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The proposal

3.1 The Department of Transport and Regional Services (DoTRS) advised in its submission that a Freight Management Study was commissioned in 1996 to evaluate options highlighted in the 1995 report of the Joint Standing Committee on the National Capital and External Territories.[1]

3.2 The identified options included a causeway ring road, two barge system, hover barge, vehicle ferry, overhead travelling crane and a deeper berth for the supply ship. Most of these options were eliminated after initial examination showed shortcomings and inherent weaknesses including unacceptable environmental impacts, excessive capital or operating costs or unproven technologies. Gutheridge Haskins and Davey Pty Ltd (GHD) advised that:

> … Alternative concepts were not considered any further: the causeway ring-road because it had excessive cost and a very high environmental impact; the two-barge system because it did not address passenger transport issues; the hover barge because it was unproven technology in a remote environment and also because there were great problems with the prevailing winds and the intensity on the island; a vehicle ferry again because it did not address passenger transport issues; and a deepwater berth again because the dredging associated with the proposal had a high environmental impact.[2]

3.3 Three concepts were considered for further evaluation. They were the:

- Inland Harbour Basin;

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1 Australia. Parliament. Joint Standing Committee on the National Capital and External Territorie, *Delivering the Goods,* 1995. See Para 2.2.

2 Evidence, p.10.

- Passenger Jetty (without Offshore Island); and
- Offshore Island and Access Bridge.

Inland Harbour Basin

3.4 The Inland Harbour Basin concept (as shown at Map 10) comprised a marine basin 50 metres inland from the shoreline at Rumah Baru, a low level ferry landing, a concrete boat ramp for barge landing and boat launching, a sealed carpark, quarantine inspection and wash down facilities, and a passenger waiting hall and ablution facilities. Ancillary services including power, water and sewerage would be provided.

3.5 The inland basin would be constructed with a steel sheet piled wall to the western face and mass concrete sea walls to the remaining three faces. Two basin entrance groyne structures, each 80 metres in length, would be constructed using concrete filled sandbags. The access road from Rumah Baru to Sydney Highway would be realigned and sealed.

Disadvantages

3.6 DoTRS advised that this concept was originally considered the most appropriate option. Data collected from the temporary groyne monitoring program at Rumah Baru, however, showed that the groynes would have a significant impact on littoral process, in particular, longshore sediment transport.

3.7 In addition, the Harbour Flushing Modelling Study undertaken in 1999 concluded that, although water exchange volumes for the Inland Harbour Basin appeared adequate to maintain water quality, tidal velocities would generally be insufficient to flush out debris deposited in the Inland Harbour Basin.[3]

Passenger Jetty (without Offshore Island)

3.8 DoTRS advised that, under this option, passenger and freight handling facilities would be relocated to a new jetty and barge ramp situated at Rumah Baru (as shown Map 11).

3 Submissions, pp. 7, 9.

3.9 The piled passenger jetty would be constructed in a T-head shape with a low level ferry landing piled at the side of the jetty, allowing passenger access during all weather events.

3.10 Freight handling facilities, however, would be via a concrete barge ramp constructed at the beach with protective groynes, adjacent to the jetty at Rumah Baru. An all tide channel would require dredging into the beach landing area. The *Biar Berjaya* barge would land at the concrete ramp and allow trailers loaded with single containers to roll off. Ancillary services including a sealed carpark, passenger waiting hall, ablution block, quarantine inspection and wash down facilities, access road upgrade, and power, water and sewerage would be provided onshore.

3.11 According to DoTRS, this jetty concept had the advantage of being based on an almost transparent structure that had minimal environmental impact on the lagoon and wave regime, littoral drift, sand accretion and beach erosion. The concrete barge ramp, however, would require the construction of groynes, which would have an adverse impact on littoral processes, in particular, longshore sediment transport.

Disadvantages

3.12 This jetty option generally would meet the operational needs for passenger transport. However, it was considered that the shoreline facilities associated with freight transport would have significant impact on the shoreline processes, particularly the groynes required for the barge ramp.

3.13 In addition, the jetty concept would not provide an all weather anchorage for vessels, with the jetty and associated infrastructure exposed to extreme storms and cyclones.

3.14 DoTRS advised the Committee that these latter factors detracted from the jetty concept providing an optimal solution to the freight management problems at the Cocos (Keeling) Islands.[4]

Offshore Island and Access Bridge

3.15 In its submission DoTRS stated that, under the Offshore Island and Access Bridge option, freight containers would be unloaded from the supply ship onto the *Jasa Cocos* dumb barge and towed directly to the Offshore Island.

4 Submissions, pp. 7-8.

3.16 The proposed Offshore Island would be 55 metres wide and 85 metres long and constructed from dredge spoil material, sheet piling and concrete block armoured revetment walling.

