

Ms Lisa Bradley  
Department of Environment, Parks and Water Security  
GPO Box 3675  
Darwin NT 0801

Dear Ms Bradley

**Re: Referral - Department of Infrastructure, Planning and Logistics – Mandorah Marine Facilities**

The Department of Environment, Parks and Water Security (DEPWS) has assessed the additional information submitted for the above referral and provides the following comments:

**Flora and Fauna Division**

Staff from the Division have reviewed the referral and have identified the potential for significant impacts to natural values but information gaps mean there are uncertainties about the extent of these impacts. Detailed comments are provided in the table found at Appendix 1.

Based on the information provided, it is likely that impacts from the proposal will be localised, and that impacts to ecological values of the Harbour more broadly will be minor. However, some significant gaps in the information provided in the referral means that there remains some uncertainty about the extent of potential impacts, and it would be appropriate that these gaps are addressed to ensure robust impact assessment and comprehensive risk management through the Construction Environmental Management Plan (CEMP) and Dredging and Spoil Disposal Management Plan (DSDMP). This particularly applies to modelling of hydrodynamic processes and sediment deposition, the potential impacts of turbidity and sedimentation, and the location of the dredge spoil disposal site.

**Rangelands Division**

**Land Assessment Branch**

The disturbance of land with an acid sulfate soil risk should be avoided, however if disturbance is necessary for a proposed development area, then an acid sulfate soil field investigation will be required.

The investigation must be undertaken by a suitably qualified and experienced professional, in accordance with the Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines v4.0 (Dear et al. 2014) or the Western Australian Acid Sulfate Soils Guideline Series (DER 2015). Essential to an investigation is the requirement for Chromium Reducible Sulfur (CRS) soil testing at an appropriate site density and to a soil depth immediately below the proposed disturbance.

If acid sulfate soils are detected through CRS testing, and exposure of these soils is still unavoidable then an acid sulfate soil management plan is required. The acid sulfate soil management plan will include the following:

- exact location of the proposed disturbance;
- depth and volume of soil to be disturbed (m<sup>3</sup>);

- clearly presented CRS results;
- acid base accounting results which clearly indicate an accurate liming rate;
- appropriately designed treatment pads;
- lime/soil mixing regimes; and
- an appropriate monitoring program.

### Weed Management Branch

It is highly likely that gamba grass will be brought in to the site despite the proponent's assurance that clean fill will be used. Any weed management plan must have contingencies in place to respond to (eradicate) any gamba incursions on the site.

Section of referral	Theme or issue	Comment
Table 2-1		<p><i>Cenchrus polystachion</i> and <i>Cenchrus pedicellatus</i> (perennial and annual mission grass) are subject to a threat abatement plan under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) as they have been identified as a key threatening process.</p> <p>Consideration should be given as to any requirements under an applicable threat abatement plan.</p>
Section 2.1.1.3	Invasive species	<p>This sections should also address the Key Threatening Process of <i>Cenchrus polystachion</i> and <i>Cenchrus pedicellatus</i> relative to the EPBC Act.</p> <p>Proponent should note that <i>Cenchrus spp.</i> Mission grass (annual) has wrongly been identified as a Class A weed. <i>Cenchrus pedicellatus</i> is not declared in the NT.</p>
Page 95	Current management plans	Section should list the EPBC Act relative to Threat Abatement Plan for the 5 listed grasses as a Key Threatening Process.

### Environment Division

The Environment Division provides support to the Northern Territory Environment Protection Authority (NT EPA) and the Minister for Environment in administering the *Environment Protection Act 2019*. Officers in the Environment Division support the NT EPA to identify, assess and mitigate the risk of significant environmental impacts and also enforce environmental approvals that are approved by the Minister. In that regard, this Departmental submission does not reflect all Departmental assistance provided to the NT EPA.

Should you have any further queries regarding these comments, please contact the Development Coordination Branch by email [DevelopmentAssessment.DEPWS@nt.gov.au](mailto:DevelopmentAssessment.DEPWS@nt.gov.au) or phone (08) 8999 4446.

