Title of Proposal - Darwin Port Maintenance Dredging, Darwin Harbour

Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

1.1 Project Industry Type

Transport - Water

1.2 Provide a detailed description of the proposed action, including all proposed activities.

This text is taken from the attached supporting information document where additional information relating to the proposed action can be found.

Darwin Port Operations Pty Ltd (Darwin Port) operates port facilities within Darwin Harbour, Northern Territory (NT); these include Fort Hill Wharf, East Arm Wharf and the Marine Supply Base (MSB). A brief introduction to these facilities is presented below.

Fort Hill Wharf
Fort Hill Wharf is Darwin Port's cruise ship and defence vessel facility. The precinct includes a purpose-built cruise ship terminal which is capable of handling complete passenger changeovers for smaller cruise vessels whilst providing a transit lounge for more infrequent larger international cruise ships. Frequent naval ship visits to Darwin are catered for at the wharf, with secure and efficient port facilities and services provided. Berthage for tugs and pilot boats used within Darwin Harbour is also provided.
The wharf was originally constructed in during World War II, though bioerosion by Teredo worms led to the collapse of some two thirds of the structure. It was partially reconstructed with steel pipes and another two wharves (the Navy Boom Wharf and the Navy Repair Wharf) were added in 1941, the latter to facilitate repairs to Navy vessels.
Over the years the land abutting the wharf has been used for pre-export stockpiling of iron ore and zinc concentrate and a Navy refuelling facility has also operated across the wharf. The current Fort Hill Wharf was commissioned in 1981 (Darwin Port Corporation, undated). The old structure was removed, and some of the seabed in the vicinity of the wharf was dredged, as a part of the Darwin City Waterfront Redevelopment in 2006.
Darwin Port records indicate that the Fort Hill Wharf berths were dredged to 12 m below chart datum (CD) in 1992. Maintenance dredging was last undertaken in 2008/09. During this dredging campaign approximately 7,000 m3 of sediments were dredged and the spoils were disposed on the seafloor approximately 300 m from the wharf. The current dredging proposal seeks to excavate sediments to a depth of 10 m below CD.

East Arm Wharf and MSB

East Arm Wharf was opened in 2000 and provides facilities for berthing vessels up to 80,000 tonnes. It comprises a:

• Bulk liquids berth which handles regular imports of fuel and is connected via pipeline to a fuel oil facility and a bio diesel refinery. Chemicals such as acids are also piped to adjoining areas.
• Common user facility which is heavily utilised by offshore oil rig tenders. The number of tenders permanently working out of Darwin is increasing as the offshore industry surrounding Darwin expands.
• Container facility served by mobile harbour cranes. This is also used as a common user berth to discharge or load break bulk cargo. Live cattle exports have increased significantly over the past few years with ongoing demand expected.
• Bulk materials handling facility which can cater for Panamax size vessels and is currently used to export iron ore and manganese.

The East Arm Wharf precinct has been progressively developed since 1994; the most recent expansion being the construction of the MSB in 2012-2013 and the Multi User Barge Ramp Facility in 2015-2016. Spoil from the capital dredging campaigns undertaken to develop East Arm Wharf has been disposed within decant ponds within the Darwin Port lease. The ponds have also received spoil from other developments (e.g. the Darwin City Waterfront Redevelopment) and pond management measures have been developed over the years that have proven to be effective in mitigating impacts upon the environment outside of the pond system.

East Arm Wharf has a design depth of 15 m below CD and maintenance dredging undertaken in 2008/09 removed accumulated sediments (approx. 1,000m3) to a depth of 13 m below CD. Sediments were disposed into Pond F at East Arm Wharf. This pond has now been reclaimed and converted into a hardstand area and refrigerated container terminal.

The MSB channel, turning basin and berths 2 and 3 have design depths of 7.7 m below CD and berth 1 has a design depth of 8.7 m below CD. Since the completion of the capital dredging for construction of the MSB in 2014, there has been an accumulation of sediment along the wharf face which now requires removal in order to provide for continued safe berthing for design vessels.

Maintenance dredging requirements

Darwin Port has a need to periodically undertake maintenance dredging to remove unconsolidated sediment (e.g. clay, silt, sand) that is naturally transported and deposited into existing berth pockets at East Arm Wharf and Fort Hill Wharf, and into the berth pockets, turning basin and channel of the MSB. This dredging is required to maintain the required depths to provide safe access at all tides for vessels using port facilities and maintain effective operational parameters at the facilities.

The frequency of maintenance dredging will be dependent upon the rates of sediment accumulation at the three locations. In turn, this will be dependent upon factors such as the nature of the seafloor materials adjacent to the port facilities and the degree of their disturbance (e.g. by tidal currents and meteorological events) following the previous dredging campaigns. It is estimated that the berth pockets at East Arm Wharf and Fort Hill Wharf will require maintenance dredging at intervals of no less than six years, and that maintenance dredging at the MSB will be required no more frequently than every three years (Streten, Tsang & Harries 2017).

The current (December 2017) estimated total volume of material requiring removal by maintenance dredging is approximately 8,000 m³ (based on hydrographic surveys undertaken

by Darwin Port in December 2016). Estimated volumes for each site are presented in Table 1 of the attached supporting document.

Dredging will be completed using a cutter suction dredge (CSD). The CSD would dredge sediment from the seabed, pumping it to the disposal areas (onshore dredge spoil decant ponds or designated disposal sites within the harbour). To achieve the required pumping distances from the dredge footprint to the disposal sites, a booster pump may be required to supplement the pumping capacity of the CSD.

Where possible, dredging will be undertaken during the Wet Season; however, should the need arise, dredging during the Dry Season will also need to be permitted.
It is expected that dredging would be undertaken up to 20 hours per day (24-hour operations with four hours down time per day) and, where dredging of all locations is required, would occur over of a period of approximately two to three weeks. Stoppages in dredging may occur for dredge maintenance or to assist in the control of the quality of the water at the designated disposal sites within the harbour.
It is expected that dredge rates will not exceed approximately 1,400 m3 per hour at a water to sediment ratio of 19:1 (Streten, Tsang & Harries 2017). A sediment loss rate of 1% at the CSD cutter head can be expected (Williams 2017). However, the cutter will only be engaged for limited time periods as the majority of dredging will be undertaken in close proximity to wharf infrastructure and the loss rate will therefore be substantially less than this estimate. To mitigate the risk of impact to the cutter head and the infrastructure, the dredge will operate in suction-only mode during these times.

1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.

Area	Point	Latitude	Longitude
Fort Hill Wharf dredging and spoil disposal	1	-12.473930272507	130.84307555092
Fort Hill Wharf dredging and spoil disposal	2	-12.471322250329	130.85013254761
Fort Hill Wharf dredging and spoil disposal	3	-12.475234273749	130.8526130566
Fort Hill Wharf dredging and spoil disposal	4	-12.476910351934	130.8449827063
Fort Hill Wharf dredging and spoil	5	-12.473930272507	130.84307555092

Area	Point	Latitude	Longitude
disposal			
East Arm Wharf dredging and spoil disposal areas	1	-12.487152627497	130.87626283738
East Arm Wharf dredging and spoil disposal areas	2	-12.492552658964	130.88331983407
East Arm Wharf dredging and spoil disposal areas	3	-12.493670536869	130.88866193529
East Arm Wharf dredging and spoil disposal areas	4	-12.49553252394	130.88808859216
East Arm Wharf dredging and spoil disposal areas	5	-12.494972761049	130.87931498169
East Arm Wharf dredging and spoil disposal areas	6	-12.491248744981	130.87378405716
East Arm Wharf dredging and spoil disposal areas	7	-12.487152627497	130.87626283738
MSB dredging and spoil disposal areas	1	-12.490504618655	130.89037854906
MSB dredging and spoil disposal areas	2	-12.490876682086	130.8938117766
MSB dredging and spoil disposal areas	3	-12.491248744981	130.89705274423
MSB dredging and spoil disposal areas	4	-12.496276635796	130.89571893198
MSB dredging and spoil disposal areas	5	-12.493110749489	130.8894241227
MSB dredging and spoil disposal areas	6	-12.490504618655	130.89037854906
Existing East Arm Wharf onshore dredge spoil disposal ponds	1	-12.485102866778	130.89152181969
Existing East Arm Wharf onshore dredge spoil disposal ponds	2	-12.485848686292	130.89209516283
Existing East Arm Wharf onshore dredge spoil disposal ponds	3	-12.487152627497	130.89400231821

Area	Point	Latitude	Longitude
Existing East Arm Wharf onshore dredge spoil disposal ponds	4	-12.48659284647	130.89514558885
Existing East Arm Wharf onshore dredge spoil disposal ponds	5	-12.488828628505	130.89648111939
Existing East Arm Wharf onshore dredge spoil disposal ponds	6	-12.489572759652	130.89419288078
Existing East Arm Wharf onshore dredge spoil disposal ponds	7	-12.488642595384	130.88923358108
Existing East Arm Wharf onshore dredge spoil disposal ponds	8	-12.485102866778	130.89152181969

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).

