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Dear EIS Assessment Team

Following are responses to your letter of 22 November 2011.

MARINE ECOLOGY

DEIS Ref	Further information provided under: Figure 15-1 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology; Figure 14-15 (Benthic habitat map and sampling site locations)
NRETAS Comment	The benthic habitat map provided in this assessment was extrapolated from only two data points, one off the north-western end of the wharf and one off the south-eastern end of the wharf. It appears anecdotal evidence from the proponent's consultants was used to indicate that moderate to high densities of benthic taxa are not present across the broad areas shown. (Section 14, Supplement).

DLP Response:

The respondent has misinterpreted the response provided on p. 88 of the EISS. The extrapolation of data from only two points refers to the sponge and soft coral habitat shown to the south-west of the existing wharf face. The above comment suggests that the entire benthic habitat map is extrapolated from only two data points – Figure 14-15 of the EISS shows this is clearly not the case.

DEIS Ref	Further information provided under: Figure 15-1 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology; Section 15 – Marine Noise.
NRETAS Comment	The area contains significant habitat for many species, including marine megafauna (Palmer, 2010). Furthermore, surveys for marine megafauna (i.e., marine turtles, dugongs and coastal dolphins) species have not sufficiently focused on the East Arm Wharf area. The lack of information presents a high

	risk of inaccurately representing and underestimating high biodiversity-value benthic habitats, incorrectly mapping the reef areas, and underestimating how local populations of marine megafauna use the areas.
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DLP Response:

DLP has found no evidence to support the assertion that the area “contains significant habitat for many species”. As indicated on p. 83 of the EISS, DLP does not consider that mere observations of a species in a given area is adequate to deem that area as containing “significant habitat” for that species.

It is noted that EPBC Act Significant Impact Guidelines (Commonwealth of Australia 2009) use the terms “habitat critical to the survival of a species or ecological community” (the term “critical habitat” is used, for brevity, in this letter) and “important habitat for a migratory species” (“important habitat” hereafter).

Critical habitat refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

An area of important habitat is:

- a. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- b. habitat that is of critical importance to the species at particular life-cycle stages, and/or
- c. habitat utilised by a migratory species which is at the limit of the species range, and/or
- d. habitat within an area where the species is declining.

DLP acknowledges that marine megafauna are present at times within East Arm and have been sighted within the project area. However, given the records of the same species (and the occurrence of similar habitats) elsewhere within Darwin Harbour, DLP does not believe that the project area, or the adjacent areas that may be subject to indirect impacts from the development, meet any of the criteria listed above and therefore cannot be considered as either critical or important habitat (as defined above) in the context of the broader harbour.

DEIS Ref	Further information provided under: Figure 15-1 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology; Figure 14-15 (Benthic habitat map and sampling site locations)
NRETAS Comment	Relevant datasets exist for important hotspots of biodiversity such as those around South Shell Island and are available to the proponent (contact MAGNT to access this information (Alvarez, et al, 2003, Hooper et al, 2002, GHD 2006 (unpublished report - contact Marine Biodiversity, NRETAS). The following information needs to be provided: Up to date data and mapping of benthos types in the project area.

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DLP Response:

The benthic habitat map for the project area has been revised to incorporate further data, as described in the attached report by Geo Oceans.

DEIS Ref	Further information provided under: Figure 15-1 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology: Figure 14-15 (Benthic habitat map and sampling site locations); Section 6 – Design and Construction Methodology: Figure 6-3 (Revised Marine Supply Base access channel relative to former channel design and South Shell Island).
NRETAS Comment	Overlay the EAW Expansion project components and dredge dispersal modelling on benthic habitat map. Figure 6-3 in the Supplement indicates the revised, reduced scope of the Marine Supply Base (MSB) access channel and should illustrate the benthic habitat map underneath.

DLP Response:

The EAW Expansion project components and the Zones of Impact and Influence derived from the dredge dispersion modelling, overlain on the revised benthic habitat map, are included in the attached report by Geo Oceans.

DEIS Ref	Further information provided under: Appendix B (Dredge Management Plan (DMP) (AECOM 2011a)); Section 27 – Draft Dredge Management Plan
EISS Ref	Further information provided under: Appendix E (Draft Dredge Management Plan (DMP) (AECOM 2011a)).
NRETAS Comment	Include the WBM (2011) report referenced in the Dredge Management Plan if this data was used to produce the benthic habitat map so that it can be publicly available as part of the assessment process. Supply details of other technical reports if they were used to describe how the benthic habitat survey and mapping were conducted and how they were produced. The report should clearly describe the mapping methods, classification systems and the decision rules applied to the data for the purpose of classifying it.