Yours sincerely

Maria Wauchope  
A/Executive Director, Rangelands

27 May 2022

APPENDIX 1 - Environmental impact assessment under the Environmental Protection Act 2019

Theme or issue	Comment
Terrestrial Ecosystems	<p>The proponent has accurately described the terrestrial biodiversity values for the project area and wider region. The Flora and Fauna Division agrees with the proponent's assessment that land-based construction activities will occur within cleared and disturbed lands and therefore the construction and operation is considered to be low risk to terrestrial biodiversity.</p>
Marine Environment	<p>In summary the referral identifies the following potential environmental risks and impacts associated with the proposed action:</p> <ul style="list-style-type: none"> <li>• impacts to sensitive receptors such as coral and seagrass habitats from elevated suspended sediments and excessive sedimentation</li> <li>• direct loss of habitat through dredging and placement of breakwaters</li> <li>• indirect impacts from decline in water and sediment quality with potential loss of ecosystem function,</li> <li>• potential impacts from vessel interaction and underwater noise on marine megafauna such as turtles, dugong and coastal dolphins</li> </ul> <p>The Flora and Fauna Division accepts the referral's conclusion that with proposed mitigation actions (e.g. vessel speed, soft starts when piling, lighting design) risks to migratory species is low.</p> <p>There is potential for turtle and dugong habitat to be directly impacted through sediment transport and sedimentation. The risks to these habitats from a regional context is likely to be low, however there is potential for local impacts which may alter the use of the area by individual marine megafauna.</p> <p>There are some information gaps that reduce the certainty associated with impact assessment and these are described further below.</p>
Landforms	<p>The referral documentation states that "beaches" are not a significant landform as these areas do not hold significant cultural or ecological value (page iv, Environmental Referral Report). The Flora and Fauna Division disagrees with this assumption, as these transitional environments can support both marine and terrestrial fauna, provide feeding habitat for migratory birds, provide nesting for marine turtles, and have a specific infauna community.</p> <p>In the case of the area relevant to the proposal, the intertidal beach impacted by the works is not known to provide important nesting habitat for marine turtles or important foraging, staging or roosting habitat for migratory waders and shorebirds.</p>
Sea	<p>The Division agrees with the proponent's conclusion that current characteristics are unlikely to be impacted over the broader Darwin Harbour. The proposal will alter the current changes within the local area (zone of influence) which will alter the benthic habitat and ecosystems locally. These changes are not considered to be a significant risk as there is unlikely to be critical habitat or important populations of aquatic species within the ZOI.</p>

<p>Coastal Processes</p> <p><i>Summary</i></p>	<p>The proponent aims to build two breakwaters to create a protected harbour to facilitate ferry terminal facility. Further, the project will dredge the newly created harbour to a depth of -4 m AHD, so it can be accessed during spring low tides.</p> <p>The breakwaters will alter coastal processes in the western nearshore marine environment of Darwin Harbour. In particular, it will irreversibly change environmental conditions that drive geophysical processes, coastal morphology, hydrodynamics, and sediment transport and hence will impact on the coastline, the near shore environment and the values they support. These changes also have the potential to influence the composition and distribution of benthic communities within the project's zone of influence (see further section Marine Ecosystems).</p> <p>Supported by hydrodynamic modelling, plume modelling, sediment transport modelling and wave modelling the referral concludes that whilst the project's intention is to deliberately change environmental conditions to facilitate an all-weather ferry facility it considers the changes to coastal processes to be small, inconsequential and will have negligible impact to the environment.</p> <p>Under the proposed development coastal processes will change from that of an open shoreline environment to a protected harbour environment, with associated changes to the currents and sedimentary characteristics, and a subsequent shift in benthic community structure. The Flora and Fauna Division considers that impacts from these changes within the newly created harbour will likely be localised and most likely will not be significant in the context of Darwin Harbour, although there are uncertainties associated with this conclusion due to information gaps described below.</p>
<p>Coastal Processes</p> <p><i>Currents, hydrodynamic and wave models.</i></p>	<p>The hydrodynamic model and wave model have not been qualitatively or quantitatively assessed. It relies on a visual assessment by using graphs that represent observed and modelled data. The referral should at least provide statistical metrics, such as skill, RSME and average bias, of the predictive power of the used models.</p> <p>The Flora and Fauna Division considers that the project may not significantly affect the broader Darwin Harbour hydrodynamics and metocean regime. However, the referral has not provided sufficient evidence to adequately demonstrate that the impacts are insignificant and will not affect what is referred to as Darwin Harbour's "compartments".</p> <p>For example, it provides only a single figure (Figure 9-3) for an outgoing tide (ebb tide), at a scale that is only useful at the whole of Darwin Harbour scale. This map seems to infer that post development the changes to current strength on an outgoing tide are localised; decrease nearshore and increase within the shallow subtidal area south of the rocky reef at West Point, north of Mandorah. The referral does not provide any results for spring flood tides post development.</p>
<p>Coastal Processes</p> <p><i>Sediment deposition from dredge and dredge spoil activities.</i></p>	<p>The referral states that the sediment deposition from dredging and dredge spoil disposal activities outside the direct footprint of the project is less than 2 mm. However, the sediment transport report (figure 6-3) clearly shows that deposition of sediments could be above 20 mm in certain areas.</p> <p>Given that the estimate is based solely on a model runtime of 15 days – when dredging and dredge spoil disposal concurrently occur – deposition of 20 mm of sediment within the 15 day timeframe could have large impacts to benthic fauna not considered in this referral.</p>