Maintenance dredging will take place at adjacent to, and to a distance of approximately 50 m from, the wharf face at East Arm Wharf and Marine Supply Base (located at East Arm Wharf, approximately 3.5 km south east of Darwin city) and along the face of Fort Hill Wharf (approximately 1 km south east of Darwin city) to a distance approximately 50 m from the wharf face.

Dredge spoil disposal will occur into the existing spoil disposal ponds at East Arm Wharf, or at locations within Darwin Harbour, approximately 400 m offshore from the dredging locations.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

12.5 ha dredging area, 7.2 ha spoil disposal areas

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title.N/A - Project activities are entirely within Darwin Harbour.

1.8 Primary Jurisdiction.

Northern Territory

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

No

1.10 Is the proposed action subject to local government planning approval?

No

1.11 Provide an estimated start and estimated end date for the proposed action.

Start date 02/2018

End date 12/2024

1.12 Provide details of the context, planning framework and State and/or Local government requirements.

Darwin Port operates under the *Ports Management Act*, which was established to provide for the control, management and operation of ports, and for related purposes.

A Long Term Dredging Management Plan (LTDMP) has been prepared to support Darwin Ports' planning applications to vary the development permits attendant to Fort Hill Wharf, East Arm Wharf and the MSB. In reviewing the applications, the Department of Environment and Natural Resources (DENR) identified the need for referral under the NT *Environmental Assessment Act.* To enable the NT Environment Protection Authority (NT EPA) to decide whether potential environmental impacts arising from the maintenance dredging works have the potential to have a significant effect on the environment, NT EPA requested that Darwin Port prepare a management plan for the dredging projects.

The LTDMP will also support Darwin Port's applications for Waste Discharge Licences pursuant to Section 74 the *Water Act.*

The LTDMP has been prepared with reference to:

-Guidelines for the Environmental Assessment of Marine Dredging in the Northern Territory (NT EPA 2013).-Guideline for the Preparation of a Notice of Intent (NT EPA 2015a).

-Guideline for the Preparation of an Environmental Management Plan (NT EPA 2015b).

-National Assessment Guidelines for Dredging (Commonwealth of Australia 2009)

-Technical Guidance: Environmental Impact Assessment of Marine Dredging Proposals

(Western Australian Environmental Protection Authority [WA EPA] 2016).

-International best practice (e.g. PIANC 2006, 2008; CEDA 2011, 2015).

-Current recommendations for monitoring and impact assessments promulgated by the Dredging Node of the WA Marine Science Institute.

The NTG developed the Darwin Harbour Water Quality Protection Plan (WQPP) (DLRM 2014) under the National Water Quality Management Strategy.

Phase 1 of the development of the WQPP was completed in 2009. The overall aim of the WQPP was to ensure that water quality objectives (WQOs) are maintained and that the community's values for waterways are protected. This included identifying key risks to water quality, development of interim WQOs (based on beneficial use declarations under the Water Act), improvements to monitoring activities and evaluation of pollutant loads (NRETAS 2010).

Phase 2 of the WQPP was released in February 2014 and aims to support good management and sustainable development by focusing on a range of management actions including monitoring, assessing and managing the impacts of sediment and nutrient (nitrogen, phosphorus) inputs to Darwin Harbour. It also highlights key considerations for future water quality protection (DLRM 2014).

The proposed maintenance dredging activities fall within the Darwin Harbour Declaration of Beneficial Uses and Objectives of Surface Water. The declared beneficial uses are environment, cultural (aesthetic, recreational and cultural) and aquaculture (NRETAS 2010).

Performance against the Darwin Harbour Region WQOs (Fortune 2016) is assessed on the basis of the annual mean value of the measured parameter. It is noted that the guidelines do not apply during high flow events associated with Wet Season conditions and that the water quality objectives are intended for use in "catchment management and land use planning activities". Hence the objectives could be considered as representing targets for long-term water quality rather than as limits to be adhered to during dredging operations. However, they have been taken into account during the development of the environmental management frameworks in the LTDMP. The environmental management frameworks have been developed in a manner that is consistent with the risk-based decision framework discussed above.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.

The public consultation process applied for this project is through the Development Consent process under the NT Planning Act. Darwin Port has applied for development approvals for dredging and this has involved the notification steps adopted by the NTG for the public and stakeholders. Darwin Port are also applying for relevant licences from the NTEPA and this process requires the consideration of public (including indigenous stakeholder) interests.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.

A Long Term Dredging Management Plan (LTDMP) has been developed for themaintenance dredging activities to be carried out. This plan includes an environmental risk assessment in accordance with the NT dredging guidelines. The Risak assessment, environmental managemetn frameworks and monitoring proposed is summarised in the attached supporting information document.

1.15 Is this action part of a staged development (or a component of a larger project)?

No

1.16 Is the proposed action related to other actions or proposals in the region?

No

Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?

No

2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
Six species of marine turtles are known to occur	Potential temporary impacts due to increased

Species	Impact
in NT waters. Of these, four are considered to occur in the Darwin region – Green Turtle (Chelonia mydas) Hawksbill Turtle (Eretmochelys imbricate) Flatback Turtle (Natator depressus) Olive Ridley Turtle (Lepidochelys olivacea) - thought to occur only occasionally within the harbour (Cardno 2014). For the other two species, both listed as endangered, the EPBC protected matters database indicates that: Loggerhead turtle (Caretta caretta) “foraging, feeding or related behaviour [is] known to occur within area”; however, the species is considered by Whiting (2003) as unlikely to occur in Darwin Harbour. Leatherback turtle (Dermochelys coriacea) “breeding [is] likely to occur within area”. However, DoEE (2017) indicates that, within the NT, “scattered nesting” has only been reported “along the coast of Arnhem Land from Coburg Peninsula to Maningrida”; i.e. some 200 km to 350 km from Darwin Harbour.	underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations. The impacts are likely to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical impact.
Three species of coastal dolphin inhabit the Darwin Harbour region: Australian humpback (Sousa sahulensis; formerly known as the Indo-Pacific humpback) Indo-Pacific bottlenose (Tursiops aduncus) Australian snubfin (Orcaella heinsohni) dolphins.	Potential temporary impacts due to increased underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations. The impacts are likely to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical impact.
Dugong (Dugong dugon)	Potential temporary impacts due to increased underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations. The impacts are likely

Species	Impact
	to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical impact.
Other marine species he EPBC protected matters database indicates that the following threatened “species or species habitat may occur within [the] area”, though there are no records (in the Atlas of Living Australia) of these species occurring within Darwin Harbour: • Great White Shark (Carcharodon carcharias) • Northern River Shark (Glyphis garricki) • Whale Shark (Rhincodon typus).	no impact expected
Three species of coastal dolphin inhabit the Darwin Harbour region: the Australian humpback (Sousa sahulensis; formerly known as the Indo-Pacific humpback), Indo-Pacific bottlenose (Tursiops aduncus) and Australian snubfin (Orcaella heinsohni) dolphins. All three species are listed under the EPBC Act as migratory marine species and are therefore matters of NES. Brooks and Pollock (2014) undertook the most extensive and recent study of the abundance, movements and habitat use of coastal dolphins in the Darwin region (Darwin Harbour, Bynoe Harbour and Shoal Bay) between 2011 and 2014, a program initiated as part of the environmental approvals for the Ichthys LNG project. Their study revealed that together, these three species are more commonly observed in Shoal Bay, while in Darwin Harbour, dolphins are more commonly seen in East Arm and West Arm than other parts of Darwin Harbour. The search of the EPBC protected matters database also indicated that the following “species or species habitat may occur within area”, though the species are not known to occur within Darwin Harbour: • Blue whale (Balaenoptera musculus). • Bryde's Whale (Balaenoptera edeni). • Humpback Whale (Megaptera novaeangliae). • Killer Whale (Orcinus orca).	Potential temporary impacts due to increased turbidity in the waters surrounding the activity and underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations.
Dugongs are known to occur in Darwin Harbour waters, although in relatively low numbers. Dugongs have been recorded in higher densities at Gunn Point and the Vernon Islands, some 30–50 km to the north-east of the mouth	Potential temporary impacts due to increased turbidity in the waters surrounding the activity and underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is

Species	Impact
of the harbour. Dugongs have also been observed in relatively high numbers at Bare Sand Island and Dundee Beach in Fog Bay, 60 km south-west of Darwin Harbour, and are known to travel long distances (Whiting 2008).	being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations.

2.4.2 Do you consider this impact to be significant?

No

2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?