DLP Response:

The benthic habitat map presented in the WBM (2011) report has been supplanted by the revised benthic habitat map in the attached report by Geo Oceans.

DEIS Ref	Further information provided under: Appendix A (EAW Environmental Management Plans).
EISS Ref	N/A

NRETAS Comment	Include the details in the Environmental Management Plan Outline (Appendix A) on documenting and monitoring the loss and/or recovery of coral/sponge species within East Arm and South Shell Island.
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DLP Response:

It is assumed this comment refers to the Environmental Monitoring Program (Appendix A of the EISS).

Monitoring of the coral and sponge communities within East Arm and South Shell Island will be detailed in the Dredge Management Plan, to be approved prior to commencement of dredging. A detailed monitoring program can only be devised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled. The zones of impact and influence can then be determined and the monitoring sites positioned accordingly. The program design will also need to consider the potential influence of other dredging activities that may be in progress at the time of the dredging works for the EAW Expansion project (e.g. the INPEX dredging campaign).

If impacts to these communities are detected, and can be attributed to the project, then monitoring of the recovery of these communities will be included within the DPC Environmental Monitoring Program.

CLASSIFICATION OF IMPACT ZONES

DEIS Ref	Further information provided under: Figure 15-2 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology; Figure 14-15 (Benthic habitat map and sampling site locations)
NRETAS Comment	<p>The classification of impacts based on benthic habitat and occurrences of turbidity/sedimentation have been broadly discussed in the Dredge Management Plan and follow the recommended approach by WA EPA (2011). This guidance states it is not possible to predict the impacts of dredging without a good understanding of biological communities within the area bounded by and including the Zone of Influence. Accordingly, a benthic habitat map covering the area predicted to be influenced by dredging is a critical piece of information for assessment. The benthic habitat map must present the extent and distribution of each benthic habitat type within a predicted zone of influence and in selected areas outside this zone considered suitable for establishing reference sites for the purposes of monitoring (WA EPA, 2011).</p> <p>The location of the outer boundaries of the Zone of High Impact, Zone of Moderate Impact and Zone of Influence are to be shown on the benthic habitat map relevant to East Arm in order to assess potential impact in the marine environment.</p>

DLP Response:

The zones of Impact and Influence derived from the dredge dispersion modelling, overlain on the revised benthic habitat map, are included in the attached report by Geo Oceans. These zones will be revised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled.

DEIS Ref	Further information provided under: Figure 15-2 (Benthic habitat classes surrounding EAW)
EISS Ref	Further information provided under: Section 14 – Marine Ecology; Figure 14-15 (Benthic habitat map and sampling site locations)
NRETAS Comment	Please Provide the following: Evidence of field validation on the benthic habitat map provided, particularly in areas predicted to be directly impacted by project components or significantly affected by indirect impacts, such as turbidity and sedimentation.

DLP Response:

The benthic habitat map presented in the WBM (2011) report has been supplanted by the revised benthic habitat map in the attached report by Geo Oceans. The latter report discusses validation of the map.

DEIS Ref	Further information provided under: Section 15
EISS Ref	Further information provided under: Section 14
NRETAS Comment	Identify habitats with higher biodiversity values that may be threatened by dredging activities (zones of moderate impact and influence).

DLP Response:

As shown in the attached Geo Oceans report, the zones of Moderate Impact and Influence for the dredging works lie either within the dredging footprints or over soft sediment habitat. They do not impinge upon habitats with higher biodiversity values (e.g. filter feeder or coral communities). These zones will be revised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled.

DEIS Ref	Further information provided under: Section 15
EISS Ref	Further information provided under: Section 14
NRETAS Comment	The range of likely impacts on different in-habitant benthos immediately adjacent to the dredged seabed area (zone of direct impact).

DLP Response:

It is assumed that the “zone of direct impact” mentioned within this comment is equivalent to the Zone of High Impact described in the WA EPA (2011) guideline (hereafter ‘EPA guideline’). For the purpose of this assessment, the Zones of High Impact have been defined as the dredged areas plus a 20 m wide annulus around each dredged area to account for smothering from coarse sediments liberated from the cutter head during dredging. This is consistent with the approach adopted by INPEX for assessment of impacts associated with their dredging campaign (INPEX 2011).