	<p>Further, the referral does not model potential sediment deposition from backhoe dredging, rock wall placement, handling of backhoe material to land based dredge spoil storage area or piling. Consequently, estimates of sediment deposition and extent could be significantly larger than the referral estimates. The Flora and Fauna Division recommends that plume modelling and sediment deposition modelling includes the cumulative effects of all project activities that have to potential to affect sediment deposition.</p>
<p>Coastal Processes <i>Beach erosion to the south of the project.</i></p>	<p>The referral notes that there will be beach erosion south of the proposal. This was not discussed further and no information was provided on the predicted fate of sediment eroded from the beach. Natural features that support aquatic fauna (seagrass meadows, drainage channels) are known to occur to the south of the proposal. However, the fate of eroded sediment on these features/habitats is likely to be localised and is unlikely to impact on the availability of these habitats for aquatic fauna in Darwin Harbour.</p>
<p>Marine Env. Quality</p>	<p>The referral has considered the potential release of contaminants from seabed sediments into the marine environment, potential turbidity and sediment plumes from dredging and dredge spoil disposal activities; run-off of waste and pollutants from terrestrial activities and the siltation of the marine facility. The referral considers with appropriate mitigation, the residual risk for all environmental aspects to be low.</p> <p>The Flora and Fauna Division agrees with most of these conclusions, with the exception of turbidity and plume modelling impacts. The referral has assessed changes in turbidity / total suspended solids (TSS) by modelling sediment plume dispersal from dredging of unconsolidated sediments and rock and dredge spoil disposal of unconsolidated sediments. However, there are a number of other pathways that sediment plumes can occur that have not been considered, such as potential plumes from the handling of dredged rock and transfer to land based storage site, and the building of the breakwaters or piling.</p> <p>To inform the risk assessment for benthic primary producer habitats (see section Marine Ecosystems) from elevated suspended sediments there is need to understand the changes in light intensity and duration at the seafloor. To undertake this assessment there is a need to understand the TSS / turbidity – light intensity relationship which can then couple with the plume modelling.</p>
<p>Marine Env. Quality <i>Zone of Influence, thresholds and triggers.</i></p>	<p>To allow for a risk assessment the referral has calculated three zones of impact: high (ZoHI), medium (ZoMI) and zone of influence (Zol) for wet and dry season conditions. They are predominantly defined by the level of impact to benthic communities (irreversible impact, recoverable within five years and undetectable impact).</p> <p>There are a number of technical inadequacies identified in the Sediment Transport Report, particularly around the proposed trigger values for impact in the Zol, which need to be resolved. The referral outlines the determination of total suspended sediment (TSS) values for 50th, 90th, 95th and 99th percentile and the duration of exceedances above background levels (Table 7-2, Sediment Transport Report). There seems to be an error in table 7-2: it is unclear how for wet season conditions the exceedance duration for them 95th percentile can be smaller than the 99th percentile. If this is correct, then this should be explained in the text. Trigger values were developed for both wet and dry seasons (Table 7-3, Sediment Transport Report). However, Table 7-3 is missing.</p>