Yes

2.5.1 Impact table

Species	Impact
Dugong (Dugong dugon)	It is possible the dugongs could occur within the project area of impact, likely to be transiting between foraging areas. Potential temporary impacts due to increased turbidity in the waters surrounding the activity and underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations. The impacts are likely to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical impact.
Narrow sawfish (Anoxypristis cuspidata).	Potential temporary impacts due to underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The impacts are likely to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical

Species	Impact
	impact.
Estuarine Crocodile (Crocodylus porosus)	This species is known to occur within Darwin Harbour but is likely to typically avoid areas of high vessel activity, such as the dredging and spoil disposal locations. Potential temporary impacts due to increased turbidity underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations. The impacts are likely to cause temporary behavioural adaptation such as avoidance of the area, rather than any physical impact.
narrow sawfish (Anoxypristis cuspidata).	Potential temporary impacts due to increased turbidity in the waters surrounding the activity and underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations.
Estuarine Crocodile (Crocodylus porosus) – this is known to occur within Darwin Harbour but is likely to typically avoid areas of high vessel activity, such as the dredging and spoil disposal locations.	Potential temporary impacts due to increased turbidity in the waters surrounding the activity and underwater noise during dredging operations. These impacts are expected to be minor and of a short term nature. The activity is being undertaken within existing operational port areas where there is existing vessel activity and ambient underwater noise levels. Operations associated with this project are not expected to increase the impact to these species significantly above what already exists from routine port operations.

2.5.2 Do you consider this impact to be significant?

No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

Yes

2.6.1 Is the proposed action likely to have ANY direct or indirect impact on the Commonwealth marine environment?

No

2.6.2 Describe the nature and extent of the likely impact on the whole of the environment.

Please refer to section 4.0 and 5.0 for a description of the likely impact on the whole of the environment.

Figure numbers referenced below relate to figures contained in teh attached supporting document.

Suspended Sediment and Sedimentation

From Figure 12 it is evident that the hard coral and filter-feeder communities around South Shell Island are predicted to lie within the Zone of Moderate Impact during dredging operations in either the Dry Season or the Wet Season. Following the definition within WA EPA (2016), this would indicate that mortality of benthic biota could occur, but that the disturbed areas may recover and there would be no long-term modification of the benthic habitats. However, in considering the SSC time series at South Shell Island presented in Figure 10 and Figure 11 it is evident that:

During the Dry Season, the 10 mg/L SSC tolerance limit for benthic communities is predicted to be exceeded on eight days during dredging and two days following dredging (the latter due to continued resuspension and dispersion of sediments deposited during the dredging campaign). It is emphasised that the 10 mg/L tolerance limit is for dredging-related SSC, whereas Figure 10 and Figure 11 show total SSC (background of 5 mg/L plus dredging-related SSC).

During the Wet Season, the 25 mg/L SSC tolerance limit for benthic communities is predicted to only be exceeded on three days during dredging.

This indicates that, provided the SSCs generated during dredging and spoil disposal are not significantly greater than those upon which the modelling of Williams (2017) was based, then:

In the Dry Season, it is considered highly unlikely that such short-term elevations in SSC would result in mortality within the hard coral and filter-feeder communities of South Shell Island. It is reasonable to conclude that elevations of SSCs over longer time periods would be necessary for detectable impacts to occur.

The risk of turbidity impacts during the Wet Season can be considered negligible. It could be expected that similar SSCs would regularly occur in the waters around South Shell Island on each spring tide cycle during the Wet Season.

Hence, it can be concluded that the implementation of robust monitoring of SSCs around the dredging and spoil disposal locations (as presented in Section 6.4.3) will be key to the protection of the benthic communities around South Shell Island.

Sedimentation

The sediment dispersion modelling predicts that the accumulation of dredging-derived sediment is not predicted to approach the 50 mm tolerance limit in any of the mangrove communities that are potentially reached by the turbid plumes generated by the dredging and spoil disposal. Hence sediment accumulation is not expected to impact on mangrove communities in areas such as Bleesers Creek and Charles Darwin National Park. It would be reasonably expected that Wet Season wave activity under normal conditions would have a greater impact in these areas than sedimentation associated with the dredging and spoil disposal.

The sediment dispersion modelling also predicts that there will be no net sedimentation of >2.5 mm within the hard coral and filter-feeder communities in East Arm. Hence it is concluded that the dredging and spoil disposal activities will pose a negligible risk of significant sedimentation impacts upon these communities.

It is concluded that potential sedimentation effects need not be given further detailed consideration in this document and that monitoring and management of suspended sediment levels within the pond system, and around the spoil disposal locations, will provide an appropriate level of mitigation against the risk of sedimentation impacts upon the receiving environment.

Environmental Risk Assessment

A systematic environmental risk assessment process has been applied to address the potential

risks to matters of NES associated with maintenance dredging by Darwin Port. It takes into account guidance within the draft Guideline for the Preparation of an Environmental Management Plan (NT EPA 2015) and is aligned with the standard AS/NZS ISO 31000: 2009 Risk Management and with Environment Institute of Australia and New Zealand guidelines (EIANZ 2015).

The purpose of the risk assessment process was to identify the activities, and the environmental aspects associated with those activities, that have the potential to result in impacts to matters of NES; and to guide the development of management measures and controls to avoid or reduce those potential impacts. The assessment of environmental risk is an essential component of Darwin Port's approach to the environmental impact assessment process. It forms that basis for ongoing management and review of significant environmental risks that may arise over the course of maintenance dredging activities. Management controls identified through the risk assessment process are included in the Environmental Management Frameworks (EMFs) presented in Section 6.0 of the attached supporting document.

Table 7 in the attached supporting document identified the potential environmental impacts assocaited with the project.

In general, the impacts to the whole of the environment (outside of the direct dredging footprint) is expected to be of a minor and short term nature, particularly given the small dredging volumes, management measures proposed and existing turbid environment in which the project activities will be taking place.

2.6.3 Do you consider this impact to be significant?

No

2.7 Is the proposed action to be taken on or near Commonwealth land?

No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

No

2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

2.10 Is the proposed action a nuclear action?

No

2.11 Is the proposed action to be taken by the Commonwealth agency?

No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?

No

2.13 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

3.1 Describe the flora and fauna relevant to the project area.

Refer to section 3.2 and 3.3 for a description of the flora and fauna relevant to the project area.

Matters of NES

The following matters of NES are pertinent for consideration in relation to the proposed action:

- Listed threatened species.

- Migratory species protected under international agreements.

Those species listed in a search of the EPBC protected matters database are discussed in this section. Other biological communities and aspects of the physical environment that may indirectly influence these species are discussed in subsequent sections.

Birds

The EPBC protected matters database search returned 19 threatened or migratory bird species:

Four critically endangered species (curlew sandpiper [Calidris ferruginea], great knot [Calidris tenuirostris], northern Siberian bar-tailed godwit [Limosa lapponica menzbieri] and eastern curlew [Numenius madagascariensis]).

Four endangered species (red knot [Calidris canutus], lesser sand plover [Charadrius mongolus], Gouldian finch [Erythrura gouldiae] and Australian painted snipe [Rostratula australis]).

Five vulnerable species (greater sand plover [Charadrius leschenaultii], red goshawk [Erythrotriorchis radiatus], partridge pigeon (eastern) [Geophaps smithii smithii], western

Alaskan bar-tailed godwit [Limosa lapponica baueri] and masked owl [northern] [Tyto novaehollandiae kimberli]).

Six migratory species (common noddy [Anous stolidus], fork-tailed swift [Apus pacificus], streaked shearwater [Calonectris leucomelas], lesser frigatebird [Fregata ariel], greater frigatebird [Fregata minor] and little tern [Sternula albifrons]).

The only species that would be at risk of impact from the maintenance dredging campaigns are those that utilise Pond D as a foraging and roosting site. Surveys conducted between 2010 and 2015 by Lilleyman, Lawes and Garnett (2015) indicated that these included all four of the critically endangered species, two of the endangered species (red knot and lesser sand plover) and one of the vulnerable species (greater sand plover). However, as evident from the information in Section 2.6.2.2, Pond D does not form part of the spoil disposal or tailwater management system for the maintenance dredging works and the bird species are therefore not at risk of impact.

Cetaceans

Three species of coastal dolphin inhabit the Darwin Harbour region: the Australian humpback (Sousa sahulensis; formerly known as the Indo-Pacific humpback), Indo-Pacific bottlenose (Tursiops aduncus) and Australian snubfin (Orcaella heinsohni) dolphins. All three species are listed under the EPBC Act as migratory marine species and are therefore matters of NES.

Brooks and Pollock (2014) undertook the most extensive and recent study of the abundance, movements and habitat use of coastal dolphins in the Darwin region (Darwin Harbour, Bynoe Harbour and Shoal Bay) between 2011 and 2014, a program initiated as part of the environmental approvals for the Ichthys LNG project. Their study revealed that together, these three species are more commonly observed in Shoal Bay, while in Darwin Harbour, dolphins are more commonly seen in East Arm and West Arm than other parts of Darwin Harbour.

