaculture farm;
- investigate a range of mitigation measures such as anti-predator netting, controlled feeding strategies and entanglement avoidance strategies;
- investigate the structural integrity and stability of the proposed sea cage infrastructure; and
- determine the economic viability of sea cage infrastructure, including cost of fingerlings, feed, equipment, services, and sale of product.

These objectives would provide DPI with some flexibility in its research activities to enable adaptations relative to any findings.

The EIS also included a detailed draft Environmental Management Plan (EMP) which detailed how the DPI would ensure that the operation of the Project was undertaken with minimal impacts on the marine environment, surrounding communities and research staff. The draft EMP included objectives, performance criteria, sampling and monitoring methods and emergency response plans. Specific aims of the EMP included minimising impacts on marine fauna, disease management, water quality monitoring and navigational safety.

The cultured species would eventually be determined by the research requirements of the DPI. The key species to be farmed initially are expected to be Yellowtail Kingfish (*Seriola lalandi*) and Mulloway (*Argyrosomus japonicus*). Table 3 below provides additional information on these species. Other potential key species include Southern Bluefin Tuna (*Thunnus maccoyii*) which is endangered under the *Fisheries Management Act 1994* and Snapper (*Pagrus auratus*). All of these species are endemic in the waters off the mid north coast of NSW.

Table 3: Key species to be farmed

Yellowtail Kingfish (<i>Seriola lalandi</i>)	Mulloway (<i>Argyrosomus japonicus</i>)
 Endemic to the mid-north coast. DPI consider that there is the potential for rapid growth of this species i.e. it could reach a body weight of 2 kg in about 230 days at Port Stephens as opposed to about 500 days in existing farms in the cooler South Australian waters. This has not yet been adequately trialled on a commercial scale in NSW.	 Endemic to NSW and are currently cultured in estuarine pond based aquaculture systems in NSW and in sea cage systems in South Australia. Researchers at PSFI have undertaken a range of research activities on Mulloway including broodstock maintenance; and developing hatchery techniques and diets for this species.

2.2 Proposed Infrastructure

The sea cages are likely to be constructed and deployed from the Newcastle Harbour industrial foreshore. Buoys and mooring lines (such as those depicted in Figures 6 and 7) would secure the sea cages to the sea floor.

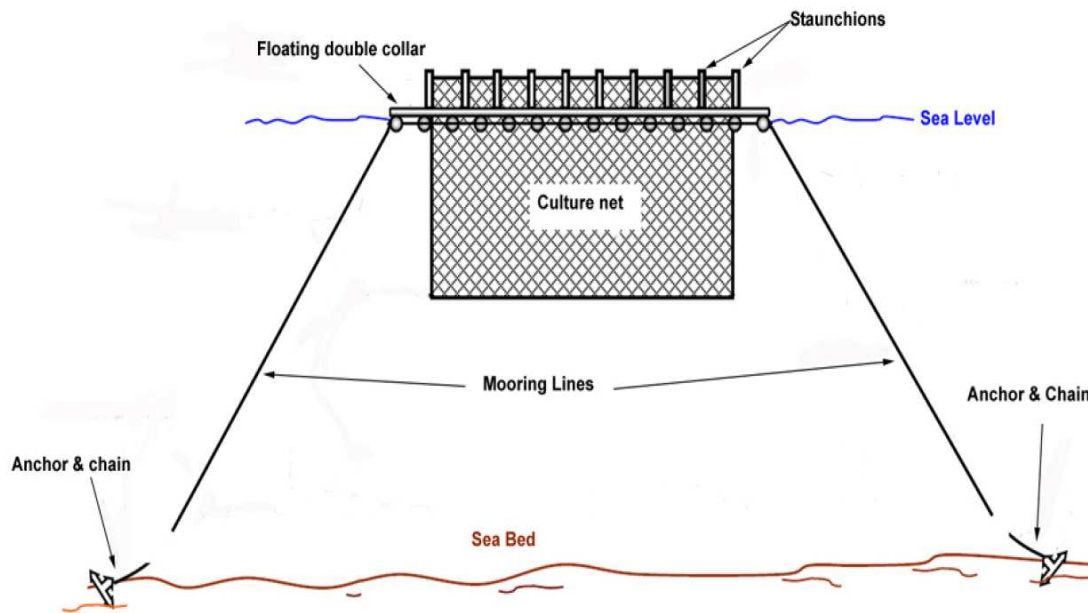


Figure 6: Sea Cage Infrastructure Design

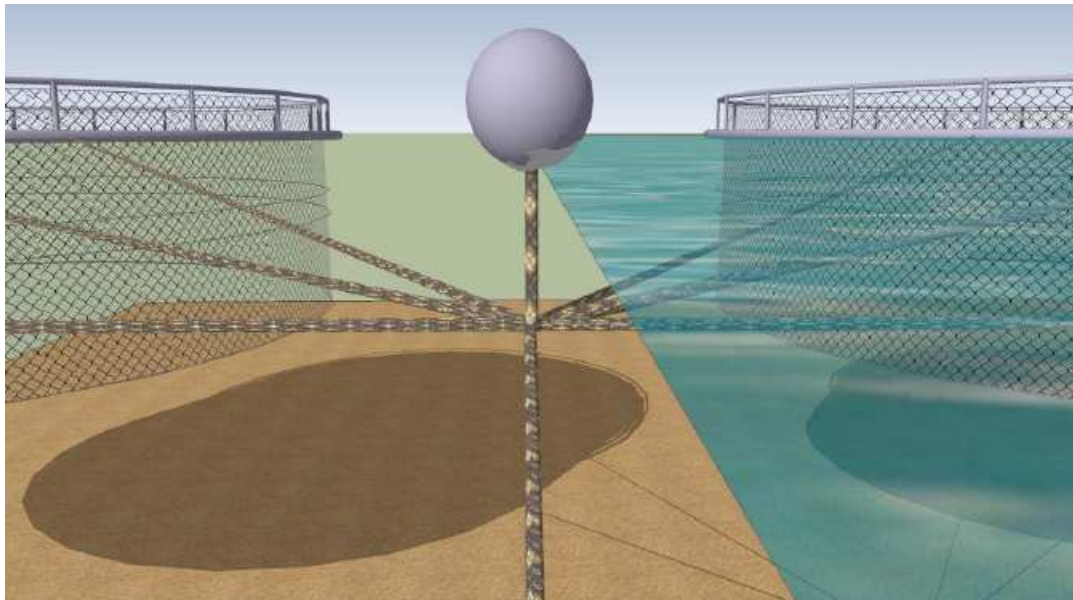


Figure 7: Buoy and Mooring System Used to Secure Infrastructure.

3. STATUTORY AND STRATEGIC CONTEXT

3.1 Permissibility and Zoning

The Project is located around 3.5km offshore and is therefore not zoned under a local environment plan. As the development is not zoned, the proposal is deemed to be permitted without consent under Part 5 of the EP&A Act.

Since the Project is permitted without consent, the DPI is considered to be a determining authority for the Project under Part 5 of the EP&A Act. As the DPI considered that the Project would require an EIS to be prepared in support of the application, the Project is deemed to be State Significant Infrastructure under section 115U of the EP&A Act. Under the EP&A Act, State Significant Infrastructure requires the approval of the Minister for Planning and Infrastructure.

3.2 State Environmental Planning Policy (State and Regional Development) 2011

Under *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), the Project is classified as a 'General Public Authority Activity' as the development is an activity for which the Proponent (ie DPI) is also the determining authority and would, in the opinion of the Proponent, require an EIS to be obtained under Part 5 of the Act.

As such, under Schedule 3 of the SRD SEPP, the Project is classified as a State Significant Infrastructure Project as outlined by section 115U (2) of the Act.

3.3 Approval Authority

Under section 115W of the EP&A Act, State Significant Infrastructure requires the approval of the Minister for Planning and Infrastructure.

However, on 27 February 2013, the Minister for Planning and Infrastructure delegated responsibility for the determination of State significant infrastructure under Division 2 of Part 5.1 of the EP&A Act to the Executive Director, Development Assessment Systems and Approvals. The Project complies with the terms of the delegation, as:

- the relevant local Council(s) have not made an objection;
- a political disclosure statement has not been made; and
- there are less than 25 public submissions objecting to the Project.

3.4 Environmental Planning Instruments

State Environmental Planning Policy - 62 – (Sustainable Aquaculture) (SEPP 62) regulates aquaculture activities in NSW.

The SEPP defines 'aquaculture' as cultivating fish or marine vegetation for the purposes of harvesting and selling them, and keeping fish in a confined area for a commercial purpose (such as a fish-out pond).

The SEPP applies to the following classes of aquaculture:

- tank-based aquaculture (e.g. barramundi or abalone);
- pond-based aquaculture (e.g. prawns and yabbies); and
- natural water-based aquaculture (e.g. oysters and caged finfish).

The SEPP establishes minimum performance criteria for certain aquaculture activities (but only for pond and tank based aquaculture at this stage). As there has been no detailed strategic study for finfish aquaculture, the minimum performance criteria for 'natural water-based aquaculture' has not yet been determined.

DPI proposes to utilise the research obtained by the Project to develop policy, strategies and to set out the minimum site location and operational requirements for permissible natural water-based aquaculture.