3.17 The Offshore Island would be connected to the land based facilities at Rumah Baru by a six metre wide and 200 metre long steel piled concrete deck access bridge.

3.18 The 50 tonne mobile crane relocated from Home Island would be used to transfer containers from the barge to the hardstand on the Offshore Island, for subsequent transfer by sidelifter to their final destination on West Island. Freight destined for Home Island would be loaded onto the existing container trailers and ferried across the Lagoon on the *Biar Berjaya* barge.

3.19 Provision of services on the Offshore Island would include water, power, lighting, telephone and fuel. Other facilities, including a sealed carpark, passenger waiting hall, ablution block, access road upgrade, power, lighting, water and sewerage services, would be provided onshore.

3.20 According to DoTRS, the Offshore Island would provide excellent shelter during normal conditions and secure conditions during severe storm events. The berthing basin located on the western side of the Offshore Island would offer sheltered protection to vessels in the lee of the island, including the ferries which would berth at the sheet piled face on the western side. This would provide a significant improvement in passenger safety during transfers to and from the ferries.

Advantages

3.21 The Offshore Island and Access Bridge concept provided a number of advantages:

- a reduced length of dredged channel would be required as the Offshore Island would be located 200 metres offshore at Rumah Baru;
- flushing problems associated with a Harbour Basin would be avoided;
- maintenance requirements such as removal of accumulated debris from a Harbour Basin would be reduced;
- potential environmental impacts would be minimised as the piled access bridge is effectively transparent to longshore sediment transport and other coastal processes;
- passenger safety would be significantly improved due to the sheltered conditions offered by the Offshore Island; and

- a suitable distance offshore could be determined for the Offshore Island and an appropriate scale of development defined that would meet operational requirements while at the same time minimising potential conflict between freight and passenger operations.[5]

Conclusion

3.22 DoTRS advised that, following the studies for the first two options, a wave study and a detailed jetty assessment were undertaken. These studies identified the advantages of a transparent structure such as that associated with the jetty option. Also, further work was done on the scale of development required to meet operational requirements for the freight and passenger facilities.

3.23 The conclusion was that the freight and passenger development should consist of an offshore island linked by piled access bridge to the shore at Rumah Baru.[6]

Scope of work

3.24 DoTRS advocates the Offshore Island and Access Bridge as the most cost effective option to address the problems of freight handling and passenger transport at the Cocos (Keeling) Islands.

3.25 The main features of the Offshore Island and Access Bridge are set out below.

Offshore Island

3.26 The plan for the proposed Offshore Island comprises the following features:

- the island is 55 metres wide and 85 metres long and constructed from dredge spoil material, sheet piling and concrete block armouring. It is located approximately 200 metres from the shoreline at Rumah Baru;
- the north-west and north-east sides of the Offshore Island are protected from wave action by concrete block armoured revetment walling. The south and south-west faces are sheet piled and are used predominantly

5 Submissions, p. 10.

6 Submissions, p. 8.

for berthing. The south-east face is a combination of sheet piling and concreted block armoured revetment walling;

- piled jetty for small vessels and transfer of passengers and supplies;
- berthing face for ferry berthing and passenger transfers;
- barge landing ramp and recreation boat launching ramp;
- passenger shelter (ten metres by three metres);
- area for bus transfers and temporary loading area for vehicles towing recreation boats on trailers;
- provision of water service to the Offshore Island. The short term non-potable water needs of the Offshore Island are met by the collection of rainwater by runoff from the passenger shelter roof and supplying various points via a pressure pump system;
- provision of electrical services to the Offshore Island. A high voltage feed from the ring main feeder unit at the Rumah Baru access road serve an electrical sub-station installed on the Offshore Island, Low voltage power is then be reticulated to the Offshore Island and land-based facilities at Rumah Baru. The sub-station and cabling will be sized to cater for the projected loads with adequate capacity for future expansion and will be installed in accordance with the requirements of AS 3000, As 3008 and also Western Power Standards. Lighting levels are in accordance with the requirements of AS 1680;
- provision of telephone cabling to the Offshore Island;
- fuel storage and dispensing facilities for diesel fuel are provided on the Offshore Island to enable the *RJ Hawke*, the *Biar Berjaya*, ferries and other diesel powered craft to be refuelled. It is envisaged that a fuel enclosure consisting of a double containment tank allowing for storage of up to 20,000 litres and a bunded fuel dispenser will be provided. The tank will be filled, by existing road tanker, from the main fuel storage at the north end of West Island. The new diesel fuel facilities will comply with current fuel storage and environmental regulations and will replace the existing non-complying facilities at the West Island jetty. Small craft operating on petrol and two stroke fuel will continue to be refuelled as per current acceptable practices, using portable containers;
- manoeuvring hard stand area for the 50 tonne mobile crane (which will be relocated from Home Island);
- temporary storage area for containers and other cargo to be unloaded from the *Jasa Cocos* dumb barge using the 50 tonne mobile crane;