Brooks and Pollock (2014) analysed the results of the first six primary samples from dolphin surveys undertaken between October 2011 and March 2014, concluding:

Australian humpback dolphins were the most abundant at all three sites monitored with the number estimated across the six surveys in Darwin Harbour remaining relatively consistent at between 37 and 49 individuals.

Bottlenose dolphin numbers in Darwin Harbour were more abundant than at Bynoe Harbour and Shoal Bay with numbers varying between 13 and 30 across the surveys. Temporary emigration between sites is thought to account for higher variation in numbers of bottlenose dolphins.

Snubfin dolphins were the least observed species in the Darwin Harbour region with highly irregular numbers observed between surveys. Only one snubfin dolphin was detected in the vicinity of Darwin Harbour East Arm during the surveys.

While significant changes in detection rates in East Arm were evident through this study, these differences occurred prior to any construction activity associated with the Ichthys project. Significant changes were also observed at Bynoe Harbour, a site distant from any potential construction impact.

The search of the EPBC protected matters database also indicated that the following “species or species habitat may occur within area”, though the species are not known to occur within Darwin Harbour:

Blue whale (Balaenoptera musculus).

Bryde's Whale (Balaenoptera edeni).

Humpback Whale (Megaptera novaeangliae).

Killer Whale (Orcinus orca).

Dugongs

Dugongs are known to occur in Darwin Harbour waters, although in relatively low numbers. Dugongs have been recorded in higher densities at Gunn Point and the Vernon Islands, some 30–50 km to the north-east of the mouth of the harbour. Dugongs have also been observed in relatively high numbers at Bare Sand Island and Dundee Beach in Fog Bay, 60 km south-west of Darwin Harbour, and are known to travel long distances (Whiting 2008).

Cardno (2014) compared the results of baseline surveys with four surveys undertaken throughout the dredging phases of the Turtle and Dugong Monitoring Program associated with the INPEX Ichthys project. This study revealed that dugongs were observed in varying numbers between surveys however no trends (including seasonal trends) were evident. There was a higher number of dugong observed in shallower waters (6 – 10 m), generally in foraging areas where seagrass was present. It was concluded that variation in dugong numbers observed at each site between surveys was most likely to be a result of short term movement to visit optimum foraging areas of seagrass.

During baseline surveys (June to October 2012) most sightings in Darwin Harbour were around Weed Reef, West Arm and near Bladin Point, as well as in the shallow regions of Shoal Bay. During later baseline surveys, most dugong sightings were around outer Darwin Harbour, with aggregations around mapped seagrass near Casuarina Beach.

During the first of the Dredging Phase surveys (May 2013), dugongs were predominantly sighted in outer Darwin Harbour, with only one dugong sighted near Weed Reef and another in the shallow areas in West Arm. During the Dredging Phase surveys in July/August and October 2013, no dugongs were sighted in the inner Darwin Harbour, while during the end of dredging survey (May 2014) three dugongs were sighted near Weed Reef.

During the two surveys undertaken in October 2013, sightings were concentrated around Casuarina Beach and were associated with areas of seagrass (Halodule sp.). Lower numbers were observed in this area in Wet Season surveys and it was considered that the reduced seagrass coverage in this season was likely to have been a contributing factor (Cardno 2014).

In general, it is considered that dugongs could occur anywhere in the harbour that could support seagrasses or algae. The closest benthic community to East Arm Wharf and the MSB that has been found to support a notable amount of macroalgae is the mixed sand and rocky reef habitat around Old Man Rock (Geo Oceans 2012a,b), some 2 km to the east of the dredging and spoil disposal locations. The nearest known area of substantial macroalgal communities to Fort Hill Wharf are those on the intertidal platform extending to the north-west from Wickham Point (Geo Oceans 2012a); these are some 2 km from the dredging and spoil disposal locations. Substantially greater areas of potential foraging habitat for dugong exist elsewhere in the harbour (INPEX 2011).

Turtles

Six species of marine turtles are known to occur in NT waters. Of these, four are considered to occur in the Darwin region – three are listed as vulnerable (green [Chelonia mydas], hawksbill [Eretmochelys imbricata] and flatback [Natator depressus]); the fourth, olive Ridley (Lepidochelys olivacea), is listed as endangered but is thought to occur only occasionally within the harbour (Cardno 2014).

For the other two species, both listed as endangered, the EPBC protected matters database indicates that:

Loggerhead turtle (Caretta caretta) “foraging, feeding or related behaviour [is] known to occur within area”; however, the species is considered by Whiting (2003) as unlikely to occur in Darwin Harbour.

Leatherback turtle (Dermochelys coriacea) “breeding [is] likely to occur within area”. However, DoEE (2017) indicates that, within the NT, “scattered nesting” has only been reported “along the coast of Arnhem Land from Coburg Peninsula to Maningrida”; i.e. some 200 km to 350 km from Darwin Harbour.

Turtles recorded during surveys associated with the Ichthys Turtle and Dugong Monitoring Program (Cardno 2014) showed a general trend of decreasing numbers with depth (62% observed in water 0–5 m deep) with the majority of turtles observed in the Darwin Harbour region over sand, gravel or reef habitats. There were only a few turtles sighted in association with mangroves and mud habitats (0.5% and 3%, respectively).

The shoreline throughout Darwin Harbour, and particularly in East Arm, consists largely of mangrove forests and mudflats and does not provide suitable nesting habitat for any species of turtle. The nearest nesting beach (used by the flatback turtle) is located in the Casuarina Coastal Reserve near Lee Point on the north-eastern shore of the harbour. Turtles visiting the

harbour are more likely to be foraging for food. Flatback and hawksbill turtles forage on the filter-feeder communities which are extensive in the harbour. The hawksbill turtle also forages on seagrass and macroalgal communities in addition to filter-feeders. Green turtles forage amongst seagrass and macroalgal communities (INPEX 2011).

Sawfish

The EPBC protected matters database indicates that four species of sawfish may potentially occur within the search area:

Three threatened species, all designated as vulnerable - dwarf sawfish (Pristis clavata), green sawfish (Pristis zijsron) and largetooth sawfish (Pristis pristis).

One migratory species - narrow sawfish (Anoxypristis cuspidata).

Although the database indicates that the “species or species habitat [is] known occur within [the] area”, the Atlas of Living Australia (biocache.ala.org.au) indicates that:

The only two records of dwarf sawfish in the Darwin Harbour region are:

Buffalo Creek, which discharges into Shoal Bay, outside of the main harbour (Museums and Art Galleries of the Northern Territory record).

An Australian Museum record with an imprecise location, possibly from Rapid Creek which is more than 10 km from the dredging and spoil disposal locations.

Two green sawfish have been recorded from Buffalo Creek.

There are no records of largetooth sawfish within the harbour.

The only record of narrow sawfish in the Darwin region is also from Buffalo Creek.

Buffalo and Rapid creeks are tidal creeks; quite a different environmental setting from the dredging and spoil disposal locations.

Other marine species

The EPBC protected matters database indicates that the following threatened “species or species habitat may occur within [the] area”, though there are no records (in the Atlas of Living Australia) of these species occurring within Darwin Harbour:

Great White Shark (Carcharodon carcharias)

Northern River Shark (Glyphis garricki)

Whale Shark (Rhincodon typus).

The database also indicates that the following migratory marine “species or species habitat may occur within [the] area”:

Estuarine Crocodile (Crocodylus porosus) – this is known to occur within Darwin Harbour but is likely to typically avoid areas of high vessel activity, such as the dredging and spoil disposal locations.

Coastal Manta Ray (Manta alfredi) and Oceanic Manta Ray (Manta birostris) – manta rays are known (from anecdotal accounts) to occur in the harbour, though there are no records (in the Atlas of Living Australia) from which to determine the particular species.

Non-NES biological communities

Darwin Harbour has a complex assemblage of marine ecological communities, including rocky shore biota, hard corals, filter feeders (primarily soft corals and sponges), macroalgae, seagrasses, soft sediment biota, mangroves and fish communities. Smit, Penny and Griffiths (2012), in their summary of previous benthic habitat mapping of Darwin Harbour, suggest that the benthic habitats present in the inner and outer harbour differ significantly and are typically characterised as follows:

Outer harbour:

extensive seagrass communities occur in shallow waters

corals and algae dominate on hard substrates in shallow waters.

deeper waters are characterised by filter-feeder communities (e.g. sponges, soft corals).

Inner harbour:

hard substrates in shallow and deeper waters consist of mixed communities or are dominated by sponge communities

no seagrass communities are present.

The environmental receptors that will be exposed to potential impacts from the maintenance dredging works are those within the inner harbour, hence seagrass communities are not considered within this document.