3.5 Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) *the protection, provision and co-ordination of communication and utility services,*
 - (iv) *the provision of land for public purposes,*

- (v) *the provision and co-ordination of community services and facilities, and*
- (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
- (vii) *ecologically sustainable development, and*
- (viii) *the provision and maintenance of affordable housing, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The objects stipulated under Section 5(a) are significant factors informing determination of the application. The Department, in its assessment, has considered the need to encourage the appropriate management and conservation of natural resources, including natural water resources, the protection of the environment, including the protection and conservation of native animals, including threatened species, and their habitats, and ecologically sustainable development. In particular, the Department considers that the Project provides an important opportunity to facilitate detailed research into the finfish aquaculture industry thereby contributing to the sustainable development of sea cage aquaculture in the coastal waters of NSW.

3.6 Ecologically Sustainable Development

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the Protection of the Environment Administration Act 1991. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

- (a) *the precautionary principle,*
- (b) *inter-generational equity,*
- (c) *conservation of biological diversity and ecological integrity,*
- (d) *improved valuation, pricing and incentive mechanisms.*

The principles of ESD have been addressed in the EIS. The EIS includes detailed studies in the form of Technical Papers in the areas of aquaculture, ecology, and water quality. The results of these studies have been summarised and integrated in the body of the EIS to ensure that the principles of ESD have been adequately addressed as part of the assessment of the Project.

The Proponent has set out a series of mitigation and management measures that would be implemented during the research period. These measures would be reviewed and augmented where necessary.

The Project also aims to produce valuable information for the development of an economically viable and sustainable offshore aquaculture industry in NSW, to help reduce reliance on imports and on wild fish stocks. On this basis, the Department is satisfied that the Project promotes the principles of ESD.

3.7 Relevant Commonwealth Legislation

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provides for the protection of the environment, especially those aspects of the environment that are considered to be matters of National Environmental Significance (NES).

The proposed development was assessed by the Proponent with reference to the EPBC Act which found that the Project is unlikely to have a significant impact on matters of national environmental significance. Notwithstanding, the Proponent made a referral directly to Department for Sustainability, Environment, Water, Population and Communities (SEWPAC) under the EPBC Act, for potential significant impact on federally listed marine fauna species.

At this stage, SEWPAC had not determined whether the Project would be a Controlled Action thereby requiring an approval under the EPBC Act. Should SEWPAC determine an approval is required, then DPI would need to obtain this approval separately.

3.8 Other Relevant Approvals and Permits

In addition to approval under the EP&A Act, other permits and approvals are required as discussed below.

Marine Parks Act 1997

The proposal is located in the habitat protection zone of the Port Stephens-Great Lakes Marine Park, and aquaculture is permitted in this zone, but only with the consent of the relevant Ministers in accordance with clause 1.18 of the *Marine Parks (Zoning Plans) Regulation 1999* (Marine Parks Regulation).

The Proponent considers that aquaculture is consistent with the objectives of the habitat protection zone of the Port Stephens-Great Lakes Marine Park, as it would provide opportunities for ecologically sustainable recreational activities, scientific research and educational activities and would not have an impact on any fish populations or on any other animals, plants or habitats.

A Marine Parks permit from the Marine Parks Authority is also required for the proposal under Section 19 of the *Marine Parks Act 1997* before works commence. The permit may contain a number of specific conditions in relation to possible impacts on ecological processes and /or threatened species.

Fisheries Management Act 1994

Aquaculture permits and aquaculture leases are issued under the *Fisheries Management Act 1994* (FM Act) which regulate species, structures, farming activities, monitoring requirements and reporting declared diseases. The Project would require both an aquaculture lease (under Section 163) and an aquaculture permit (under Section 144(1) of the FM Act).

Food Regulation 2010

Provisions protecting the general public from foodborne illness are contained within the *Food Regulation 2010*, which is administered by the NSW Food Authority. The Project requires a licence as fish from the Project is to be used for human consumption.

4. CONSULTATION AND SUBMISSIONS

4.1 Exhibition

Under section 115Z(3) of the EP&A Act, the Director-General is required to make the EIS prepared in support of a State significant infrastructure application publicly available for at least 30 days.

After accepting the EIS, the Department:

- made it publicly available from Friday 26 October 2012 until Thursday 29 November 2012;
 - on the Department's website;
 - at the Department's Head Office Information Centre in Sydney;
 - at the Nature Conservation Council;
 - at Port Stephens Council; and
 - at Great Lakes Council.
- notified landowners in the vicinity of the site about the exhibition period by letter;
- notified community groups, water based sporting clubs, special interest and tourism groups, local environmental groups and other interested parties (this list included parties consulted directly by DPI in preparing the EIS);
- notified relevant State government authorities and both Port Stephens and Great Lakes Councils Planning Divisions by letter; and

- placed the exhibition notice in the Hawkes Nest Myall Lakes Nota and Port Stephens Examiner.

During the assessment process, the Department also made a number of documents available for download on the Department's website. These documents included the:

- SSI application;
- Director-General's EIS Requirements;
- EIS;
- Submissions received; and
- Response to Submissions Report.

During the exhibition period, the Department received a total of 27 submissions on the Project, which included:

- 9 submissions from public authorities; and
- 18 submissions from the general public and special interest groups.

A summary of the issues raised in submissions is provided below. The Department has considered the issues raised in submissions in its assessment of the Project.

4.2 Public Authority Submissions

A summary of the issues raised in public authority submissions is provided below and also detailed in Figure 8.

The **Office of Environment and Heritage (OEH)** provided comments in relation to the environmental management of the lease, particularly in relation to the lease lighting affecting the Gould's Petrel (*Pterodrom leucoptera leucoptera*) which is listed as endangered under the *NSW Threatened Species Conservation Act 1995*, and the EPBC Act. OEH also raised issues relating to vermin management and marine fauna entanglement.

The **Environment Protection Authority (EPA)** did not object to the Project and provided recommended conditions in relation to environmental monitoring and general noise management.

The **Commonwealth Scientific and Industrial Research Organisation (CSIRO)** Marine and Atmospheric Research centre in Hobart, Tasmania provided an analysis of the Project with respect to juvenile great white shark behaviour and made a number of recommendations in relation to tagging and monitoring of the sharks.

The **Great Lakes Council (Council)** provided detailed comments on the Project, including comments on the concerns raised by the community about shark behaviour, but did not object or make any recommendations.

The **Marine Parks Authority (MPA)** raised some concerns regarding the risk of fauna entanglement and possible impacts on ecological processes and threatened species. As a MPA permit is required for the operation of the lease, MPA is satisfied that any residual concerns can be resolved prior to issuing the permit through consultation with DPI and OEH.

NSW Trade and Investment supports the Project as an example of sustainable aquaculture.

The **NSW Aquaculture Research Advisory Committee (ARAC)** strongly supports the research as an example of potential sustainable seafood production.

NSW Crown Lands stated that it did not identify any new issues that had not been adequately addressed within the EIS.

Roads and Maritime Services were satisfied that all requirements had been addressed within the EIS, and did not provide a submission.

4.3 Public and Special Interest Group Submissions

The Department received 18 submissions from the public and special interest groups. Of these submissions, 8 objected to the Project, 6 supported and 4 provided comments. Submissions were received from individuals, businesses, tourism operators and special interest groups such as the NSW Aquaculture Association.

The key issues raised in public and special interest group submissions are detailed below in Table 4 and illustrated in Figure 8 below.

Table 4: Public and Special Interest Group Concerns

Issue	Issue summary
Ecology	• Lack of baseline data to accurately determine impacts; • Marine fauna entanglement and impacts on migratory routes; • Impacts on dolphin and other animal habitats; and • Navigation light impacts on the 'Gould's Petrel', a nocturnal sea bird.
Waste	• Benthic pollution from faeces and leftover food; and • Lease infrastructure may break away during storms, polluting nearby beaches and creating a hazard for wildlife.
Attraction of predators	• Increase in predators in the area such as sharks and seals and associated impacts on marine species and scuba divers; and • Impacts on tourism due to perceived risk from additional shark activity.
Community consultation	• Local residents not being adequately informed about the Project.
Existing lease infrastructure	• The 'Pisces' lease should be utilised for the trial.
Tourism	• Annexing of the lease waters from tourism operators; • Changes to the behaviour of animals i.e. dolphins upon which a number of tourism businesses are based; and • Impacts on eco-tourism which relies on pristine habitats.
Visual pollution	• The lease would be visible from Bennett's beach and other viewpoints and would be inconsistent with the natural beauty of the area.
Use of wild fish as stockfeed	• Pressure on wild stocks to supply fishmeal and fish oil for aquaculture may threaten the sustainability of the Project.
Use of chemicals	• Chemical use and potential impacts on marine life.
Disease	• Introduction of diseases from cultured animals to wild populations.

The graph presented as Figure 8 depicts the issues of concern raised (most frequent to least frequent) in all submissions, including government agencies.