As shown in the attached Geo Oceans report, the Zones of High Impact for the dredging works mainly lie over soft sediment habitat. A portion of the approach channel to the Marine Supply Base (MSB) overlies a filter feeder community. The areas of each habitat type within the Zones of High Impact are presented later in this letter and within the attached Geo Oceans report. These Zones of High Impact will be revised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled.

Within the Zones of High Impact, benthic biota within the dredging footprint will be removed from the seabed and transported to the reclamation ponds, almost certainly resulting in mortality. Within the 20 m annulus it is possible that some benthic biota will be smothered by coarse sediments liberated from the seabed by the action of the dredge. Again, mortality of these biota is likely due to burial or to clogging of feeding and respiratory mechanisms.

After completion of the dredging works, the seabed within the dredging footprint in each Zone of High Impact is likely to be subtidal hard substrate, as the surface soft sediment layers will be removed by the dredge. There is no reason to suspect that biota will not recolonise these surfaces and this could balance the loss of biota within the area smothered by coarse sediments. As described by INPEX (2011), invertebrate fauna of tropical ecosystems are generally adapted to extreme and rapidly changing environmental conditions such as high temperatures, salinity fluctuations (e.g. due to inundation by monsoonal freshwater inflows) and periodic spikes in sediment load (e.g. from seabed disturbance or terrigenous sediment inputs during and following tropical storms). Fauna communities exposed to such environmental extremes commonly experience seasonal mortality and changes in community structure; these communities are often dominated by opportunistic species with adaptive strategies to respond quickly to erratic environmental changes, thereby providing a level of resilience to the ecosystem (Alongi 1989).

Certain sponge species have a high capacity to adapt to changing and stressful conditions and to recover quickly from them (e.g. Carballo 2006; Rützler, Duran & Piantoni 2007). This high recovery capacity is partly attributable to their primitive level of organisation that gives them more plasticity and adaptation potential. Some species of sponges have also been reported to adapt to a sedimentation regime by changing their morphology to prevent sediment settlement (Carballo 2006).

Given the extensive areas of similar habitat in Darwin Harbour that will remain undisturbed from the dredging activity, and the high rate of dispersal of the planktonic larval stages of many invertebrate species, recolonisation within the Zone of High Impact is likely to commence during the first reproductive event following the completion of dredging. However, the community may not return to its pre-disturbance state within five years, hence the impacts are classified by EPA (2011) as irreversible. In the longer term, the community composition will continue to fluctuate in response to both natural and anthropogenic impacts.

DEIS Ref	Further information provided under: Section 15.5.3
EISS Ref	Further information provided under: Section 14
NRETAS Comment	Use existing scientific and NTG knowledge and compiled data sets (e.g., Attachment 2 Supplement, GHD 2006), to predict influence of dredging activities on nearby sensitive habitat.

DLP Response:

It is assumed that that “sensitive habitat” refers to habitats supporting hard coral and filter feeder communities. The potential influences of dredging upon these communities is described in Section 15.5.3 of the DEIS.

The scientific and NTG knowledge and data sets provided by NRETAS are acknowledged as useful additional information to the extent that they provide data on the individual taxa of biota present around South Shell Island. However, such point sources of data are of limited use for mapping the boundaries of broader habitats.

It is recognised that the monitoring described within the GHD report detected a slight decline in sponge abundances at the South Shell Island sites over the period of dredging works for the Darwin Wharf Precinct project (during which dredged material was pumped from Kitchener Bay to decant ponds at East Arm Port). However, GHD also noted that “some of the transect marker stakes had been pulled out, probably by boat anchors”, indicating that the decline may not have been due to impacts from the discharge of decant water from the ponds. Therefore the GHD report provides little information that can be used to predict the influence of the EAW expansion dredging on the South Shell Island benthic communities – the dredging activity will be in closer proximity to the communities than was the dredging for the Darwin Wharf Precinct project (Kitchener Bay) and the potential for this to influence the communities will overshadow the potential for the communities to be influenced by the discharge of decant water, which will occur on the northern side of East Arm Port.

An earlier report by GHD (2002) on monitoring the effects on coral communities of dredging for the East Arm Port Stage 2A development concluded that possible impacts were no greater at impact sites (South Shell Island and Wickham Point) than at control locations (Weed Reef and Channel Island) and that these possible impacts were minor when compared to damage to the sites from storm action. It is noted that dredging works for the Stage 2A development were a comparable distance from South Shell Island as are the proposed works for the EAW Expansion.