- turning and manoeuvring area for the container sidelifter and prime mover;
- manoeuvring and berthing swing basin for the ferries and freight handling vessels;
- berthing space for the *Jasa Cocos* dumb barge (or replacement barge), *Biar Berjaya* and two ferries; and
- the Offshore Island is linked by a 50 metre wide, 400 metre long channel dredged to -2.0 metre Chart Datum (CD) to deeper water in the Lagoon.[7]

Access Bridge

3.27 The Access Bridge will consist of a steel piled, precast concrete deck structure approximately six metres wide and 200 metres in length which will connect the Offshore Island to the land based facilities.[8]

Land based facilities

3.28 Land based facilities will consist of:

- a raised sealed access area and carpark, 50 metres by 50 metres, and short term container storage area constructed of fill material including excess dredge spoil;
- a passenger waiting hall and ablution facility (approximately 10 metres by seven metres). The ablution facilities will include a toilet and non-potable water, serviced by an Aerobic Treatment Unit (ATU) located on site;[9] and
- the existing access track between Sydney Highway and Rumah Baru to be upgraded to a wider elevated, nominally realigned and sealed road, approximately six metres wide and 700 metres long.[10]

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7 Submissions, pp. 20-21.

8 Submissions, p. 21.

9 An ATU is a below ground, self contained wastewater treatment facility which can produce effluent treated for bacteria and nutrient removal that satisfies Public Health Standards. Wastewater is collected via the plumbing system and graded to the ATU. The short term non-potable water needs for the ablution facilities would be met by the collection of rainwater by runoff from the passenger shelter roof and supplying various points via a pressure pump system.

10 Submissions, p. 21.

Zonings and approvals

3.29 Under the provision of the Shire of Cocos (Keeling) Islands Town Planning Scheme No.1, the site at Rumah Baru is currently zoned 'rural' for those areas above the high water mark, with the areas below high water mark reserved for 'foreshore protection and nature conservation'.[11]

3.30 In its submission DoTRS stated that within the 'rural' zone, certain discretionary uses may be permitted, including carpark, office and light industrial uses. The objectives established for the area reserved for 'foreshore protection and nature conservation' include protection of remnant vegetation near the foreshore, provision of public access to the foreshore and provision for jetties, loading ramps and boat launching areas.[12]

3.31 DoTRS advised that construction of the freight and passenger facilities may necessitate applications for Council development approvals:

> …Being an Australian external territory administered in part by its own Shire Council and in part by the Department of Transport and Regional Services, both authorities would be involved in the decision-making process.[13]

Land acquisition

3.32 According to DoTRS, the existing area leased by the Commonwealth from the Cocos (Keeling) Islands Shire Council is to be amended to allow for expansion of the lease areas to accommodate the proposed onshore development associated with the proposed freight and passenger facilities. DoTRS advised in its submission that amendment of the lease was in progress.[14]

Codes and Standards

3.33 All structures, services and infrastructure will comply with all relevant town planning, Commonwealth and State building, health and safety

11 Submissions, p. 22.
12 Submissions, p. 23.
13 Submissions, p. 23.
14 Submissions, p. 23.

regulations, the Building Code of Australia and all relevant Australian Standards.

Planning and design concepts

3.34 The proposed design is based on a simple and functional construction concept with minimal maintenance requirements. In its submission DoTRS provided the following details relating to the planning and design concepts to be adopted for this project.[15]

Offshore Island

3.35 The Offshore Island construction comprises steel sheet piling for the berthing faces and Longard tubes for the remaining perimeter faces.[16] The Longard tubes will be protected on the north-west and north-eastern faces by concrete block armouring similar to the design for the West Island sea wall.

3.36 Once the perimeter of the Offshore Island has been formed, the inside of the structure will be filled using dredge spoil material generated from the channel dredging operations. Excess dredge spoil will be placed in shore based stilling basins to be used as fill material in the construction of roads.

3.37 Reinforced concrete crane slab supports comprise slab supported on a base course of cement stabilised over compacted sand. Once the Offshore Island has been formed, the critical areas will be excavated and compacted before the base course is placed. The general use pavement areas are of similar construction except the wearing layer comprises interlocking concrete blocks.

3.38 The piled passenger jetty at the Offshore Island is to be constructed using steel piles of nominal 200mm diameter with the deck constructed using timber decking on steel beams spanning pile bent to pile bent similar to the Direction Island Jetty.