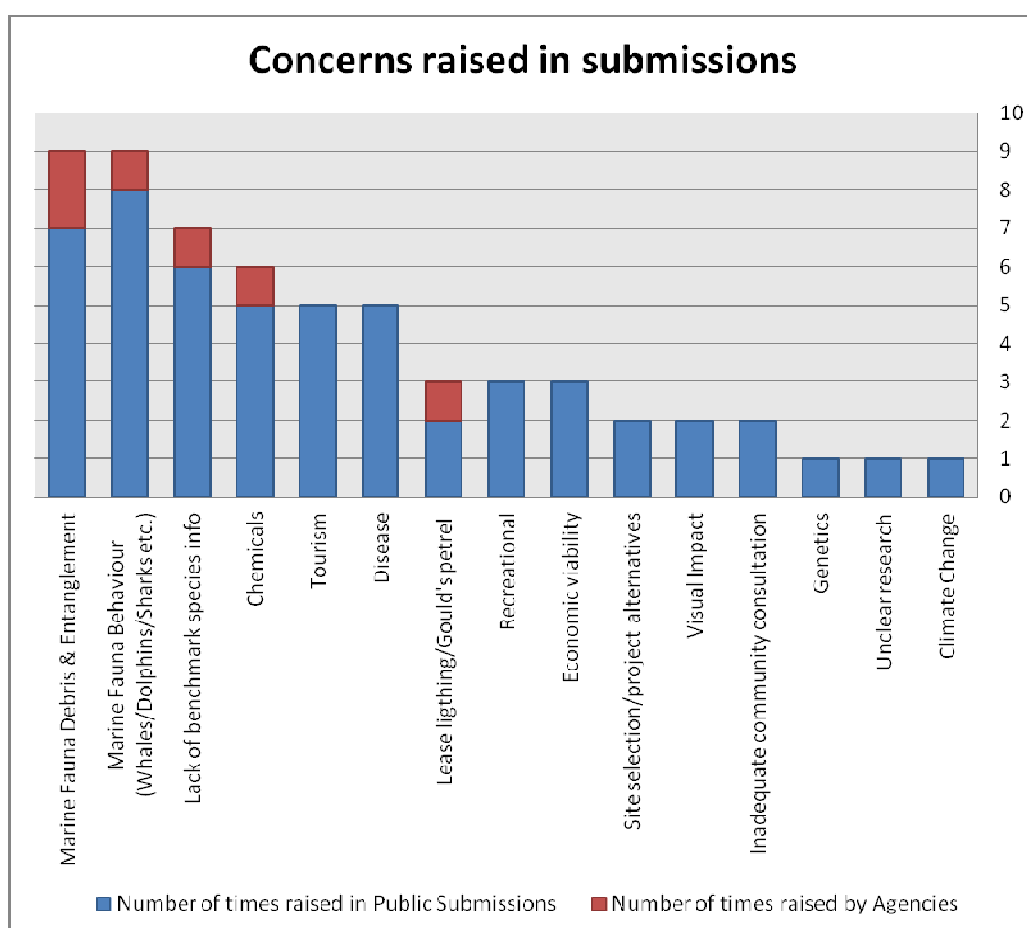


Figure 8: Concern Raised in Agency and Non-Agency Submissions

Table 4 below details the key reasons for supporting the Project as raised in all submissions.

Table 4: Issues Raised in Support of the Project (public and special interest groups)

Issue	Issue summary / comments
Seafood Production	- Commercial seafood production is becoming increasingly important and the growing demand for seafood can only be supported by sustainable aquaculture; - Sustainable aquaculture can prevent the decline of wild fisheries; and - Benefit to other operators in the local and global aquaculture industry.
Economic benefits	The Project should enable a true total cost of production to be calculated from hatchery to market to determine whether this type of industry can be profitable to other farmers.
Site selection	Site selection is ideal in terms of proximity to the DPI hatchery (and supporting infrastructure) and the coastal environment.
Community feedback and consultation	- Consideration be given to providing an information display at the Hawks Nest Surf Club once the farm is established; and - A community consultation group could be established to report on research progress and other issues.

4.4 Proponent's Response to Submissions

DPI provided a response to the issues raised in submissions in its 'Response to Submissions' (RtS) report (see Appendix A), which was submitted to the Department on 27 January 2013.

The RtS provided additional information and clarification on a number of issues that were raised in submissions. The RtS was also made available on the Department's website.

4.5 Independent Marine Ecology and Aquaculture Review

The Department engaged an independent marine ecology and aquaculture expert, Associate Professor Daryl McPhee (Dr McPhee) of Bond University in Queensland, to review the EIS,

submissions received, and the Proponent's RtS. Dr McPhee considered that the EIS provided a comprehensive and accurate assessment of the potential impacts on the marine environment, and recommended that the Project be approved subject to certain conditions. A copy of Dr McPhee's assessment of the Project and recommendations is provided in Appendix C.

5. PROJECT ASSESSMENT

In assessing the merits of the Project, the Department has considered:

- the EIS, submissions and the Proponent's response to submissions on the Project (refer Appendices A);
- the relevant environmental planning instruments, guidelines and policies;
- the objects of the EP&A Act, including the object to encourage ecologically sustainable development; and
- the relevant statutory requirements of the EP&A Act & Regulation.

The Department considers the key issues relate to the potential impacts on flora and fauna (particularly entanglement), other local businesses, water quality and the benthic environment. The Department's Assessment of the key issues is provided below.

The Department's assessment of the other issues is provided in Table 5 of this report, which included issues relating to navigation, visual impacts, genetics, cumulative impacts, use of fish meal, structural integrity of the lease infrastructure, and noise.

5.1 Biodiversity

5.1.1 Assessment

The EIS was prepared by a team of environmental professionals at DPI with extensive experience in fisheries biology, marine ecology, aquaculture, environmental management and NSW coastal processes.

The DPI considered the *NSW National Parks and Wildlife Atlas* (the Atlas) for information on the distribution of both threatened and non-threatened species of plants and animals. Additional species that are not included in the Atlas, but known to occur at the location (e.g. the threatened Flatback Turtle - *Natator depressus*) as well as certain finfish and elasmobranch species (i.e. sharks and rays) were also considered in the EIS.

The DPI also conducted desktop searches to identify threatened species, populations and communities listed under the *Threatened Species Conservation Act 1995* (TSP Act) and the *Fisheries Management Act 1994* (FM Act) that may occur in the Project area. The Commonwealth's Protected Matters Search tool was also used by the Proponent to identify species that are protected by Commonwealth legislation.

Using these information sources, DPI considered that 70 marine fauna species could be potentially impacted by the Project, including 17 mammals, six marine reptiles, and 47 species of seabirds.

A number of submissions received during the exhibition period raised concerns about the lack of baseline (or benchmark) data, particularly on the migratory behaviour and distribution of certain marine species in Providence Bay. However, the Department notes that DPI consulted extensively with OEH on the issue of conducting baseline population, distribution and migratory studies on key species. OEH agreed that baseline studies would not be required given the extensive areas of similar habitat around the proposed lease which marine mammals, reptiles and birds (including migratory species) can utilise and the lack of incidents or problems with the Pisces fish farm. It was agreed that no further baseline studies would be required.

In addition, Dr McPhee agreed that relevant, comprehensive and up to date information was used in the overall assessment. Dr McPhee also stated that the most appropriate set of databases had been used to provide baseline information on the marine fauna that are likely to occur or known to occur at the proposed Project location.

5.1.2 Key impacts and proposed mitigation measures

The EIS identified and discussed the potential impacts of the Project on marine fauna, which included:

- entanglement in sea cage infrastructure;
- ingestion of marine debris;
- attraction of predators leading to competition for habitat;
- chemical bioaccumulation in tissues;
- lighting impacts on nocturnal sea birds;
- non-targeted antibiotic administration due to predation on stock; and
- change of food sources.

A range of marine fauna such as whales, dolphins, seals, sharks, teleosts (bony finfish), marine turtles and seabirds are vulnerable to entanglement in aquaculture infrastructure and ingestion of marine debris. The issue of entanglement was raised in 6 public submissions and also by the Marine Parks Authority.

DPI has considered these potential impacts in the context of the proposed infrastructure and the characteristics of the proposed site, including the soft sediment seafloor, the high energy wave climate and the extensive nature of similar habitat in the surrounding area.

A range of industry best practices, management plans, protocols and monitoring programs would be implemented to mitigate these identified potential impacts. DPI's draft Environmental Management Plan (EMP) included with the EIS, was developed in consultation with the OEH and other key stakeholders, and included a Marine Fauna Entanglement Avoidance Protocol, and a Marine Fauna Monitoring Plan which are discussed in more detail below.

Marine Fauna Entanglement Avoidance Protocol

The Marine Fauna Entanglement Avoidance Protocol aims to minimise the threat of entanglement or entrapment and implement prompt management measures should an entanglement incidence occur. DPI has proposed that any entanglements would be reported to an 'Entanglement Committee' (which would be formed by key stakeholders, including the OEH) to ensure its implementation would be effective. Requirements of the protocol include:

- regular inspections of all chains, ropes, anchors and buoys to ensure compliance with the 'taut rope policy';
- using ropes with a 'large' diameter;
- notification of the relevant government departments if an entanglement occurs; and
- development of an effective response plan.

The Department has recommended a condition which requires DPI to finalise the members of the Entanglement Committee prior to the commencement of operation. Additionally, OEH requested that DPI supports (through funding or otherwise) a whale disentanglement team. The Department has also included this requirement in the recommended conditions.