Within the attached Geo Oceans report are figures showing the predicted Zones of Impact and Influence, overlaid upon the refined habitat map. The figures show that the only “sensitive habitats” (as defined above) within these zones are potentially within a portion of the approach channel to the MSB. Outside of this portion, it is predicted that there is minimal risk of measurable impact upon these habitats from sediments of the particle sizes modelled (refer Appendix E of the DEIS).

Whilst the channel alignment shown in the DEIS may have presented a risk of sedimentation of some sensitive habitats by sediments coarser than those modelled, it is considered that the revised alignment shown in the EISS is sufficiently distant from sensitive habitats that the risk of such sedimentation is considerably lower. Coupled with DLP’s commitment within the EISS to not dredge in the vicinity of the South Shell Island coral community during ebb tides,

it can be reasonably predicted that there will be no measurable impacts upon nearby sensitive habitats.

DEIS Ref	Further information provided under: Section 15
EISS Ref	Further information provided under: Section 14
NRETAS Comment	Calculate areas occupied by each habitat type and amount of each type in the predicted impact zones (i.e. direct and indirect impact) and present as a percentage of the overall known habitat type in the Harbour for zones of direct, moderate and zone of influence.

DLP Response:

The Zones of High Impact, Moderate Impact and Influence are shown in the attached Geo Oceans report. The Zones of Moderate Impact and Influence are based upon neap tide plume dispersion, when suspended sediment concentrations (SSC) are higher over a greater distance from the dredging activity than during spring tides.

The area of each habitat type within each zone, calculated from the data presented in the Geo Oceans report, is presented in the following tables. The total area of each habitat type within each zone is then presented as a proportion of the total mapped area of that habitat within Darwin Harbour.

It should be noted that the Zones of Moderate Impact and Influence are calculated from the dredge plume dispersion modelling presented within the DEIS; i.e. for dredging of a greater volume of sediment (1,008,320 m³ vs 640,000 m³), over a larger area and for a longer duration than the dredging required for the revised alignment of the MSB channel. Hence these zones can be considered as conservatively large in their extent. These zones will be revised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled.

Zones of High Impact (ZoHI):

The Zones of High Impact have been defined as the dredged areas plus a 20 m wide annulus around each dredged area to account for smothering from coarse sediments liberated from the cutter head during dredging. This is consistent with the approach adopted by INPEX for assessment of impacts associated with their dredging campaign (INPEX 2011). For the MSB and the Barge Ramp, the zone also includes the areas of seabed to be reclaimed.

Habitat	Area within ZoHI (ha)				Total area of habitat in Darwin Harbour (ha)	Proportion of total area within ZoHI (%)
	Tug Pen	MSB	Barge Ramp	TOTAL		
Filter Feeders	0	1.25	0	1.25	7,912	0.016%
Soft Bottom Benthos	3.5	5.0	5.0	13.5	41,058	0.033%

Zones of Moderate Impact (ZoMI):

The Zones of Moderate Impact are those areas within which impacts on benthic organisms are predicted to be sub-lethal or where recovery from impacts can be expected within five years following completion of dredging (EPA 2011). Using an approach that is consistent with that adopted by INPEX for assessment of impacts associated with their dredging campaign (INPEX 2011), the outer boundaries of these zones are delineated by the 90th percentile contour plot for SSC, as defined by dredge plume modelling. This delineates the areas

where, for 90% of the time, the predicted SSC is below the calculated tolerance for benthic communities (10.5 mg/L for East Arm benthic communities, refer Table 4-7 of INPEX 2011). The 10% of time during which the SSC threshold is predicted to be met or exceeded is likely to represent periods of mid-flow tidal states (particularly during spring tides) and any one exceedance event is likely to be no more than an hour or two in duration.

Habitat	Area within ZoMI (ha)				Total area of habitat in Darwin Harbour (ha)	Proportion of total area within ZoMI (%)
	Tug Pen	MSB	Barge Ramp	TOTAL		
Soft Bottom Benthos	0.5	0	0	0.5	41,058	0.001%

It is notable that:

- The predicted Zone of Moderate Impact for the Tug Pen lies almost entirely within the development envelope for this component of the expansion project.
- There are no predicted Zones of Moderate Impact associated with the MSB and Barge Ramp. That is, over the duration of dredging at these locations (98 and 49 days respectively) the 90th percentile SSC values are predicted to remain below the threshold value of 10.5 mg/L.