	<p>In the following section (p 27 of the Sediment Transport Report) assigns the trigger values to the zones of impact, using the 85th percentile for the Zone of High impact, the 90th percentile for the Zone of medium impact and 95th percentile as the zone of influence. In all three case it uses the TSS concentrations: 11 mg/L during the dry season and 49 mg/L in the wet. It is unclear why this approach is taken. Firstly, the zone of influence would at the lower end of the percentile range, not the highest. The TSS concentrations for each of the impact zones cannot be the same for each percentile classes (Table 7-2 clearly shows this is not the case). Finally, the referral arbitrary assigns a percentile class to a Zone of impact. There is no supporting evidence that links TSS values, exceedance durations to the definitions used for impact zones. Further, the severity of the impact is solely dependent of TSS values, rather than combined effect of sediment deposition and TSS values. This assessment should also include the derived layer for light availability at the seafloor (see Marine Environmental Quality).</p> <p>As the DSDMP relies heavily on these triggers to inform management actions, it is critical that this section is well documented and reasoned. Clear supporting evidence should be provided that links total suspended solid (TSS) values, and exceedance durations to the definitions used for impact zones. Further, the severity of impact should consider the combined effect of sediment deposition, TSS values and the derived layer for light availability at the seafloor (see Marine Environmental Quality).</p> <p>Given there is a need for further information which may change CEMP and DSDMP mitigation actions, it is recommended that these two management plans are revised with the additional information before works can commence.</p>
<p>Marine Ecosystems <i>Benthic Habitats.</i></p>	<p>Benthic primary producer habitats and filter feeder habitats can be impacted by suspended sediment through three primary pathways: light reduction, increased suspended sediment concentrations, and sediment deposition (smothering). The level of risk to these habitats is unknown but is likely to be localised due to the scope of works and the extent of dredging/disposal. Impacts to these habitats can be reduced through the development of appropriate triggers which are informed using research by WAMSI and the NESP Dredging node<sup>1</sup>.</p> <p>The Flora and Fauna Division considers the approach for identifying sensitive receptors acceptable, in that it used modelled data to underpin ground truthing of benthic habitats at a finer scale. The Flora and Fauna Division notes a preference for towed video to be used in such assessments, rather than drop down camera, especially where benthic cover is low. The referral could have tried to model survey results to get a better estimate of the extent of sensitive habitats, rather than drawing polygons around sites with similar community types. Udyawer et al (2021) provides a method how to derive predicted habitat maps.</p> <p>The Flora and Fauna Division questions why the spoil disposal site lies outside the benthic survey area. Consequently the risk assessment relies on modelled data, rather than verified habitat data. The Division also queries why the dredge spoil area was placed just north of a subtidal rocky reef, which generally are high biodiversity areas, and not directly west of project area, closer to the main channel of Darwin Harbour, which would most likely evade impacts to sensitive receptors. The distance from the project site would have been approximately the same as the current chosen disposal site.</p>

<sup>1</sup> [Dredging Science Program – Western Australian Marine Science Institution \(wamsi.org.au\)](https://www.wamsi.org.au)

	<p>The Flora and Fauna Division recommends that the proponent fills the habitat mapping gap within the zone of influence of the dredge spoil disposal plume, or reassess the placement of the dredge spoil disposal site.</p>
Seagrass and Dugong	<p>Seagrass meadows on the western side of Darwin Harbour are not extensive and are only known to occur in small areas, between Weed Reef and Stokes Point, the mouth of Woods Inlet, Mandorah, and some small patches between West Point and Charles Point. These seagrass meadows do not seem to be as extensive as those on the eastern side of Darwin Harbour. Woods Inlet is a known feeding ground for Dugong, even though percentage cover of seagrass is low (less than 5% cover). Even though the meadows along the western side may not be the main feeding grounds for dugong in Darwin Harbour, they may assist dugong movement between Darwin Harbour and Bynoe Harbour. In that respect the loss of seagrass habitat within the zone of influence could influence feeding dugong and hinder movement.</p>