Whilst Dr McPhee considers the risk of entanglement is low, he has recommended that further discussion should be held with OEH on the issue of Acoustic Deterrent Devices (ADD's) and acoustic alarms (Pingers) should the research lease be approved. These devices use underwater noise to deter marine fauna from sea cage infrastructure, thereby reducing the potential for marine entanglement and are commonly used on foreign aquaculture farms. If it is agreed that these devices are a safe and appropriate management

option to trial, marine fauna interactions and responses to the use of these devices would also be monitored. Dr McPhee identified uncertainties regarding the effectiveness of such devices, and as such the Department has recommended a condition that the use of these devices is subject to approval from OEHL following further discussion, rather than directly requiring DPI to implement ADD's and Pingers via the Project approval.

Marine Fauna Monitoring Plan

DPI has proposed a Marine Fauna Monitoring Plan to monitor fauna behaviour and movement in Providence Bay. The plan includes:

- recording all observations of marine fauna interactions with infrastructure and vessels, including boat strikes, predatory interactions and entanglements; and
- investigating movements of high priority species within the direct study area, such as whales, dolphins, great white sharks and grey nurse sharks.

Provided that the research lease is properly managed, monitored and mitigation measures (as proposed) are implemented, the EIS concluded that the lease would have a 'low' potential impact on areas of conservation significance (i.e. the Port Stephens-Great Lakes Marine Park) and on all threatened and protected species.

As one of the key NSW government agencies responsible for biodiversity and coastal protection, OEHL advised that DPI's risk assessment, proposed operating procedures and mitigation measures for marine fauna followed best practice. Furthermore, OEHL indicated that significant negative impacts on marine fauna, reptiles or birds would also be unlikely. It did however, raise some concerns in relation to potential impacts on the Gould's Petrel, which is discussed in further detail in Section 5.1.3 of this report.

Dr McPhee noted that the risk assessment approach applied was rigorous and specifically designed for the type of development proposed, and he concluded that risks to marine fauna (such as entanglement) were low, and negative interactions with the lease infrastructure were unlikely (with the proposed plans/mitigation measures in place).

Although avoidance, management and mitigation measures have been considered in the EIS, the Department acknowledges there is still potential for some impacts on threatened species.

The Department's consideration of the potential impact of the Project on key fauna species, including species raised in submissions, is discussed in more detail below. This includes consideration of the DPI's response to these concerns, Dr McPhee's consideration and the Department's final conclusions and recommended conditions.

5.1.3 Gould's Petrel (*Pterodrom leucoptera leucoptera*)

Pterodrom leucoptera leucoptera is a sub-specie of the Gould's Petrel which is listed as an endangered seabird under the NSW TSC Act and the Commonwealth *Endangered Species Protection Act 1992*. In this report, *Pterodrom leucoptera leucoptera* is referred to as the Gould's Petrel.

This sub-specie of the Gould's Petrel is known to only breed on two islands worldwide, Cabbage Tree Island and to a lesser extent Boondelbah Island which are both located around 2km to the south of the lease area (refer to Figure 3). Both islands are gazetted nature reserves under the *National Parks and Wildlife Act 1974* and located in the Port Stephens-Great Lakes Marine Park. While the population of the specie is increasing due to active conservation efforts, the Department notes that it still remains of conservation concern.

The EIS stated that navigation and vessel lights may cause disorientation and stress to some species of seabirds and possibly impede their navigation abilities when returning to their nests on the offshore islands at night.

Four flashing navigation lights are proposed to delineate the corners of the research lease. The lights would have a range of around 4 nautical miles and vertical width of around 9 degrees. To mitigate any potential impacts, DPI has proposed to use low intensity flashing white strobe lights with a low profile. In addition, DPI has proposed to restrict the hours of operation to mainly daytime hours and reduce vessel lights if emergency night work is required. With these measures in place, DPI concluded that the risk to birds such as Gould's Petrel would be low.

Despite the measures proposed, OEH and two public submissions raised concerns about the impacts of the proposed lease lighting on the Gould's Petrel.

Dr McPhee considered this issue in detail and noted that light disturbance of fauna is caused by the wavelength of light (colour) and the intensity of light. Dr McPhee considered that the issue is important given the status of the specie and the proximity of the proposed Project to important habitat (the lease area is around 2 km from Cabbage Tree Island).

As such, Dr McPhee recommended a condition requiring DPI to prepare and implement a Light Spill Management Plan (LSMP), in consultation with OEH and the Department, to determine the wavelength and intensity of light that provides the least disturbance to Gould's Petrel. Dr McPhee also recommended that the LSMP should allow for adaptive management to address any issues as new information arises, but that DPI should not compromise navigational safety requirements. Dr McPhee's recommendations have been incorporated into the recommended conditions of approval.

To further ensure the potential impacts on the Gould's Petrel are mitigated, an additional condition relating to DPI's commitment to restrict operational hours to daylight and has also been included in the recommended conditions of approval. This would restrict night-time activities which is when the Gould's Petrel accesses and breeds on the nearby Cabbage Tree Island.

The Department consulted with the OEH on the draft recommended conditions which included the specific provisions for the management and monitoring of the potential impacts of the Project on the Gould's Petrel. The OEH reviewed the conditions and advised that they considered that the recommended conditions addressed their concerns.

As such, the Department is satisfied that these measures would help to manage and minimise any potential impact on the Gould's Petrel, whilst also ensuring that the appropriate safety and maritime requirements are satisfied.

5.1.4 Dolphin and Whale entanglement

Port Stephens is the location of Australia's largest dolphin watching industry, with the majority of the dolphin watching activity occurring within Port Stephens itself. Many whale species are also regularly sighted close to the shore in the coastal waters of Port Stephens as part of their annual migration from Antarctic waters to Southern Queensland (June to November).

A number of tourism operators and community stakeholders raised concerns about the impact of the Project on migratory pathways and marine fauna behaviour, particularly from entanglement in the lease infrastructure (nets and ropes). The potential for changes to dolphin behaviour as a result of the Project is discussed in Section 5.2.1.

In the EIS, DPI suggested that marine fauna entanglement (and ingestion of marine debris) is a 'Key Threatening Process', which is listed under the *Threatened Species Conservation Act 1995* and the EPBC Act. However, DPI noted that the area of the proposed sea cage lease (20 hectares) represents approximately 0.3% of Providence Bay, and the exact

migratory pathway of whales is uncertain, and no specific areas have been determined as important for resting, calving or feeding in the Port Stephens region.

Further, DPI stated that there is 3km of un-obstructed water to the west of the lease and 2.5km to the south towards which provides plenty of open water for the movement of whales and dolphins. DPI also considered that while it would be unlikely that whales or dolphins would be impacted, its proposed mitigation measures (as discussed in Section 5.1.2) would ensure any impacts are minimised and monitoring would ensure any changes in behaviour are identified and addressed.

Dr McPhee noted that any changes to the path of migratory animals such as Humpback whales to avoid the Project site is highly unlikely to impact on the overall health or fitness of an individual animal (ie to go around or avoid the lease) or the migratory population as a whole. Particularly given that whales and dolphins would be able to detect the lease area and traverse around the Project, therefore without disturbing there

Isolated incidences of whale entanglement in ropes and nets are known to have occasionally occurred, including in shark nets set for bathers protection and various fishing apparatus. The EIS notes that whale entanglement has occurred off the coast of Western Australia in fishing lines related to the rock lobster fishery. However, this fishery previously used fine ropes that were not maintained in a taut state.

The Project would implement a number of measures to prevent marine fauna entanglement, including the use of underwater anti-predator nets and highly visible, thick ropes and anchor lines kept under tension at all times (e.g. 40 mm eight strand rope). This reduced flexibility is known to minimise the risk of entanglement. The anti-barrier nets are also thought to provide a subsurface barrier for echolocating species (such as whales and dolphins) to enable them to identify the underwater infrastructure and consequently alter their course.

The EIS stated that the most frequently reported interaction between dolphins and fish farms is that dolphins are attracted to prey around the farm opposed to attempting to eat fish within the cages. However, behavioural changes associated with feeding around fish farms, notably feeding patterns and social structure, could represent a potential issue and would be closely monitored (see Section 5.2.1).

DPI's RtS also provided additional information on the Great Oyster Bay and Mercury Passage in Tasmania which had (in 2002) up to 1600 hectares (or around 2000km) of longline aquaculture in an area seasonally frequented by Humpback and Southern Right whales, without any incidents of entanglement over a period of approximately 15 years.

It should be noted that no entanglements of dolphins, whales or other marine fauna were recorded over the two year period when the adjacent Pisces lease was in operation. The Department is satisfied that DPI has presented sufficient information demonstrating that entanglement of whales and dolphins rarely occurs, even in areas of Australia where there is a large amount of aquaculture infrastructure in place.

Further, given the small size of the Project site (in context with the surrounding ocean area), the 5 year timeframe, and DPI's proposed Entanglement Protocol (particularly the maintenance of taut infrastructure as described in the EIS) the Department considers that adequate and effective mitigation would be implemented. In addition, the Department also considers that in the context of the duration and distance migrating whales make each year, which is around 2,500km each way, then the lease area would represent an insignificant area (around 0.02% of a one way journey) to avoid and disturb.

5.1.5 Grey nurse sharks

The east coast population of the Grey Nurse Shark is considered to be critically endangered under the EPBC Act and the FM Act. The preferred habitat of this species is well known and

Little Broughton Island (north of Port Stephens, and 10km away from the proposed Project area) is one of 10 identified critical habitat areas for the species in NSW.