Zones of Influence (Zoi):

The Zones of Influence encompass areas which, at some time during the proposed dredging activities, will experience changes in sediment-related environmental quality outside of natural ranges; however the intensity and duration is such that effects on benthic communities are minor and reversible in the short term. Using an approach consistent with that adopted by INPEX (2011), the outer boundaries of these zones are delineated by the 95th percentile contour plot for SSC, as defined by dredge plume modelling. This reflects the areas where, for 95% of the time, SSC will be below the tolerance limit (10.5 mg/L) for the East Arm benthic communities.

Habitat	Area within Zoi (ha)				Total area of habitat in Darwin Harbour (ha)	Proportion of total area within Zoi (%)
	Tug Pen	MSB	Barge Ramp	TOTAL		
Soft Bottom Benthos	1.0	0	0	1.0	41,058	0.002%

It is notable that:

- The predicted Zone of Influence for the Tug Pen extends only marginally beyond the dredging footprint and into subtidal soft sediment areas.
- The predicted Zone of Influence for the MSB lies entirely within the dredging footprint.
- There is no predicted Zone of Influence for the Barge Ramp, i.e. over the duration of dredging for the Barge Ramp (49 days) it is predicted that the 95th percentile SSC value will remain below the threshold value of 10.5 mg/L.

Whilst it may seem counterintuitive that the Zones of Moderate Impact and Influence are smaller than the Zones of High Impact, this is a function of the different criteria used to define the zones. The Zones of High Impact are those in which the seafloor is directly disturbed, whereas the Zones of Moderate Impact and Influence are indicative of potential areas of indirect impact due to suspended sediments. It should be noted that the latter zones largely overlie the dredging footprint, hence any biological communities that are present will ultimately be removed by the dredging process. As the source of potential indirect impact will cease once dredging is complete, there will be no impediment to recolonisation of the dredged area by biota.

The small zones of impact and influence reflect:

- The scale of the dredging program, in terms of both area and duration.
- The use of a cutter suction dredge pumping dredge spoil ashore, in which the only losses of sediment to the system are those that are disturbed by the cutter head but not entrained into the suction system (see Appendix E of the DEIS for the assumptions made for the dredging technique).

In a manner consistent with INPEX (2011), sedimentation thresholds are not calculated for filter feeder, coral or macroalgae communities as literature values for these communities vary widely and are dependent on species within each community, morphology within species and duration and rate of sedimentation (INPEX 2011). In addition, the thickest modelled deposition is in the 1-5 cm category, which is predicted to occur within the MSB footprint (refer Figure 4-5 of Appendix E of the DEIS). No deposition of greater than 0.5 cm is predicted within mangroves; an order of magnitude below the threshold for potential effects on mangroves established for the INPEX project (5 cm).

PROTECTION OF MARINE MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

DEIS Ref	Further information provided under: Section 15
EISS Ref	Further information provided under: Section 14 and Figure 14-15 (Benthic habitat map and sampling site locations).
NRETAS Comment	The Australian Government Department of the Sustainability, Environment, Water, Population and Communities (DSEWPaC) requires the following additional information on <i>Environment Protection and Biodiversity Conservation</i> (EPBC) listed species to make an informed decision on whether or not to approve the proposal. It is recommended the proponent Liaises directly with the DSEWPaC if clarification is required on the below information request: The benthic habitat map near East Arm Wharf does not show all areas impacted by the dredge plume. Unless further information can be provided, the department will assume these areas are biologically important to each of the relevant matters of National Environmental Significance (NES).

DLP Response:

The zones of Impact and Influence derived from the dredge dispersion modelling, overlain on the revised benthic habitat map, are included in the attached report by Geo Oceans. These zones will be revised once a dredging contractor is appointed and the actual dredging methodology to be applied is confirmed and modelled.

DEIS Ref	Further information provided under: Section 13, Appendix B
EISS Ref	Further information provided under: Appendix E (mitigation measures) and Section 18 (offsets).
NRETAS	Further information is required on appropriate mitigation measures for matters of NES and offsets.

Comment	
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DLP Response:

As described in the EISS, the following mitigation measures have been proposed for the protection of marine matters of NES. These zones will be reviewed for applicability once a construction contractor is appointed and the actual dredging and piling methodologies are confirmed.