The NT Department of Environment and Natural Resources (DENR) is the custodian for comprehensive habitat mapping datasets accrued over surveys for many projects within Darwin

Harbour (e.g. Geo Oceans 2011, 2012a,b; Siwabessy et al 2015). Habitats that are relevant to this document (i.e. those that could potentially be impacted by maintenance dredging) are shown in Figure 11.

Hard coral communities

Hard coral communities occur in Darwin Harbour where the substrate is rocky in the lower intertidal and shallow subtidal zones and where hydrodynamic conditions permit. A total of 123 species of corals have been recorded in Darwin Harbour (Wolstenholme, Dinesen & Alderslade 1997). Hard coral communities are typically dominated by colonies with massive (e.g. Faviidae, Porites spp.), foliose (e.g. Turbinaria spp.) or encrusting (e.g. Faviidae) growth forms (INPEX 2010).

Hard corals are dominant within some of the benthic communities around South Shell Island, mainly on the western side of the island. A reduction in hard coral cover was recorded at South Shell Island monitoring sites during the INPEX capital dredging campaign conducted between 2012 and 2014; this was concluded to be as a result of a combination of elevated turbidity and increased sedimentation (Cardno 2014). Reductions in hard coral cover at South Shell Island monitoring sites were also detected during the MSB capital dredging campaign that was undertaken within the same period as the much larger INPEX campaign (Macmahon 2013, Department of Infrastructure [DoI] 2014). Sediment plume modelling for the maintenance dredging works covered in this document (Section 4.4) predicts that the South Shell Island coral community is sufficiently distant from the works to not be at risk of irreversible impact.

Other well-known hard coral communities in Darwin Harbour include the following:

Off the north-east shore of Wickham Point.

Weed Reef, Plater Rock and Kurumba Shoal, on the western side of the harbour, and Dudley Point at the northern end of Fannie Bay.

Channel Island coral community in Middle Arm, on the intertidal platform between Channel Island and the mainland. This is listed on the Register of the National Estate and is a declared Heritage Place under the NT Heritage Conservation Act 1991.

All of these communities are sufficiently remote from the dredging and proposed spoil disposal locations that there is no credible risk of impact to them.

Filter-feeder communities

Filter-feeder communities are those that primarily comprise sponges, gorgonians (sea fans and sea whips) and other soft corals. They primarily occur on intertidal or subtidal hard substrates and may co-occur with hard corals, giving rise to “mixed species” communities. However, they

also occur at depths shallower than, and deeper than, those at which hard corals thrive and can be the dominant component of the benthic community in some areas.

It is recognised that filter-feeder communities around South Shell Island and Old Man Rock may contain species that could be of importance to bio-prospecting. However, it is also recognised that large areas of filter-feeder communities are present both within East Arm and across the broader harbour (Geo Oceans 2011, 2012a,b; Siwabessy et al 2015).

Benthic habitat monitoring during the MSB capital dredging campaign (undertaken in 2012 and 2013) found no statistically significant changes in filter-feeder communities across the three surveys (Macmahon 2013, DoI 2014). This is somewhat unsurprising as these communities are generally less sensitive than corals to the physiological pressures of reduced benthic light availability and sedimentation associated with dredging activities or natural environmental conditions. Filter-feeder communities were not monitored as part of the INPEX dredging campaign that was conducted within the same period as the MSB dredging (INPEX 2013).

3.2 Describe the hydrology relevant to the project area (including water flows).

A number of reivers and creeks enter Darwin Harbour with periods of high rainfall resultign in turbid plumes from these waterways. The East Arm Wharf spoil disposal pond system is used as a surface water runoff catchment system for surface water draining from the East Arm Wharf area allowing sedimetn to settle prior to entering Darwin Harbour.

Dredging operations will not affect teh hydrology of the Darwin Harbour Region

3.3 Describe the soil and vegetation characteristics relevant to the project area.

Section references refer to the attached supporting information document.

Sediment characteristics

Prior to each maintenance dredging campaign, the geochemical characteristics of representative samples of the material to be dredged will be determined through the implementation of a sampling and analysis plan (SAP). The material will be unconsolidated sediments that have accumulated within areas in which capital dredging has been undertaken. The following characteristics of the sediments will be determined:

Particle size distribution (PSD) to confirm that the sediment to be dredged is of comparable PSD to those used in plume dispersion modelling (Section 4.3).

Concentrations of contaminants of potential concern (Section 3.4.3.2) to ascertain whether the

95% upper confidence limit of the mean (95% UCL) concentration of any contaminant exceeds the Commonwealth of Australia (2009) screening level for that contaminant.

Acid sulfate soil potential (Section 3.4.3.3) to ascertain whether potential acid sulfate soils (PASS) are present in the areas to be dredged. This will only be required for sediments from the MSB berths for which disposal into the decant ponds at East Arm Wharf is proposed (Section 2.6.2); the sediments to be disposed into harbour waters (Section 2.6.1) will not be exposed to air, hence there will be no potential for oxidation and acid generation.

Marine Sediment

Marine sediments of Darwin Harbour

Approximately 80% of the Darwin Harbour region's seafloor is estimated to be covered with soft surfaces consisting of mud and fine sand. Soft surfaces containing varying amounts of gravel and sand are found in the main channels around reefs, on beaches and on spits and shoals near the mouth of the harbour (Fortune 2006).

The typical geological profile of the Darwin Harbour seafloor comprises Quaternary age intertidal marine alluvium comprising mud, silt, sand and coral remnants, underlain by the Proterozoic metasediments of the Burrell Creek Formation, consisting of meta-siltstone, meta-sandstone and phyllite. The rocks strike close to north-south and are steeply dipping either to the east or west. Quartz veins are widespread within the Burrell Creek Formation.

Sediments in the river catchments are predominantly fine-grained, mainly clay and silt. Creeks and rivers may transport coarser material (e.g. sand) into the estuary during the wet season, though much is trapped by coastal vegetation, both riparian and mangrove (McKinnon et al. 2006). The fine sediment delivered to the upper arms of the harbour settles out of suspension and is then eroded and re-deposited mainly by tidal currents, especially at spring tides (Munksgaard 2013).

Hydrodynamic modelling of the fate of suspended sediment plumes has shown that substantial sediment fluxes are directed up-estuary where fine sediments are trapped; the sediment fraction exported to the ocean is relatively small (Williams, Wolanski & Spagnol 2006).

Contaminants of potential concern

Land uses in the Darwin Harbour catchment represent potential sources of contaminants that may accumulate in the berths to be dredged. Skinner, Townsend and Fortune (2009) estimated the diffuse annual contaminant loads contributed to the harbour during typical Wet Season rainfall (1,670 mm); the loads from catchments that may influence the maintenance dredging

locations are presented in Table 2.

Approximately 6 km upstream of East Arm Wharf, the Palmerston Wastewater Treatment Plant discharges treated effluent into Myrmidon Creek, which enters the lower reaches of the Elizabeth River where it enters East Arm. The mass loadings of the release from the Plant in 2005/06 (the most recent data available) were 181 tonnes of suspended sediment, 40 tonnes of ammonia, 69 tonnes of nitrogen and 18 tonnes of phosphorus (Power and Water Corporation [PWC] 2006).

Potential contaminants in the three dredging areas pertaining to port operations over the years include metals (e.g. arsenic, cadmium, chromium, copper, iron, mercury, manganese, nickel, lead, uranium, zinc), hydrocarbons, nutrients (from fertilisers) and organotins (i.e. tributyltin from ship anti-foulant coatings). Whilst the latter substance is no longer permitted to be applied to ships that would enter Darwin Harbour (as per the International Convention on the Control of Harmful Anti-fouling Systems on Ships) it is a persistent contaminant that may remain within sediments for many years (Okoro et al 2011), often associated with paint flakes (Commonwealth of Australia 2009).

As indicated in Section 2.2, the geochemical characteristics of the material to be dredged in each campaign will be ascertained through analysis of representative samples during the planning phase.

Potential acid sulfate soil

In the Darwin region, PASS has been identified in association with mangrove sediments (e.g. Hill & Edmeades 2008). As PASS is formed under anaerobic conditions, it is considered unlikely that it will occur in the sediments that accumulate at the maintenance dredging locations, which will be deposited under aerobic conditions (i.e. in the presence of dissolved oxygen within the water column). Nonetheless, the presence of PASS in the material to be dredged in each campaign will be ascertained through analysis of representative samples during the planning phase (Section 2.2).

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.

All project related work will be carried out in Darwin Harbour in areas that have been developed for port operations.

3.5 Describe the status of native vegetation relevant to the project area.

No native vegetation existis within the Project Area.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

Dredging will occur at the face of existing wharves and entrance channel to the MSB to maintain navigable depths. The proposed dredging depths are -10m CD at Fort Hill Wharf, -13 m CD at East Arm wharf and -8.7 m CD at the MSB. A summary of dredging depths and volumes is provided in Table 1 of the attached supporting information document.