One submission indicated that pregnant Grey Nurse Sharks migrate from Wolf Rock (near Fraser Island, Queensland) to near the proposed aquaculture lease to give birth. While Grey Nurse Sharks are generally attached to specific sites, it is considered that they may make migrations for reproduction as evidenced by the pattern of capture in the NSW Shark Meshing program, however the existence of such migrations has not been clearly demonstrated.

Dr McPhee stated that it is well documented that Grey Nurse Sharks prefer to utilise deep sandy-bottomed gutters or rocky caves, usually in the vicinity of inshore rocky reefs and islands. This habitat type is not evident at the proposed development location, however they may range beyond this habitat for foraging.

Based on the information provided in the EIS and on Dr McPhee's advice, the Department considers that the risk of entanglement of Grey Nurse Sharks is extremely low, especially given that the closest known aggregation site is 10km away from the Project. Notwithstanding, a number of shark deterrent measures and entanglement avoidance protocols will be applied to the Project, and the Department has also included a condition of approval which requires DPI to closely monitor shark interactions with the lease, including implementing acoustic tagging and listening stations to follow Great White Sharks and Grey Nurse shark movements in Providence Bay. This will provide additional and valuable information on the nature and distribution of this species in Providence Bay.

5.1.6 Great White Sharks

The Great White Shark (*Carcharodon carcharias*) is listed as 'vulnerable' under the FM Act, with the Port Stephens area being one of two primary residency areas for juvenile and sub-adult Great White Sharks (GWS) on the east coast of Australia (the other being in Victoria). This 'nursery' area is defined as between Stockton Beach and Mungo Brush (around 60km in length) and has been well documented by the CSIRO as part of its tracking and tagging program (see Figure 8).

DPI has proposed to implement a range of operational and maintenance procedures to actively deter sharks and other predators from the sea cages, such as the removal of dead and injured fish, using pelletised feeds (as opposed to whole fish) and adopting a demand feeding regime to minimise excess feed entering the water column. These commitments have been incorporated into the recommended conditions of approval by the Department.

DPI considers that the Project would not change shark behaviour and attract increased numbers of GWS to Providence Bay. However a detailed monitoring program would be implemented at the Project site and nearby localities using a range of sampling methods such as visual census techniques, passive and active acoustic tracking studies and recording incidental sightings and behaviours.

Despite the conclusions of the EIS (that the Project posed a low risk to the GWS with the proposed management and mitigation measures in place), a number of submissions raised concerns about shark entanglement and/or changes to shark behaviour in Providence Bay. The Department's consideration of the more specific issue of the risk of shark attack on humans (raised in public submissions) is provided in Section 5.2.1 of this report.

Dr Barry Bruce of the CSIRO's Marine and Atmospheric Research Centre provided a detailed submission on the Project, including details on the occurrence of GWS in the area, details on current studies and programs and suggestions for monitoring potential impacts on shark behaviour.

Dr Bruce stated that the Project was located within a well documented GWS nursery area (Bruce and Bradford 2011, 2012a) and was known to have a high level of GWS activity. As part of his submission, Dr Bruce provided details of a CSIRO GWS satellite tracking program undertaken in the Port Stephens region. The information was based on the movements of 30 individual sharks which were tracked between 2007-2012, and the location of these sharks in the context of the Project lease area and broader Port Stephens region is illustrated in Figure 8 below.

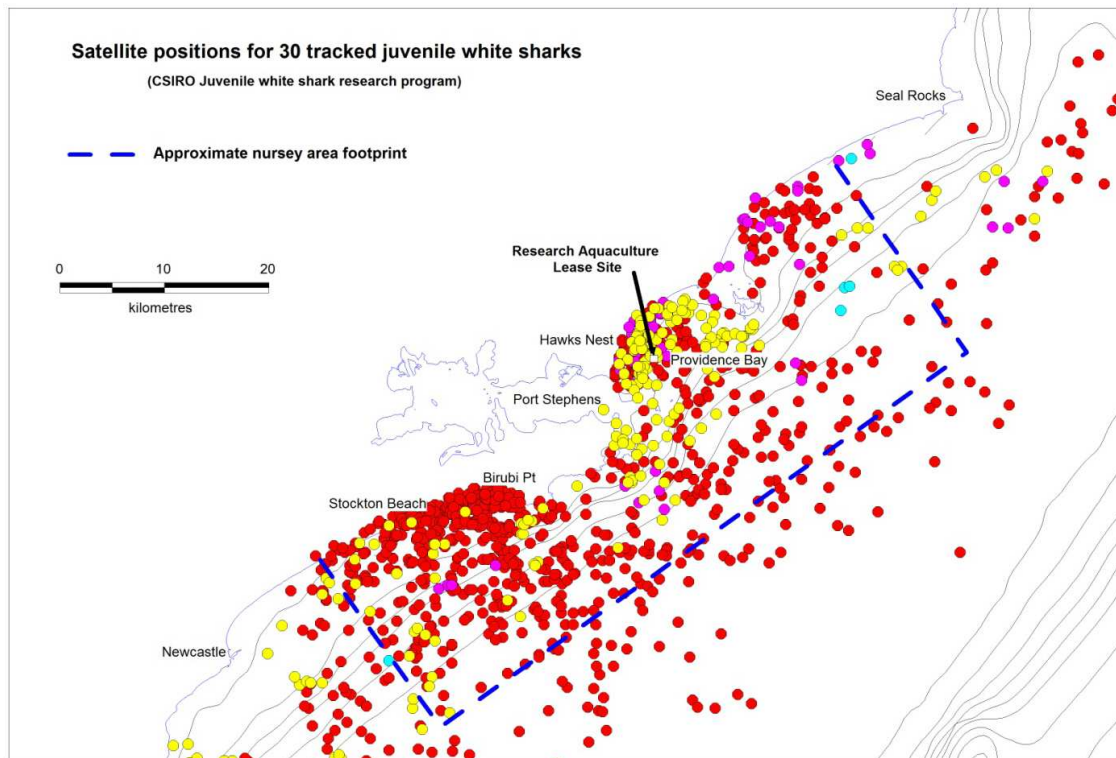


Figure 8: GWS in the vicinity of the Project site (note the colours represent data files not individual shark').

Dr Bruce's submission also outlined that GWS interactions have previously been recorded in South Australia around cages containing similar species proposed by DPI and that instances of sharks entering similarly designed cages have occurred. However, Dr Bruce considered that this is unlikely to occur at the Project site as these interactions have been with sharks that are larger than the size range most commonly present in the Port Stephens region which is less than 3 metres in length.

Monitoring of GWS in this area (by the CSIRO) has shown that juvenile GWS are highest in numbers between November and January and can be found up to 1.5m offshore from the beach in the surf zone near the Hawks Nest Surf Club. The Department notes that Dr Bruce concluded that despite the Project, there would always be a high level of GWS activity in this area of the Mid-North Coast.

A submission from Great Lakes Council stated that the local community may be concerned that the Project would attract sharks, potentially alter their movements and be at risk to entanglement or incidental hooking. However, Great Lakes Council agreed with the EIS that it is more likely that sharks would be initially inquisitive about the captive fish in the sea cages but if no rewards are provided and sufficient barriers are installed, sharks would eventually lose interest as has been observed on other sea cage farms.

The Department considers that the proposed approach to mitigating entanglement and actively deterring sharks is a standard and highly successful approach. However, the issue of whether shark movements are likely to be altered by the Project is considered further below.

In his submission, Dr Bruce also noted that some interaction between sharks and the lease would be inevitable, but whether it is a chance sighting event, or represents a change in shark behaviour would be difficult to ascertain. Dr Bruce considered that a shark monitoring program that is independent of visual-based observations (i.e. use of acoustic receivers and acoustic tags) is critical for gaining a better understanding of any potential changes to shark behaviour. The use of incidental sighting in the region either by divers or from the surface, while considered to be a contribution to knowledge, could potentially underestimate GWS activity.

Although the CSIRO is currently undertaking some research in the Providence Bay area, Dr Bruce considered that additional acoustic receivers, specifically deployed to understand the potential impact of the lease on shark behaviour in the area are needed. In its RtS, DPI agreed with Dr Bruce's comments that acoustic receivers need to be deployed at a variety of sites prior to the commencement of lease operations and sharks should be monitored during and after the trial as part of the Marine Fauna Monitoring Plan. This would enable DPI to gain a full picture of any behavioural changes and interactions with the Project.

Dr McPhee also recommended that DPI works with the CSIRO or other suitable research institution to ensure the continued tracking of the movement of sharks.

DPI agreed that a shark monitoring program is needed to identify and if necessary, reduce or mitigate any shark related impacts. In the RtS, DPI has outlined a program that would involve the capture and acoustic tagging of sharks. This would allow their movements to be monitored around the Providence Bay region. As part of the program, acoustic stations would be deployed around the area of the Project site and neighbouring control sites, as well as several nearby locations used for scuba diving and tourism activities, such as Cabbage Tree Island and the wreck of the SS Oakland. DPI considers that this would provide an understanding of whether movements and behaviour of GWS have changed in response to the implementation of the Project.