- Mitigation of potential impacts upon habitats that may be utilised by EPBC listed marine species by managing turbid plumes and sedimentation generated by the dredge (e.g. by avoiding dredging in the vicinity of South Shell Island during ebb tides) and by managing turbidity levels in the decant water (e.g. by increasing the flow path of the decant water through the decant ponds to enhance settlement of fine sediments).
- Mitigation of impacts upon EPBC listed marine species by the dredge is proposed to be primarily through the implementation of a “marine fauna exclusion zone”. Rather than a zone to exclude marine fauna, the presence of EPBC listed species within this zone will preclude the commencement or continuation of dredging activities, as shown in Figure 10 of Appendix E of the EISS.
- Implementation of a similar exclusion zone will be considered for piling operations if pre-construction marine species surveys indicate that EPBC listed marine species frequent the areas within 500 m of piling operations.
- The potential for direct impacts upon EPBC listed marine species by other vessels that may be associated with the construction operations will be mitigated by the implementation of vessel speed limits in areas where there is deemed to be a significant collision risk (as derived from pre-construction marine species surveys).

DEIS Ref	Further information provided under: Section 15.3
EISS Ref	Further information provided under: Section 14
NRETAS Comment	The marine fauna surveys have not been identified as occurring within the EAW project area or in all affected by the dredge plume. Survey techniques remain unclear - more detail is required on the timing and duration of the surveys conducted and studies other than the GHD, 2011 used for the INPEX project. The proponent is encouraged to contact Marine Biodiversity, NTG to access surveys and information relevant to the EAW area.

DLP Response:

DLP has received from Marine Biodiversity a listing of EPBC listed marine megafauna within the East Arm area and within the broader Darwin Harbour; these are shown in the attached Geo Oceans report. Coupled with the results from the GHD surveys presented in Section 14 of the EISS, DLP contends that there is sufficient information available on the presence of EPBC listed marine megafauna within the East Arm area for the assessment of the proposed project to be finalised. DLP recognises the presence of marine megafauna (and some habitats that may be utilised by these species) within East Arm and will manage the construction activities appropriately to reduce the risk of impacts to them.

DEIS Ref	Further information provided under: Sections 2.7.3 & 2.7.5 (piling activities), 13.2.4 & 13.6 (potential noise impacts from piling) and 13.9.1 (marine fauna exclusion zones)
EISS Ref	Further information provided under: Section 15
NRETAS Comment	Further information about the piling activities to validate the exclusion zone of 500 m and the extent of piling to be undertaken is to be provided.

DLP Response:

Piling activities are proposed to be undertaken over a period of some six months at the MSB and for two months at the Tug Pens. The final construction methodology for the MSB is yet to be confirmed; hence the total number of piles required cannot be estimated. For the Tug Pens a total of 48 piles will be required.

The 500 m exclusion zone is derived from the assessment of underwater noise modelling outputs presented in Appendix S7 of the INPEX SEIS (INPEX 2011). The rationale for the size of the exclusion zone is presented in this document and also in Section 13.9.1 of the DEIS. To reiterate, given the proximity of the INPEX development to the EAW expansion, it is considered that the modelling undertaken for INPEX could be applied to the EAW expansion and a similar exclusion zone adopted.

DEIS Ref	Further information provided under: Section 15.7
EISS Ref	Further information provided under: Section 14
NRETAS Comment	Three species of sawfish have been recorded in Darwin Harbour and as such information regarding the potential impacts needs to be provided.

DLP Response:

The extract of the MAGNT database for records of marine species protected under the EPBC Act within Darwin Harbour and surrounding areas (as provided to DLP on 2 December 2011) does not include any records of sawfish. DLP will appreciate receipt from DSEWPaC of any records they may have of sawfish within Darwin Harbour.

It should be noted that potential impacts upon sawfish from a number of dredging-related sources are discussed in Section 14 of the EISS. DLP will appreciate advice from DSEWPaC as to the identity of the third species of sawfish purported to have been recorded within Darwin Harbour and whether they perceive it could be vulnerable to impacts other than those described in the EISS for two sawfish species.