Dredge spoil disposal within Darwin Harbour will be approximately 500 m offshore from where dredging is taking place and will be spread to avoid mounding.

Coastal geomorphology and bathymetry

Darwin Harbour is a large ria system, or drowned river valley, formed by post-glacial marine flooding of a dissected plateau. The harbour was formed by rising sea levels about 6000–8000 years ago. Since the formation of the harbour, surface erosion from the adjoining terrestrial environment has carried substantial quantities of sediment into the harbour. This sediment now forms much of the intertidal flats that which overlie bedrock around the harbour margins.

The harbour extends for more than 30 km along a north-west to south-east axis. The main channel of the harbour is around 15-25 m CD deep, with a maximum depth of some 36 m. The channel favours the eastern side of the harbour and continues into East Arm, at water depths of more than 10 m CD. The bathymetry in this area has been modified by dredging for the development of East Arm Wharf and the INPEX LNG processing facilities located at Bladin Point.

3.7 Describe the current condition of the environment relevant to the project area.

Please refer to Section 3 of the attached supporting document for a description of the existing environment and relevant studies.

Dredging will be undertaken in operational port areas that are highly modified environemtns and subject to high vessel traffic. The nearby spoil disposal areas are located in areas of low enviroinemntal sensitivity and have also been impacted by port operations over a numbe rof years.

3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.

A number of heritage sites occur within Darwin Harbour as identified by the EBPC Act online

PMST. None of these are in close proximity to the project area and none will be impacted directly or indirectly from any project related activities.

3.9 Describe any Indigenous heritage values relevant to the project area.

A number of heritage sites occur within Darwin Harbour as identified by the EBPC Act online PMST. None of these are in close proximity to the project area and none will be impacted directly or indirectly from any project related activities.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.

Tenure across the project area varies – most dredging is within area leased by Darwin Port but a small portion is within crown land areas as are the sea disposal areas. NTG approvals for project activities on crown land areas and as lessor have been sought.

3.11 Describe any existing or any proposed uses relevant to the project area.

Please refer to Section 1.1 for a description of the Darwin Harbour port facilities where this project will take place.

Darwin Harbour port facilities

Darwin Port Operations Pty Ltd (Darwin Port) operates port facilities within Darwin Harbour, Northern Territory (NT); these include Fort Hill Wharf, East Arm Wharf and the Marine Supply Base (MSB). A brief introduction to these facilities is presented below.

Fort Hill Wharf

Fort Hill Wharf is Darwin Port's cruise ship and defence vessel facility. The precinct includes a purpose-built cruise ship terminal which is capable of handling complete passenger changeovers for smaller cruise vessels whilst providing a transit lounge for more infrequent larger international cruise ships. Frequent naval ship visits to Darwin are catered for at the wharf, with secure and efficient port facilities and services provided. Berthage for tugs and pilot boats used within Darwin Harbour is also provided.

The wharf was originally constructed in during World War II, though bioerosion by Teredo worms led to the collapse of some two thirds of the structure. It was partially reconstructed with steel pipes and another two wharves (the Navy Boom Wharf and the Navy Repair Wharf) were added in 1941, the latter to facilitate repairs to Navy vessels.

Over the years the land abutting the wharf has been used for pre-export stockpiling of iron ore and zinc concentrate and a Navy refuelling facility has also operated across the wharf. The current Fort Hill Wharf was commissioned in 1981 (Darwin Port Corporation, undated). The old structure was removed, and some of the seabed in the vicinity of the wharf was dredged, as a part of the Darwin City Waterfront Redevelopment in 2006.

Darwin Port records indicate that the Fort Hill Wharf berths were dredged to 12 m below chart datum (CD) in 1992. Maintenance dredging was last undertaken in 2008/09. During this dredging campaign approximately 7,000 m3 of sediments were dredged and the spoils were disposed on the seafloor approximately 300 m from the wharf. The current dredging proposal seeks to excavate sediments to a depth of 10 m below CD.

East Arm Wharf and MSB

East Arm Wharf was opened in 2000 and provides facilities for berthing vessels up to 80,000 tonnes. It comprises a:

Bulk liquids berth which handles regular imports of fuel and is connected via pipeline to a fuel oil facility and a bio diesel refinery. Chemicals such as acids are also piped to adjoining areas.

Common user facility which is heavily utilised by offshore oil rig tenders. The number of tenders permanently working out of Darwin is increasing as the offshore industry surrounding Darwin expands.

Container facility served by mobile harbour cranes. This is also used as a common user berth to discharge or load break bulk cargo. Live cattle exports have increased significantly over the past few years with ongoing demand expected.

Bulk materials handling facility which can cater for Panamax size vessels and is currently used to export iron ore and manganese.

The East Arm Wharf precinct has been progressively developed since 1994; the most recent expansion being the construction of the MSB in 2012-2013 and the Multi User Barge Ramp Facility in 2015-2016. Spoil from the capital dredging campaigns undertaken to develop East Arm Wharf has been disposed within decant ponds within the Darwin Port lease. The ponds have also received spoil from other developments (e.g. the Darwin City Waterfront Redevelopment) and pond management measures have been developed over the years that have proven to be effective in mitigating impacts upon the environment outside of the pond system.

East Arm Wharf has a design depth of 15 m below CD and maintenance dredging undertaken in 2008/09 removed accumulated sediments (approx. 1,000m3) to a depth of 13 m below CD. Sediments were disposed into Pond F at East Arm Wharf. This pond has now been reclaimed and converted into a hardstand area and refrigerated container terminal.

The MSB channel, turning basin and berths 2 and 3 have design depths of 7.7 m below CD and berth 1 has a design depth of 8.7 m below CD. Since the completion of the capital dredging for construction of the MSB in 2014, there has been an accumulation of sediment along the wharf face which now requires removal in order to provide for continued safe berthing for design vessels.

Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

Please refer to Section 6 of the attached supporting information document for the proposed environmental monitoring and management.

Environmental Management Frameworks, and associated monitoring programs, have been developed for the key risks associated with the dredging works.

These are provided in table format in Section 6 of the attached supporting informaiton document.

Two of the EMFs relate directly to matters of NES:

- Protected marine species – physical interaction

- Protected marine species – underwater noise

The other two EMFs relate to aspects that may indirectly affect matters of NES:

- Darwin Harbour - water quality

- Dredge spoil decant ponds - water quality

Each EMF states the relevant project commitments made and objectives to be met, and contains specific, measurable targets to achieve the objectives. It also summarises the management actions required to meet these targets, the relevant KPIs and the monitoring activities to be employed to measure success in meeting the requirements and identify the need

for corrective actions.

It should be noted that:

Management actions are routine tasks that will be undertaken to meet the objectives of each EMF.

Corrective actions are those tasks that are possible to be undertaken if monitoring indicates that trigger levels have been exceeded.

Where trigger levels are proposed, it should be noted that these are triggers for further investigation and are set well below levels at which significant adverse ecological effects could be anticipated, thus protecting the declared beneficial uses of Darwin Harbour. Each EMF also indicates the relevant reporting requirements and the responsibilities of project personnel.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.

Environmental outcomes for identified matters of NES are for the project to have no significant or lasting impact to populations within Darwin Harbour.

Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

5.1.9 A water resource, in relation to coal/gas/mining

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

The action proposed is a small dredging program in the context of Darwin Harbour. This referral application and the attached supporting information document outline the environmental risks and potential impacts and the management measures to be implemented to reduce the potential for impacts to occur.

The attached supporting document has been developed drawing on information that is incorporated into a Long Term Dredging Management Plan for the maintenance dredging of Darwin Harbour port facilities. The undertaking of dredging activities in accordance with that Plan will ensure that all of the monitoring and management actions identified will be implemented as part of the eventual NT EPA approval of the project. The Plan is aligned with similar plans implemented for the INPEX Ichthys LNG and East Arm Wharf expansion projects, both of which were undertaken with no incidents of impacts upon matters of NES.

We believe that the short term duration of the dredging activities and very small dredging volumes, coupled with the management and monitoring measures proposed, mean that any impacts that may occur to matters of NES would be minor, of short term duration, and not significant.

Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.

Yes.

Darwin Port has a long history of operating in an environmentally responsible manner when operating the port and when undertaking capital and maintenance dredging within Darwin Harbour. Past capital dredging projects have been completed in an environmentally responsible manner after undertaking the required level of Commonwealth and Territory environmental approvals, including EPBC Act referrals, and have adhered to any conditions set out in those approvals.

Darwin Port's Environmental Policy Statement (Figure 2 in the attached supporting information document) outlines Darwin Port’s recognition of the need to manage operations in manner that will protect the environment in which we operate.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.

We are not aware of any past or present proceedings against either the proponent (Darwin Port) or the person making this application (AECOM Australia).

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation’s environmental policy and framework?

Yes

6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.