To ensure that this important research is undertaken, the Department has included DPI's commitment to shark research in the recommended conditions of approval (requiring an updated Marine Fauna Monitoring Program). The Department considers that this shark monitoring and tracking program would help provide a better understanding of any GWS interactions with the Project and any potential impacts it may have.

5.1.7 Seals

A number of submissions raised concerns about the predation of fur seals by sharks attracted to the sea cage infrastructure. While adult GWS are known to feed on seals, juveniles primarily feed on finfish, rays and other sharks. Marine mammals, including fur seals and sea lions, do not form part of the GWS diet until they reach around 3 metres or more in length.

In his consideration of the Project, Dr McPhee referred to research undertaken by the CSIRO which has demonstrated that the GWS that commonly occur in the Port Stephens region (Bruce and Bradford, 2008) are juvenile (less than 3m), and as such are unlikely to feed on seals. Further, in Australia, research has found that the population and range of fur seals are increasing and which itself is leading to conservation concerns for other species that may be impacted by this change (Shaughnessy et al. 2002; Page et al., 2005).

A number of mitigation measures have been proposed by DPI to deter seals from the sea cages and mooring infrastructure, including raised railings (i.e. 2 m above sea level) with no 'perching' place (in order to prevent seals from jumping into the pens) and the use of large round cages with low stocking densities to reduce accessibility of stock to seals.

As such, the Department is satisfied that DPI has adopted suitable measures to control the occurrence of seals around the Project area which would assist in controlling the predation of any seals around the Project area. However, the recommended conditions which require DPI to prepare and implement a Marine Fauna Monitoring Plan would monitor the occurrence of seals and any predation of seals around the Project area.

5.2 Local Business Impacts

As detailed in the EIS and in Section 1.3 of this report, tourism is one of the main industries in both the Port Stephens and Great Lakes Local Government Areas (LGA's).

The Department received 8 public and special interest group submissions on the potential positive and negative impacts on local businesses as a result of the proposed Project which is discussed below.

5.2.1 Marine Eco Tourism

Dolphin behaviour

The EIS outlined that the Port Stephens area is known to have Australia's largest dolphin watching industry. As such, the DPI believes that the Project would provide an opportunity to enhance Port Stephen's tourism industry by diversifying experiences available to visitors.

Notwithstanding, various concerns were raised in submissions regarding the potential impacts of the Project on the marine ecotourism industry as a result of both direct (entanglement – discussed in Section 5.1.4 above) and indirect impacts.

Dr McPhee outlined that previous research has found that dolphin-based tourism itself can pose considerable environmental risks to dolphins, even when well managed (e.g. Orams, 1997; Scarpaci et al., 2003; Steckeneuter et al. 2012). This includes changes in feeding and socialising activities when dolphin-watching boats were present. Dr McPhee considered that it is important to identify this in the context of the submissions and in order to clarify that Port Stephens dolphins are not currently impacted by human activities.

When considering the issue of behaviour, Dr McPhee also referred to studies of dolphins interacting with operational sea cage farms. Main changes recorded included the periodic hunting of wild fish species attracted to the sea cages (e.g. Díaz López, 2006; López, 2009; 2012). That is, the dolphins use the sea cages as an additional foraging area. While much of this research has occurred overseas (e.g. in the Mediterranean), the Department has considered this information in responding to the concerns raised in public submissions.

DPI and Dr McPhee had detailed discussion around the method and timing of dolphin monitoring and agreed that cost-effective monitoring of the habitat use of dolphins around the sea cage lease area is critical, at least 6 months before the lease infrastructure is installed, and for one year after the deployment of the sea cages. A specific dolphin interaction register would include details such as dolphin numbers, displayed behaviour (i.e. resting, milling, feeding, socialising; travelling), the nature of the activities within the lease and the weather conditions at the time.

Such monitoring is hoped to build significantly on the knowledge of dolphins in the Port Stephens region, and Dr McPhee considers that this monitoring would be sufficient to determine changes in habitat use of the lease area by dolphins, before, during and after operation.

The Department has recommended that DPI update its draft Marine Fauna Monitoring Plan to include this more specific and detailed dolphin interaction register as part of the conditions of approval. This monitoring would also be reported annually as part of an Annual Report which would be submitted to the Department, EPA and the OEH.

Positive tourism impacts

A number of public submissions identified the potential positive benefits of the proposed research lease, such as 'flow on' economic benefits to businesses that could supply services to the proposed Project and also businesses that may supply products.

In terms of tourism, the RtS highlighted that aquaculture has proven to be complementary to other marine based industries, as well as provide additional tourism opportunities to local communities. Further, DPI noted the contribution that aquaculture has made to tourism in Australia generally, including in areas such as Western Australia, which have provided a valuable addition for tourist operators and other businesses in Broome.

Dr McPhee noted that the South Australian Tourism Industry Council's Major Tourism Award winner was Adventure Bay Charters who offer the chance to swim with caged tuna. Similarly, on the east coast of Tasmania the Freycinet Lodge on Freycinet Peninsula incorporates aquaculture farm tours into its tourism experience.

To support local tourism opportunities, the Department has recommended a condition that requires DPI to work with the local community to develop aquaculture tourism in the region. In addition, within two years of the Project approval DPI is to provide a report to the Department that outlines initiatives undertaken, the success or otherwise of these initiatives and what additional activities (if anything) would be undertaken for the duration of the Project.

The Department is satisfied that this condition would ensure DPI works with the local community to further investigate the potential for aquaculture tourism.

5.2.2 Shark Attack

A number of public submissions raised concerns regarding the potential for increased shark attacks as a result of sharks being attracted towards Providence Bay and the proposed sea cage infrastructure (and therefore impacting on marine based tourism businesses such as snorkeling and scuba diving).

Great Lakes Council also outlined in its submission that the community has raised concerns about the risk of increased numbers of sharks impacting on the safety of other waterway users, notably scuba divers, swimmers and research lease staff.

In its RtS, DPI outlined that there are a number of anecdotal sightings of GWS's at recreational dive sites in Providence Bay and that unprovoked shark attacks are known to have occurred in the Port Stephens area. However, the DPI considered that shark sightings in and around the Project site during operation would be hard to interpret and difficult to relate directly to the Project.

Notwithstanding, DPI has proposed to monitor shark behaviour at the Project site and nearby localities using a range of sampling methods such as visual census and acoustic tracking devices.

In 2012, Dr McPhee prepared a report for the Western Australian Government on shark activities and methods to mitigate shark attacks. Dr McPhee considered that the factors that influence the probability of shark attack are complex, but the long term protection that species such as GWS have been afforded would also lead to a population increase (which may also increase the probability of shark attack). Given that some tourism activities such as scuba diving and swimming with dolphins involve being in the marine environment, and regardless of the location in Australia where such activities occur, there is always going to be a small risk of shark attack.

Dr McPhee also noted that whilst GWS's are known to sporadically interact with Southern Bluefin Tuna cages in South Australia, there is no correlation between aquaculture and the risk of shark attack in that region.

Meanwhile, shark attacks are known to have occurred in the Port Stephens area, with the RtS pointing to two recent non-fatal events. In 2007, a GWS attacked a surfer at Yacaaba Headland and in 2011 a GWS attacked a wakeboarder off Jimmys Beach in Port Stephens.

Given that shark attacks have occurred in the Port Stephens area, Dr McPhee noted that the tourism industry has already had to consider management of the issue. Further it is important to note that no shark attacks occurred in the Project area while the Pisces commercial lease was in production. In addition, Dr McPhee also emphasised that the risk of shark attack is significantly less than the risk of drowning, where in beach areas between 2001 and 2005, 129 people drowned whereas during this period 5 fatal shark attacks occurred.

Taking into consideration all of the information provided by DPI in the EIS, RtS and the expert advice from the CSIRO and Dr McPhee, the Department is satisfied that the risk of shark attack in the Port Stephens region is not likely to be altered by the proposed Project. However, the Department is satisfied that the requirements to include detailed shark monitoring as part of the Marine Fauna Monitoring Program would provide a further mechanism to monitor GWS activities in the area and potential influence of the Project on their behaviour.

5.2.2 Public Water Access

The proposed lease will cover a small proportion of Providence Bay (~ 0.3%). A number of submissions identified that the area was utilised by marine tourism operators, however no submissions identified that businesses were dependent on the exact location of the proposed lease for its operation.

The Department notes that Providence Bay is not the only location used by marine tourism operators in the Port Stephens region, with Port Stephens itself being heavily used. Notwithstanding, the Department has recommended that the Proponent work with relevant tourism operators to ensure access to the lease area is available to facilitate current tourism activities and to investigate integrating additional tourism opportunities into the Project. The Department has included these requirements in the recommended conditions of approval.

5.3 Water quality and benthic (sea floor) impacts

The EIS considered the background water quality and the potential impacts of the Project (particularly nutrients) on water quality. As part of this assessment, the EIS considered the Project's site location, the level of environmental energy, its depth and benthic structure, other wastewater discharge locations (eg a deepwater ocean outfall 11km from the Project) and the small scale and short-term nature of the proposal.

The DPI concluded that the combination of the Project with the natural background (nutrient) concentrations would be lower than the trigger values recommended in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)*. It was considered unlikely that the operation of the Project would have a significant cumulative impact on nutrient levels or water quality in Providence Bay or the surrounding region.