DEIS Ref	Further information provided under: Sections 13.1, 13.7
EISS Ref	Section 14

<p>NRETAS Comment</p>	<p>On page 192 of the draft EIS it is stated "development of harbour facilities serviced by heavy vessel traffic will also elevate local background levels, and may cause some species to avoid former nearby breeding or feeding areas owing to the amount of vessel movement and disturbance as well as noise'. The location of this referred habitat for the Australian Snubfin dolphin must be provided. The DSEWPaC species profile for the Snubfin dolphin identified that it can be expected to exhibit vessel avoidance behaviour, potentially negatively affecting their extent of occupancy and life history, as per other nearshore dolphins. Additionally, the frequencies of whistles produced by Snubfin dolphins are likely to fall within the range often emanating from boat traffic, suggesting that noise pollution may be a problem for this species". All impacts from increased vessel traffic must be provided (noise and collision) and proposed monitoring and mitigation measures and their efficacy be addressed. An estimation of the number of current vessels using EAW and the number of additional vessels expected due to the proposed expansion would aid assessment of vessel impacts on this species.</p> <p>Comments made above for the Australian Snubfin dolphin should also be used for Spotted Bottlenose Dolphin, Indo-pacific Humpback Dolphin, Dugong and Marine turtles.</p> <p>Impacts from increased vessel traffic (noise and collision) and proposed monitoring and mitigation measures for marine turtles need to be addressed. Foraging habitat areas for marine turtles also need to be discussed.</p>
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DLP Response:

The quoted DEIS text was intended to convey that a potential impact upon species if breeding or feeding areas were nearby. No breeding areas for any of the species mentioned by DSEWPaC are known to be present within East Arm.

The attached Geo Oceans report includes maps showing areas within East Arm that are potential foraging habitat for marine turtles and dugong. Given their diets, all areas within East Arm can be considered as potential feeding habitat for dolphins (refer Section 14 of EISS).

Potential sources of impacts from increased vessel traffic on each of the species are described in Section 14 of the EISS. Monitoring of actual impacts from increased vessel traffic will be via reports of collisions with vessels utilising the extended East Arm Port facilities. Dead or injured fauna that may be washed ashore in the vicinity of East Arm Port will not necessarily have been impacted by vessels utilising the port, but will be reported to NRETAS so that they may be examined for potential causes of injury. Routine monitoring of species in the vicinity of East Arm Port is not proposed as it would not be feasible to separate changes in behaviour due to vessels utilising the port from those due to other sources of potential disturbance (e.g. recreational boats or vessels servicing the Hudson Creek and INPEX LNG export facilities).

Mitigation against impacts upon the species during operation of the extended facilities will be through the inclusion within inductions of vessel masters and pilots of the need for vigilance for the species when approaching and departing the facilities. If confirmed collisions occur between vessels and the species, then further mitigation measures, such as reduced transit speeds within the approaches to the facilities, will be implemented.

The following predicted commercial vessel activity data have been provided by the Department of the Chief Minister. These data are for vessel usage of the entire East Arm Port, not just the facilities that are proposed for the expansion project.

Scenario	2009	2015	2020	2025	2030	2035	2040
Low Demand	501	974	538	470	558	418	402
High Demand	501	1130	934	866	866	918	626

The following data have been provided by the Darwin Port Corporation and show that vessel traffic over recent years has been predominantly fishing vessels, which will not be utilising the extended EAW facilities.

Vessel Type by Frequency of Call	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Trading Vessels							
Barge/stone dumping	293	628	550	594	585	586	635
Charter	18	20	23	153	6	1	2
Cruise	22	42	44	45	47	49	53
Bunkers/ferry	1	1	2	1	7		
Car carrier	12	12	13	13	12	13	18
Bulk – clinker/dry/concentrates/sulphur	12	10	21	44	54	76	63
Container/general cargo/ro-ro	178	163	107	145	171	178	167
Tanker – liquid bulk/petroleum	44	55	88	97	115	99	106
Rig Tender	366	270	307	369	520	517	353
Livestock	95	94	98	86	108	123	83
Trading Vessels Total	1 041	1 295	1 253	1 547	1 625	1642	1480
Non-trading Vessels							
Naval	80	87	69	65	50	35	70
Research	17	24	18	32	16	30	35
Pleasure/yacht	122	118	116	252	23	134	103
Sail/training	3	2	5	6	1	1	
Tug	36	42	28	53	78	97	143
Fishing/fishing supply/prawning	3 089	2 750	3 057	3 074	3 673	3182	3101
Pearling	159	129	112	148	3	117	73
Patrol Boat/Other/unspecified	68	90	59	163	144	312	308
Non-trading Total	3 574	3 242	3 464	3 793	3 988	3908	3833
TOTAL	4615	4537	4717	5340	5613	5550	5313
Percentage Change		-1.7%	4.0%	13.2%	5.1%	-1.1%	-4.3%