Maintenance dredging will be undertaken in accordance with the Darwin Port Environmental Policy (Figure 2 in the supporting information document); this requires that Darwin Port develops and maintains an Environmental Management System (EMS), provides sufficient resources to achieve its environmental targets and seeks to prevent pollution from its activities.

Darwin Port has prepared an Environmental Management Plan (EMP) that sets environmental standards to be adhereed to at their facilities. It provides environmental information, targets and management strategies to prevent adverse impacts to the environment.

Darwin Port's EMS is a management system that covers all environmental aspects of the Port. It includes an Environmental Policy, Aspects and Impacts Register, Procedures, Objectives and Targets, Legal Register, Auditing, Plans and other components. The EMS is to be further developed and certified in accordance with ISO 14001:2015

The Port Environmental Protection Plan (PEPP) was developed as required under the EPBC Act approval for the expansion of the East Arm Wharf and was approved by the Commonwealth Minister for Environment.The PEPP sets requirements for marine fauna and vessel strikes, large vessel speed restrictions, oil spill, marine pests prevention and environmental awareness.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes

6.4.1 EPBC Act No and/or Name of Proposal.

The following referrals have been made under the EPBC Act for project in which Darwin Port has played a role:

2013/6988: DARWIN PORT CORPORATION/Transport - Water/Outer part of Darwin Harbour/Northern Territory/Dredging the outer shipping channels of Darwin Harbour

2010/5431: Darwin Port Corporation/Transport - water/Darwin Harbour/NT/Shipping Channel Enhancement

2010/5304: DEPARTMENT OF PLANNING AND INFRASTRUCTURE - MAJOR PROJECTS UNIT/Manufacturing/Darwin Harbour/Northern Territory/East Arm Wharf Expansion Works

Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
AIMS undated, Letter to Darwin Port from D Williams, Australian Institute of Marine Science. ANZECC & ARMCANZ 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment & Conservation Council and Agriculture & Resource Management Council of Australia & New Zealand, October 2000. BoM 2017, Climate averages for Darwin. Bureau of Meteorology website, viewed 27 September 2017 at http://www.bom.gov.au/climate/averages/tables/cw_014015.shtml. Brooks, L and Pollock, K 2014, Abundance, movements and habitat use of coastal dolphins in the Darwin region: Analysis of the first six primary samples (October 2011 to March 2014). Final report to the Northern Territory Government Department of Land Resource Management. Cardno 2014, Turtle and Dugong Monitoring End of Dredging Report Ichthys Nearshore Environmental Monitoring Program. Prepared for INPEX September 2014. Cassilles-Southgate N 2016, Interim Darwin Harbour	References have been sourced from reputable sources including scientific journals, technical reports and other publications from reputable sources	Generally none.

Reference Source	Reliability	Uncertainties
Turbidity Water Quality Objectives for Neap Tide Conditions. Report Number 14/2016D. Aquatic Health Unit, Water Resources Division. Department of Land Resource Management. NT. CEDA 2011, Environmental Control on Dredging Projects. Central Dredging Association Information Paper, June 2011. CEDA 2015, Integrating Adaptive Environmental Management into Dredging Projects. Central Dredging Association Position Paper, March 2015. Commonwealth of Australia 2009, National Assessment Guidelines for Dredging. Commonwealth of Australia, Canberra. Commonwealth of Australia 2013, Matters of National Environmental Significance. Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia, Canberra. Darwin Harbour Advisory Committee 2007, Status on the implementation of the Darwin Harbour Regional Plan of Management 2005–2006. Darwin Port 2016, Cyclone Procedure 2016-2017. Standard Operating Procedure SOP_OPS/40. Darwin Port Corporation, undated, Port of Darwin History. Darwin Port Corporation Fact Sheet 7. DENR 2016, Darwin Harbour Region Report Card 2016. Department of Environment and Natural Resources. DoEE 2017, Leatherback turtle		

Reference Source	Reliability	Uncertainties

(Dermochelys coriacea). Department of the Environment and Energy website http://www.environment.gov.au/marine/marine-species/marine-turtles/leatherback. DoI 2014, Annual Monitoring Report for the Darwin Marine Supply Base Dredging and Dredge Spoil Placement Activities 2013 Reporting Period. Prepared by Department of Infrastructure, Northern Territory Government on behalf of Department of Lands, Planning and Environment, March 2014. Drewry, J, Fortune, J, Majid, M, Schult, J, Lamche, G, Townsend, S and Cusack, S 2011, Darwin Harbour Region Report Cards 2011. Aquatic Health Unit, Department of Natural Resources, Environment, The Arts and Sport. Report No 17/2011D. Palmerston, NT, Australia. Duckworth, A, Giofre, N and Jones, R 2017, Coral morphology and sedimentation. Marine Pollution Bulletin, 125(1-2): 289-300. Duggan, S 2006, The water quality of Darwin Harbour: December 2002 - December 2004. AIMS Report No. 37, Australian Institute of Marine Science. EIANZ 2015, Ecological Impact Assessment (EcIA) - EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. Environment Institute of Australia and New Zealand Inc., March 2015. Fortune, J 2006, The grain size and heavy metal content of sediment in Darwin

Reference Source	Reliability	Uncertainties
Harbour. Environmental Protection Agency, Department of Natural Resources, Environmental and the Arts. Report No. 14/2006D. Fortune, J 2010, Water Quality Objectives for the Darwin Harbour Region – Background Document. Aquatic Health Unit, Department of Natural Resources, Environment, The Arts and Sport. Fortune, J 2016. Darwin Harbour Region 2016 Report Card Water Quality Supplement. Report No. 22/2016D. Aquatic Health Unit, Department of Environment and Natural Resources. Palmerston, NT. Geo Oceans 2011, Ichthys Gas Field Development Project: Benthic Habitat Mapping of the Darwin region – Methods of Data Collection, Collation, and Map Production. Technical Appendix S6 to INPEX (2011). Geo Oceans 2012a, NT Department of Lands and Planning – East Arm Wharf Expansion Project. Marine Habitat Mapping Survey. Report to URS Australia Pty Ltd, Document code DLPEAWMAP.406, August 2012. Geo Oceans 2012b, NT Department of Lands and Planning – East Arm Wharf Expansion Project. Baseline Marine Habitat Monitoring Survey. Report to URS Australia Pty Ltd, Document code DLPEAWMON.401, October 2012. Hill, JV and Edmeades, BFJ 2008, Acid Sulfate Soils of the Darwin Region. Technical Report No.09/2008D. Land and Water		

Reference Source	Reliability	Uncertainties
Division, Department of Natural Resources, Environment the Arts and Sport, NT, November 2008. IADC 2016, Facts about: Adaptive Management. International Association of Dredging Companies. INPEX 2010, Ichthys Gas Field Development Project: Draft Environmental Impact Statement. INPEX 2011, Ichthys Gas Field Development Project: Supplement to the Draft Environmental Impact Statement. INPEX 2013, Dredging and Spoil Disposal Management Plan – East Arm. Document No C075-AH-PLN-0028, Rev. 4, 16 December 2013. Jensen, FH, Bejder L, Wahlberg, M, Aguiar Soto, N, Johnson, M and Madsen, PT 2009, Vessel noise effects on delphinid communication. Marine Ecology Progress Series, 395: 161-175. Lilleyman, A, Lawes, MJ and Garnett, ST 2015, Final report on Project D13-0379 – Darwin – East Arm Port Project. Report to the Department of Business, Northern Territory Government. Macmahon 2013, Dredging and Dredge Spoil Placement Management Plan (DDSPMP) End of Phase 1 Environmental Monitoring Report – Revision 0. McKinnon, AD, Smit, N, Townsend, S and Duggan, S 2006, Darwin Harbour: water quality and ecosystem structure in a tropical harbour in the early stages of development. In: 'The Environment in Asia Pacific Harbours' (Ed: Wolanski, E). Springer,		

Reference Source	Reliability	Uncertainties

Dordrecht, the Netherlands. Mills, D and Kemps, H 2016, Generation and release of sediments by hydraulic dredging: a review. Report of Theme 2 - Project 2.1 prepared for the Dredging Science Node, Western Australian Marine Science Institution, Perth, Western Australia. Moein Bartol, S and Musick, JA 2003, Sensory biology of sea turtles. In: Lutz PL, Musick JA and Wyneken J (eds) The Biology of Sea Turtles, Vol 2. CRC Press, Boca Raton, FL, pp 79–102. Munksgaard, NC 2013, Recommendations for sampling and analysis of Darwin Harbour sediment. Environmental Chemistry and Microbiology Unit (ECMU), Research Institute for the Environment and Livelihoods, Charles Darwin University, November 2013. Natural Resource Management Ministerial Council 2005, Australian National Guidelines for Whale and Dolphin Watching. NRETAS 2010, Water Quality Objectives for the Darwin Harbour Region at a Glance. Northern Territory Government, Darwin Harbour Advisory Committee. NT Emergency Service 2011, Darwin Storm Surge. NT Emergency Service brochure. NT EPA 2013. Guidelines for the Environmental Assessment of Marine Dredging in the Northern Territory. Northern Territory Environment Protection Authority. Version 2.0, November 2013. NT EPA