In addition, due to the high energy environment of Providence Bay and the distance from the ocean outfall, the DPI considered that the outfall water would not affect the required food safety standards for aquaculture.

A number of submissions (7) including the EPA, raised concerns and questions relating to water quality and benthic impacts, including that effluent from the Project could affect the public and marine life and even local beaches. The EIS stated that one of the most important issues for marine finfish aquaculture world wide to address is the potential impacts on water

quality and sediments from uneaten food, fish faeces and therapeutics. Conversely, the Department notes the EIS also stated that recent environmental monitoring results for marine finfish cage farming in other States of Australia indicates that there is a 'limited' environmental impact on surrounding environments. The following water quality issues are discussed in more detail below:

- potential benthic impact (see section 5.3.1)
- water quality – monitoring of nutrients (see section 5.3.2); and
- chemical use (see section 5.3.3).

5.3.1 Potential Benthic Impact

Dr McPhee noted that the EIS utilised the detailed Before-After-Control-Impact (BACI) study undertaken by the Pisces fish farm operators to determine the likely benthic impacts from the proposed Project. Given the close proximity of that particular study, Dr McPhee agreed to its direct relevance to the proposal.

A range of benthic organisms were identified in the sandy sediments near the proposed research lease and the study found that the Pisces lease had little impact on the patterns or abundance of existing animals. In addition, the study found that there was no evidence that snapper farming (at the Pisces site) caused the local extinction of any type of animal or the appearance of any type of animal that was not already present.

The Department is aware that there are a number of factors that influence the magnitude and importance of changes to benthic habitats and this includes the site itself, the fish stocking density and feeding protocols.

The EIS stated that the amount of nutrients excreted into the environment by fish depends on the species type, the nutrient content of its diet and the availability of nutrients in the food. The potential impacts of finfish nutrient / waste excretions included increased nutrient loads and sedimentation, which in turn can cause eutrophication (ie increased nutrients) and smothering of benthic organisms.

The amount of waste produced by a farmed fish species also depends on the Food Conversion Ratio (FCR) for that species i.e. the efficiency of a species to convert food to body weight. The lower the FCR, the more efficient the species and the less volume of waste is produced. As such, the FCR of a farmed fish species is an important parameter when considering potential environmental impacts on benthic (ocean floor) communities and nutrient levels. Any nutrients that do not end up in fish tissues are ultimately released into the environment. Research has shown varied FCR's for different finfish species, and DPI hopes that research undertaken at the proposed lease will aim to reduce the FCR through advances in feed formulations and feeding practices.

The EIS states that as the proposed research lease is trialling a range of species, feeds and stocking densities over the 5 year trial period, it would be difficult for DPI to provide estimates for the amount of nutrients that will be discharged into the environment.

As such, as a precautionary measure, the Department considers that the Project should be limited to a maximum standing stock of 998 tonnes ('fish in the water'), and a stocking density of no more than 12kg/m³ at any time. This would ensure consistency with the adjacent Pisces fish farm which is approved to farm similar fish species, and ensure that the Project is unlikely to alter the known impacts on the benthic environment beyond that which has been assessed via the BACI study. These limitations on fish standing stock and density have been included in the recommended conditions of approval.

Benthic monitoring has also been proposed by DPI as part of the Draft EMP. The benthic environment beneath and surrounding the sea cages is proposed to be monitored biologically (eg macrofauna abundance and species diversity), chemically (eg the

composition of elements in sediment) and physically (eg the particle size of sediment and video footage/photo comparisons).

Dr McPhee noted that impacts on benthic fauna from sea cage aquaculture have been well studied and that feeding of captive fish with pellets as opposed to fresh fish reduces the benthic impacts as it reduces waste in the form of uneaten food. However, given the nature of the proposed Project (a 5 year research lease), Dr McPhee considered that additional monitoring of benthic impacts should occur. Dr McPhee suggested that the proposed analyses for the benthic macrofauna should be broadened from the proposed univariate measures of abundance and diversity to also include multivariate analyses (where 'the response variable' is influenced by multiple factors, or even a combinations of factors). Dr McPhee indicated that this would provide a better understanding of any changes in the structure of the benthic macrofauna assemblage. DPI has agreed to this additional monitoring and the Department has included a revised Marine Fauna Monitoring Program, in the recommended conditions of approval.

The Department is satisfied that the Project will enable the detailed analysis of any potential benthic fauna impacts.

5.3.2 Water quality

The EIS indicated that the potential nutrient load (primarily nitrogen and phosphorus) into the surrounding water from the Project would be well below the recommended *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC).

The EIS indicated that based on worse-case scenarios, the Project is predicted to generate around 11.87g/L of Total Nitrogen which is well below the ANZECC criteria of around 120g/L and around 8.6g/L of Total Phosphorus which is also well below the ANZECC criteria of 25g/L. The DPI also indicated that as part of the Project, detailed validation of the modelling work would be undertaken, including a detailed water sampling program. The monitoring program would include:

- the collection of water samples from within and outside the proposed research lease and from control sites;
- the investigation of changes to water quality parameters; and
- a comparison of the sample water quality to the ANZECC & ARMCANZ (2000) guidelines.

Dr McPhee agreed that given the high energy nature of the proposed lease site, acute water quality impacts are unlikely. However, Dr McPhee indicated that detailed monitoring would be required and should be included in the conditions of approval.

A number of public and special interest group submissions and the EPA raised concerns about the potential water quality impacts and the proposed sampling regime. Specifically, the EPA recommended that DPI undertake 'quarterly' water quality monitoring, and made a number of recommendations including consideration being given to feeding efficiencies, monitoring of bacterial resistance to chemical treatment, chemical use and reporting requirements.

In its RtS, DPI committed to a number of additional management measures to further reduce and monitor any potential water quality impacts, as a result of the research activities, including:

- collecting water quality data at least annually after the research lease is approved, irrespective of whether the lease is stocked with fish;
- monitoring water quality at critical production levels (e.g. a standing biomass of 25, 50, 75, 100 tonnes etc); and
- using efficient and controlled feeding techniques.

These commitments were included in the recommended conditions of approval which the EPA has agreed to.

The Department is satisfied that given the combination of the low level of nutrients expected to be generated and the high energy environment around the Project area would ensure that any nutrient impacts from the Project would be negligible. Notwithstanding, the Department has recommended that the Proponent implement a detailed water quality monitoring program to ensure the Project's potential impact on the quality of the surrounding waters is adequately managed. This program is also required to be prepared in consultation with the EPA.

5.3.3 Chemical use and disease management

The EIS indicated that chemicals such as antibiotics, parasiticides and anaesthetics may be used as part of the operation of the Project, but chemical use would be minimised through a range of measures including close monitoring of fish stock, prompt treatment of infections, regular cleaning of nets and use of high quality feed.

The EIS indicated that chemicals are generally used throughout the aquaculture industry as part of general health management, transportation and pest control. However, the EIS indicates that the use of chemicals is highly controlled and would only be used in accordance with a veterinary prescription or the Australian Pesticides and Veterinary Medicines Authority (APVMA) guidelines. The APVMA strictly controls the use of therapeutics in the aquaculture industry.

A number of public submissions raised concerns about chemical use on the Project site and the introduction of pathogens to naturally occurring local fish stocks. The EPA also raised concerns about the development of bacterial resistance (in benthic organisms) to control chemicals.

However the EIS indicated that the risk of chemicals used during as part of the Project would be 'low' when considered in the context of the requirements of the APVMA and licensed veterinarians regulating chemical use, the infrequent treatments, the low doses used and the Project's small scale and short-term life.

The NSW Food Authority stated that the main food safety risk would be from the use of therapeutics and food sources, however it concluded that the EIS provided adequate management measures to mitigate such risks. On clarification that chemicals would only be used sparingly, the EPA agreed that that the monitoring of benthic organisms to test for bacterial resistance was not necessary.

In relation to disease, the Department notes that the introduction of diseases into the wild from aquaculture principally occurs if hatchery reared fish are of poor health when introduced to the grow-out facilities. In NSW, fish hatcheries have a detailed accreditation and management program to certify that fish produced are disease free. Dr McPhee noted that this management approach has been effective at preventing disease introductions to the wild, and also notes that fish from the relevant hatcheries are directly stocked into a number of NSW waterways in support of recreational fishing.

The Department has included a condition of approval that stocked juvenile fish are to be sourced only from hatcheries that are accredited under the NSW Hatchery Quality Assurance Scheme, or hatcheries that have similar protocols in place. The Department is satisfied that this will ensure that fish are disease-free prior to stocking.

Additionally, the Department has included the EPA's recommendation that pharmaceutical chemicals should only be used in accordance with APVMA guidelines in the recommended conditions of approval. The Department is satisfied that this would help to ensure that such chemicals would only be used sparingly and when absolutely necessary. This would also

help to prevent the accumulation of antibiotic residues in sediments in and around the Project site.

5.5 Assessment of Other Issues

The Department's assessment of the other issues relating to the Project is presented in Table 5 below.