3.39 The barge landing and recreational boat launching ramp are both constructed using a Flexmat working surface contained within steel sheet piling, similar to the new barge landing at the Home Island Wharf.

3.40 The use of cathodic protection for the sheet piles is not recommended. An even distribution of current and hence protection is difficult to achieve

15 Submissions, pp. 23-25.

16 Longard tubes area geotextile tubes which are filled with cement stabilised sand.

with an impressed current system and it is possible that a person could received an electric shock by bridging the anode and cathode. The use of anodes is not considered suitable due to:

- the area protected is not the area where corrosion is most active;
- the high cost of installation; and
- recurring maintenance costs.

3.41 Protection to sheet piling can be provided by paint treatments to provide initial protection and additional thickness of steel, which is sacrificed so that the required thickness of steel remains at the end of the structure's design life. If the design life is to be extended the sheet piling can be clad with concrete.

Access Bridge

3.42 The access bridge will be constructed using 500 dia steel piles at six metre longitudinally and connected transversely by steel crosshead beams to support the deck.

3.43 The deck will be constructed using precast prestressed concrete planks constructed off island.

3.44 The precast concrete deck planks will be treated to repel water to increase durability. The steel components will also be fabricated off island, however, welding will be required on island to provide robust durable connections. High build epoxy paints will be used to protect the steelwork and additional protection will be provided to the steel piles by cladding them with HDPE tubes.

3.45 Cathodic protection of the Access Bridge is not recommended due to the large number of small boats using the area and the increased risk of receiving an electric shock from bridging the anode and cathode.

3.46 The most active corrosion area of piles is the splash zone area from mean sea level to approximately a metre above high water level. Cathodic protection works best from mean sea level down. The Access Bridge piles have limited length between mean seal level and the seabed, where corrosion rates reduce significantly. The most appropriate protection for these piles is wrapping or cladding from headstock down to the seabed level. This method can be a treatment similar to Denso sea shield or a sleeve with grout.

3.47 The design loads to be considered for the Offshore Island and Access Bridge comprise the following:

- crane wheel loads;
- crane pad loads;
- sidelifter pad loads;
- sidelifter wheel loads;
- fork lift wheel loads;
- trailer wheel loads;
- containers;
- wind loads;
- wave loads;
- earthquakes; and
- soil loads for the sheet piling.

3.48 Preliminary design calculations indicate that the maximum vertical design load is likely to be due to the crane wheel loads of 21.1 tonne per axle.

Geotechnical information

3.49 DoTRS advised the Committee that a geotechnical investigation will be conducted prior to detailed design of the Access Bridge to ensure that the piles are sized to suit the local ground conditions and design loads. DoTRS further advised that GHD has been involved in several pile investigations on Cocos (Keeling) Islands in the past and this information has been used for the preliminary design.[17]

Future expansion

3.50 Utilisation rate and possible expansions to the proposed facility in the future will depend to a large extent on the development of tourism on the Cocos (Keeling) Islands and the consequential increase in freight volumes. Future expansion of the facilities is anticipated to be limited, with possible upgrading of the water and sewerage systems to allow for connection to the Island's main water supply and wastewater treatment systems.

17 Submissions, p. 25.

Provision for the disabled

3.51 DoTRS assured the Committee that the proposed freight and passenger facilities will be designed to provide access for disabled people and will meet the requirements of the Building Code of Australia and relevant Australian Standards. This will include:

- passenger jetty access via ramp; and
- access to passenger shelter and ablution facilities.[18]

Fire protection and security

3.52 An Emergency Response Plan is proposed to address all issues relating to safety and evacuation procedures.

Occupational health and safety

3.53 DoTRS advised that the facilities will comply with the requirements of the *Occupational Health and Safety (Commonwealth Employment) Act 1991*.

Employment impact

3.54 DoTRS considers that the project will create both short and long term job opportunities for the local community to help relieve the current unemployment problem and to develop the skills base. During construction, this will be in the form of sub-contract work available from the mainland head contractor. During the operational stage, employment will be generated in the management, operation and maintenance of these facilities.

3.55 It is anticipated that 60 man-years of direct employment will be generated during the construction of this project.

18 Submissions, p. 25.

Project delivery system

3.56 DoTRS' submission states that the following consultants have been appointed for this project:

- Gutteridge Haskins and Davey Pty Ltd - Project Management, Design and Contract Administration Services;
- PPK Environment and Infrastructure - Freight Management Services; and
- Halpern Glick Maunsell - Environmental Services.[19]

3.57 DoTRS advised that the most appropriate form of delivery for this project is considered to be calling of Expression of Interest for Construction Contractors, Shortlisting and then tendering for a Lump Sum Contract.[20]

19 Submissions, p. 26.

20 Submissions, p. 26.