Reference Source	Reliability	Uncertainties

2015, Guideline for the Preparation of an Environmental Management Plan. Northern Territory Environment Protection Authority. Version 1.0, May 2015. Okoro, HK, Fatoki, OS, Adekola, FA, Ximba, BJ, Synam, RG and Opeolu, B 2011, Human exposure, biomarkers, and fate of organotins in the environment. In Whitacre D (ed.) Reviews of Environmental Contamination and Toxicology, 213, 27-54. Padovan, AV 2003, Darwin Harbour water and sediment quality. Marine and Estuarine Environments of Darwin Harbour. Proceedings of the Darwin Harbour Public Presentations, February 2003. PIANC 2006, Environmental Risk Assessment of Dredging and Disposal Operations. World Association for Waterborne Transport Infrastructure (PIANC) Environmental Commission report of WG 10, October 2006. PIANC 2008, Dredging Management Practices for the Environment: a Structured Selection Approach. World Association for Waterborne Transport Infrastructure (PIANC) Environmental Commission Report No 100, 2008. Pineda, MC, Strehlow, B, Sternel, M, Duckworth, A, den Haan, J, Jones, R and Webster, NS 2017, Effect of sediment smothering on the sponge holobiont with implications for dredging management. Scientific Reports. doi:10.1038/

Reference Source	Reliability	Uncertainties

s41598-017-05243-x. PWC 2006, Wastewater Treatment, Reuse and Discharge Report 2006. Power and Water Corporation. Siwabessy, PJW, Tran, M, Huang, Z, Nichol, S and Atkinson, I 2015, Mapping and Classification of Darwin Harbour Seabed. Record 2015/18. Geoscience Australia, Canberra. Skinner, L, Townsend, SA, and Fortune, J 2009, The impact of urban land-use on total pollutant loads entering Darwin Harbour. Department of Natural Resources Environment the Arts and Sport, Darwin. Smit, N, Penny, SS and Griffiths, AD 2012, Assessment of marine biodiversity and habitat mapping in the Weddell region, Darwin Harbour. Report to the Department of Lands, Planning and Environment. Department of Land Resource Management, Palmerston. Streten, C, Tsang, JJ and Harries, S 2017, Sediment Sampling and Analysis Plan. Report prepared for Darwin Port. Australian Institute of Marine Science, Darwin. URS 2004, Darwin City Waterfront Redevelopment Project: Draft Environmental Impact Assessment. Prepared for Department of Infrastructure, Planning and Environment, May 2004. URS 2009, Ichthys Gas Field Development Project: Nearshore Marine Water Quality and Sediment Study. Report prepared for INPEX Browse, Ltd, R1382, August 2009. Appendix 9 to INPEX

Reference Source	Reliability	Uncertainties
(2010). URS 2011, Ichthys Gas Field Development Project: summary of the long-term water-quality and program for Darwin Harbour. Report prepared for INPEX Browse, Ltd, R1589, March 2011. Technical appendix S9 to INPEX (2011). WA EPA 2016, Technical Guidance: Environmental Impact Assessment of Marine Dredging Proposals. Western Australian Environmental Protection Authority, December 2016. Water Monitoring Branch 2005, The Health of the Aquatic Environment in the Darwin Harbour Region, 2004. Report 5/2005D. Natural Resource Management Division. Department of Natural Resources, Environment and the Arts. Darwin. Whiting, SD 2003. Marine mammals and marine reptiles of Darwin Harbour. In: Darwin Harbour Region: current knowledge and future needs. Proceedings of public presentations hosted by the Darwin Harbour Advisory Committee at the Northern Territory University, Darwin, on 11, 19 and 26 February 2003. Department of Infrastructure, Planning and Environment, Darwin, Northern Territory. Whiting, SD 2008, Movements and distribution of dugongs (Dugong dugon) in a macro tidal environment in northern Australia. Australian Journal of Zoology 56: 215–222. Williams, D, Wolanski, E and Spagnol, S 2006, Hydrodynamics of Darwin Harbour. In ‘The environment in Asia Pacific Harbours’ (Ed:		

Reference Source	Reliability	Uncertainties

E. Wolanski) pp 461-476. Springer, Dordrecht, the Netherlands. Williams, D 2016, Sediment Transport, Marine Supply Base, East Arm, Darwin Harbour. Report prepared for Darwin Port. Australian Institute of Marine Science, ATRF Darwin, October 2016.

Williams, D 2017, Sediment Plume Modelling for Darwin Port. Report prepared for Darwin Port by Australian Institute of Marine Science, September 2017.

Wolstenholme, J, Dinesen, ZD and Alderslade, P 1997, Hard Corals of the Darwin region, Northern Territory, Australia. In Hanley, JR, Caswell, G, Megirian, D and Larson HK (eds) Proceedings of the Sixth International Marine Biological Workshop (“The marine flora and fauna of Darwin Harbour, Northern Territory, Australia”). Museums and Art Galleries of the Northern Territory and the Australian Marine Sciences Association, Darwin, Northern Territory.

Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

8.0 Provide a description of the feasible alternative?

Not undertaking the action was excluded as an option due to the need to maintain navigable depths in operational port areas.

A range of spoil disposal areas (including areas closer and further offshore, offsite disposal and onshore disposal) were investigated and the proposed locations were identified as achieving the best operational and environmental outcomes.

Onshore disposal is proposed for dredging at the MSB where appropriate; however, this option was discounted for other areas due to the increased distance required to transport spoil, resulting in greater environmental risk and increasing operational and financial challenges.

Dredging timing has been considered and restricting the timing of dredging was not considered to present significant environmental benefits given the relatively small scale of the project while increasing the risk to port operations.

Alternative dredging methodologies were considered but the use of a small cutter suction dredge was deemed the most appropriate when considering environmental and operational outcomes. The use of a back hoe dredge would not provide significant environmental benefits and would possibly extend the duration of the dredging.

8.1 Select the relevant alternatives related to your proposed action.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

9.2 Organisation

9.2.1 Job Title

Chief Executive Officer

9.2.2 First Name

Terry

9.2.3 Last Name

O'Connor

9.2.4 E-mail

terry.oconnor@DarwinPort.com.au

9.2.5 Postal Address

GPO BOX 390
Darwin NT 0801
Australia

9.2.6 ABN/ACN

ABN

62603472788 - DARWIN PORT OPERATIONS PTY LIMITED

9.2.7 Organisation Telephone

1300 327 946

9.2.8 Organisation E-mail

darwinport@darwinport.com.au

9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Not applicable

Small Business Declaration

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date: .....

9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations

No

9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made

Person proposing the action - Declaration

I, Terrence O'Connor, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:..... Date: 24-1-18

I, Terrence O'Connor, the person proposing the action, consent to the designation of CEO - Terrence O'Connor as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:..... Date: 24.1.18

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Chief Executive Officer

9.5.2 First Name

Terry

9.5.3 Last Name

O'Connor

9.5.4 E-mail

terry.oconnor@DarwinPort.com.au

9.5.5 Postal Address

GPO BOX 390
Darwin NT 0801
Australia

9.5.6 ABN/ACN

ABN

62603472788 - DARWIN PORT OPERATIONS PTY LIMITED

9.5.7 Organisation Telephone

1300 327 946

9.5.8 Organisation E-mail

darwinport@darwinport.com.au

Proposed designated proponent - Declaration

I, Terence O'Connor, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:..... Date: 24-1-18

9.6 Is the Referring Party an Organisation or Individual?

Organisation

9.8 Organisation

9.8.1 Job Title

Strategic Projects Advisor

9.8.2 First Name

Phil

9.8.3 Last Name

Vivian

9.8.4 E-mail

phil.vivian@darwinport.com.au

9.8.5 Postal Address

GPO BOX 390
Darwin NT 0801
Australia

9.8.6 ABN/ACN

ABN

62603472788 - DARWIN PORT OPERATIONS PTY LIMITED

9.8.7 Organisation Telephone

1300 327 946

9.8.8 Organisation E-mail

darwinport@darwinport.com.au

Referring Party - Declaration

I, PHILIP VIVIAN, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature:..... Date: 25/1/18

Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. darwin_port_dredging_and_disposal_areas.zip
2. darwin_port_dredging_and_disposal_areas_updated_24_jan_2018.zip
3. darwin_port_environment_policy_statement.png
4. darwin_port_ltdmp_epbc_support_info_rev0.pdf
5. darwin_port_ltdmp_epbc_support_info_rev1.pdf
6. darwin_port_ltdmp_epbc_support_info_rev1a.pdf