Table 5: Consideration of other issues

Issue	Consideration	Recommendation
Navigation	- Four navigation buoys with flashing lights would mark the corners of the research lease and all infrastructure would be installed in accordance with the Roads and Maritime Services (RMS) guidelines. - DPI has proposed to regularly inspect navigation markers and the lease infrastructure for faults or damage and any navigation issues would be recorded and managed. - The RMS raised no issues in relation to navigation and was satisfied with the Department's recommended conditions. - As such, the Department is satisfied that any potential navigational issues associated with the Project would be managed.	Conditions are recommended that require the Proponent to: - survey the site to ensure the navigational markers are appropriately positioned; - ensure the RMS is satisfied with the navigational markers and advised of the lease coordinates; and - decommission and remove the lease infrastructure within one year of operations ceasing.
Visual	- The Project would be located approximately 4km offshore from Hawks Nest. - The EIS indicates that due to the low profile of the infrastructure (approximately 1-2 metres above sea level) and use of dark colours, it would only be partially visible on the horizon on calm days. - Great Lakes Council agreed with DPI that Providence Bay is predominately a high energy environment with high wave height, so considers that the Project would be difficult to see. - However, the Department notes that the Project may alter views from passing vessels, and the four navigation buoys (including flashing lights) which are required for safety reasons are likely to be visible from Hawks Nest at night. - Three public submissions raised concerns about potential visual impacts. - The RtS stated that while visual impacts are hard to quantify, measures would be in place to minimise the visual impact of the sea cages e.g. dark coloured materials (black stanchions), minimising and streamlining surface infrastructure, maximising subsurface infrastructure and maintaining a low profile and small scale design. - If necessary, DPI indicated it would investigate modifying the alignment of the lease to minimise any visual impact of the sea cages from Hawks Nest. - The Department is satisfied that the Project is unlikely to result in significant visual impacts and has recommended conditions to ensure any visual impacts are mitigated.	Conditions are recommended that require the Proponent to: - Implement all measures to reduce visual impacts; and - consider the alignment of the Project to minimise any potential visual impacts prior to construction and to the satisfaction of the Director-General.
Genetics	- Concerns were raised about the impacts from fish escaping and then breeding or feeding with wild fish populations. - The EIS stated that fingerlings produced for the Project would be derived from broodstock collected from local stocks or from the same recognised genetic population. - The Department has included this commitment in the recommended conditions of approval. - In its RTS, DPI stated that juvenile fish would also be evaluated for deformities prior to stocking into the sea cages, thereby reducing potential impacts on wild stocks. - The Department is satisfied that while escaping stock would be unlikely, they would be genetically similar as the wild fish populations and are therefore of minimal risk.	Conditions are recommended that require the Proponent to: - only use stock spawned from the endemic population or broodstock originating from the east coast of Australia; and - keep detailed records of all fish stock and related data on their health and life cycle stage.

Issue	Consideration	Recommendation
Cumulative Impacts	- The Project would be located around 500m from the existing Pisces aquaculture lease (which is not currently operational). - The EIS considered potential cumulative impacts from both the existing Pisces lease and proposed Project. - The EIS considered that the 500m separation provided sufficient distance between the facilities to mitigate any potential navigational and environmental issues, such as cumulative water quality and sedimentation associated with either lease. - Notwithstanding, DPI committed to preparing a coordinated health management plan in consultation with the Pisces lease operator if it was to resume production during the five year research period. - The Department is satisfied that the 500m distance between the two lease areas provides a sufficient buffer to manage any potential water quality, disease and impacts on marine fauna. - However to ensure these impacts are suitably managed, the Department has recommended conditions of approval which require DPI to consult with the Pisces lease operator as part of preparing a co-ordinated health plan to manage and monitor potential disease transfer issues and chemical usage across both sites.	Conditions are recommended that require the Proponent to: prepare and implement a co-ordinated health management plan with the Pisces operator, to address potential cumulative impacts, and to prevent the transfer of disease between the developments and minimise the use of chemicals.
Use of Fish meal	- A number of public submissions questioned whether the use of fish 'meal' as a food source was environmentally sustainable. - Fish meal is a globally traded commodity produced from small short lived pelagic species and from fish trimmings and is used by a number of agricultural sectors as well as in aquaculture. - As a significant cost component to the Project, DPI considers that there is a financial incentive to optimise (minimise) the use of fish meal, and to ensure that food conversion ratios of the species farmed are as low as possible. - DPI also state that a key aim of the Project is to focus on fish nutrition and that the Project would provide the opportunity to trial more sustainable fish feeds on a commercial scale. - The Department is satisfied that the use of fish meal is appropriate and that research undertaken as part of the Project would assist in refining its use.	Conditions are recommended that require the Proponent to: - only use pelletised feeds sourced from accredited facilities; and - ensure the feeding regime used is efficient and controlled.
Structural integrity of Project infrastructure	- A number of public submissions raised concerns about the structural integrity of the proposed sea cages, citing the incidents associated with the Pisces site. - In the late 1990's, both navigation markers and sea cages broke away from the Pisces farm and some sea cage components were washed up on Hawks Nest Beach. - DPI stated that sea cage technology has developed greatly since the Pisces farm and that its Project would be engineered to withstand maximum wave height, tidal range, swell and wind speed to mitigate the risk of equipment failure. - RMS and the MPA raised no concerns with the proposed sea cage infrastructure. - The DPI would implement a Structural Integrity and Stability Monitoring Program to ensure that daily inspections and maintenance procedures (including scuba assessments) of the sea cages are undertaken. - The Department has reviewed the Program and considers that it would be adequate for managing the infrastructure to prevent break-aways.	Conditions are recommended that require the Proponent to: - implement a Structural Integrity and Stability Monitoring Program which would incorporate daily inspections, removal of bio-fouling organisms to reduce weight and drag and undertake repairs to maintain the structural integrity; and - decommission and remove all infrastructure within one year of the Project ceasing.
Use of the existing 'Pisces' lease for research	- A number of submissions considered that rather than starting a new sea cage lease, DPI should be utilising the nearby adjacent commercial lease for the proposed Project. - DPI stated that it has previously held discussions with the lessee; however the discussions had not progressed to a sale. - As such, DPI indicate that the Project site would provide the secure tenure it requires to allow for an effective research program to be undertaken.	No specific condition is required.
Noise	Noise from associated with the Project includes noise from vessels, on board equipment and incidental noise from	Conditions are recommended that require the Proponent to:

Issue	Consideration	Recommendation
	- personnel. - Due to the Project's distance from the coast, noise impacts from the Project would be inaudible. - The EPA recommended conditions in relation to noise to ensure that all 'reasonable and feasible measures' are implemented to ensure that noise is kept to a minimum during the construction and operation of the facility. - The Department is satisfied that with these conditions in place noise is unlikely to be an issue for the Project.	- ensure all construction and operational noise is managed to the satisfaction of the EPA and Director-General; and - detail noise management measures for the construction and deployment of the infrastructure.

6. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the Project (see Appendix B). These conditions are required to:

- prevent and minimise adverse environmental impacts such as on water quality and marine fauna;
- set standards and performance measures for acceptable environmental performance;
- require regular water quality and marine fauna monitoring and reporting; and
- provide for the ongoing environmental management of the Project and the engagement of the local community.

DPI has reviewed and accepted these conditions.

7. CONCLUSION

The proposed Project would enable DPI to extend its marine hatchery research at the PSFI with the principal objective of conducting specific research on the sustainable development of sea cage aquaculture in NSW waters.

The Department is satisfied that the proposed site is suitable given it is close to the PSFI and the harbour facilities of Port Stephens. The climatic conditions are also considered to be suitable for finfish aquaculture and the environmental factors (sandy bottom, current, wave climate) are appropriate. The Department is satisfied that DPI has thoroughly considered the threats posed by the Project on the environment including entanglement in sea cage infrastructure, ingestion of marine debris and attraction of predators.

The Department also considers that the results from the proposed monitoring programs and reviews of the effectiveness of the management plans, protocols and other mitigation measures would provide valuable information to strategically plan for future sustainable seafood production in NSW. Similarly, the Department is satisfied that these management measures would ensure that the key potential impacts are adequately mitigated.

Furthermore, the Department also considers that as the Project would be for a specific 5 year period, it would allow for any potential impacts on the marine ecology to be carefully monitored and mitigated. The Project would also provide beneficial opportunities for additional tourism or to be integrated with existing activities.

The Department's independent marine ecology and aquaculture expert, Dr Darryl McPhee, is also satisfied that the potential impacts of the Project would be manageable and that the recommended conditions of approval would provide an appropriate mechanism to monitor any potential impacts of the Project in detail.

The Department has assessed the proposed Project in accordance with the relevant requirements of the EP&A Act, including the objects of the Act and the principles of ecologically sustainable development, and is satisfied that it is in the public interest and should be approved.

8. RECOMMENDATION

It is RECOMMENDED that the Executive Director, Development Assessment Systems and Approvals, as delegate of the Minister:

- **considers** the findings and recommendations of this report;
- **approves** the application, subject to conditions, under section 115ZB of the *Environmental Planning and Assessment Act 1979*; and
- **signs** the attached State Significant Infrastructure approval (**Appendix B**).

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APPENDIX A EIS, SUBMISSIONS AND RTS

See the Department's website at <http://majorProjects.planning.nsw.gov.au> for copies of the:

- Environmental Impact Statement;
- Submissions; and
- DPI's Response to Submissions

These documents can also be viewed on the attached CD's.

APPENDIX B RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX C INDEPENDENT MARINE ECOLOGY REVIEW