Darwin Port Corporation has also provided forecast vessel traffic data, excluding fishing vessels, tugs, ferries, charter, naval and pleasure vessels:

Vessel Type	Actuals		Forecast									
	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/2020
Barge	588	528	539	549	560	572	583	595	607	619	631	644
Car/Carry	12	12	12	12	13	13	13	14	14	14	14	15
Clinker	4	3	3	4	4	5	5	5	5	6	6	6
Container	42	54	57	60	63	66	66	66	66	66	66	66
D/Bulk - Cu/Mg tails	3	22	24	59	84	84	84	109	109	49	49	49
D/Bulk - Mn	20	24	27	33	33	33	33	33	33	33	33	33
D/Bulk - Iron Ore	22	27	33	33	47	64	64	71	98	98	98	98
General	129	113	119	125	131	137	137	137	137	137	137	137
L/Bulk	10	8	12	12	13	13	14	15	16	16	17	18
Livestock	108	125	138	145	152	159	167	176	185	194	204	214
Petroleum	48	33	41	43	45	54	57	59	62	66	69	72
Research	16	27	29	29	29	29	29	29	29	29	29	29
Rig Tender	520	529	594	612	630	820	861	904	1,039	1,091	1,146	1,203
Sub Total	1,523	1,505	1,627	1,716	1,804	2,050	2,114	2,213	2,400	2,418	2,499	2,584
LNG	55	53	53	53	53	53	53	53	258	258	258	258
Cruise vessels	47	43	50	53	55	58	61	64	67	70	74	78
Grand Total	1,625	1,601	1,730	1,821	1,912	2,160	2,228	2,330	2,725	2,746	2,831	2,920

DEIS Ref	Further information provided under: Appendices B and E
EISS Ref	Further information provided under: Appendix E
NRETAS Comment	The dredge plume modelling provides one very specific scenario modelled for a cutter suction dredge (best case scenario) and it is assumed the proponent will accept dredging methodology is restricted to this method as a condition, should the project be approved.

DLP Response:

DLP considers this comment to be inappropriate. There is no mention of a CSD being the “best case scenario” in the DEIS. It is certainly the most likely equipment to be utilised, as described in Appendix E of the EISS. However, it would be highly irregular for a regulator to restrict a project to the use of a particular dredging technique as a condition of approval. It is more usual for a proponent to be given latitude to explore alternative techniques once a dredging contractor is appointed and the actual dredging methodology proposed to be applied is confirmed and modelled. Through their assessment of the Dredge Management Plan, the regulators then have the opportunity to consider whether the proposed method

poses a greater environmental risk than the method upon which the initial environmental assessment was based.

REFERENCES

- Alongi, D.M. 1989. The role of soft-bottom benthic communities in tropical mangrove and coral reef ecosystems. *CRC Critical Reviews in Aquatic Sciences* 1: 243–280.
- Carballo, J.L. 2006. Effect of natural sedimentation on the structure of tropical rocky sponge assemblages. *Ecoscience* 13(1): 119–130.
- EPA 2011. *Environmental Assessment Guideline for Marine Dredging Proposals*. WA Environmental Protection Authority Environmental Assessment Guideline EAG7, September 2011.
- GHD 2002. *East Arm Port Stage 2A Final Report*. Report to Department of Infrastructure Planning and Environment by GHD, June 2002.
- GHD 2006. *Darwin Wharf Project. Coral Monitoring – 2006 Post Dredge Survey*. Report by GHD, September 2006.
- INPEX 2011. *Ichthys Gas Field Development Project. Supplement to the Draft Environmental Impact Statement*. Report prepared by INPEX Browse, Ltd., Perth, Western Australia, for the Commonwealth Government, Canberra, ACT, and the Northern Territory Government, Darwin, Northern Territory.
- Rützler, K., Duran, S. and Piantoni, C. 2007. Adaptation of reef and mangrove sponges to stress: evidence for ecological speciation exemplified by *Chondrilla caribensis* new species (Demospongiae, Chondrosida). *Marine Ecology: An Evolutionary Perspective* 28 (Supplement s1): 95–111.

Yours sincerely

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