

## Submission on the supplementary environmental report (SER)

### Department of Infrastructure, Planning and Logistics – Mandorah Marine Facilities

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This submission is made under regulation 123 of the Environment Protection Regulations 2020

#### Government authority: Aboriginal Areas Protection Authority

**Summary:** AAPA's submission on the Environmental Impact Assessment raised concerns that potential indirect impacts from changing coastal processes had not been addressed. The supplementary environmental report has developed wave, tidal, and longshore current (littoral drift) models to consider changes to coastal processes.

AAPA is satisfied that coastal erosion is not anticipated based on changes to tidal flow velocities and wave heights as long as NTEPA is satisfied with the parameterisation, assumptions, and calibration of the models. In terms of parameterisation and assumptions we note that all of the post development scenario coastal process models appear to consider the harbour breakwaters but not the change in sea floor created by dredging (excavation and deposition). As the sea floor bathymetry is a model input it is not clear why changes to the sea floor bathymetry are not incorporated.

The longshore current (littoral drift) model predicts erosion of an Aboriginal sacred site associated with changes to north to south longshore currents due to the barrier created by the harbour. This appears to be based on a model that has not been well calibrated to baseline conditions and therefore there is low confidence in its predictive ability.

The models have considered the impact of the project on the Aboriginal sacred site situated 300m to the north, referred to in the Environmental Impact Assessment comments. There is potential for impact on this Aboriginal sacred site from deposition of sediment dispersed by dredging activity and deposition associated with impeded littoral drift. The existing Authority Certificate C2019/067 does not take into account impacts to areas outside of the immediate project area (subject land). A Variation to the existing Authority Certificate C2019/067 should be sought for the protection of the wider potential impact area.

The excavation of sand from another location, trucking, and distribution south of the harbour around the Aboriginal sacred site in perpetuity is not considered to be a sustainable mitigation strategy, nor culturally sensitive. Such an activity would require a Variation to the existing Authority Certificate C2019/067 to avoid offending the *Northern Territory Aboriginal Sacred Sites Act 1989*.

Section of SER	Theme or issue	Comment
Executive Summary	4.3 Coastal Processes	<p>States: <i>The interruption of southward moving sediment may create a supply deficit to the beach south of the facility, leading to gradual erosion and shoreline recession. This may be counteracted, however, by additional protection from wave energy from the facility that reduces the existing drivers of longshore drift.</i></p> <p>The report describes how longshore drift transports sediment from north to south, and interruption of this may lead to erosion of the coast south of the new harbour. Therefore it is not clear how 'counteracting' these processes would be beneficial when maintaining these processes appears to be important.</p>

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Executive Summary	4.5 People	<p>The potential for impacts to Aboriginal sacred sites are concluded to be low.</p> <p>However, AAPA considers that any erosion within the sacred site boundary is a significant impact and proposed mitigation by transportation and distributing of sand around the sacred site to be a potentially significant impact.</p>
Main report 2	Proposal description	The proposed construction of a boat ramp, or construction related to repurposing an existing building at the site to become a ferry terminal building are not covered by AAPA Authority Certificate C2019/067.
Table 7-1	Weed monitoring	Weed monitoring is confined to the rehabilitated area. There is potential during and after the works for wind and dust to enable weeds to spread further afield. Monitoring should also include along the margins of the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2) to ensure the character of Aboriginal sacred sites are not impacted.
8.1	Coastal processes modelling	<p>Each model (tidal velocity, wave height, sedimentation/erosion, littoral drift) includes a wet season, dry season and typical storm scenario; but extremes, such as a cyclone event or the impact of the harbour on coastal processes with climate change are not described. Appendix K sections 5, 6, 8 describe cyclone and climate change variables.</p> <p>This section should make clear whether the predictive models incorporate cyclone and climate change. If it is the case, please state in this section that the inputs for each model account for cyclonic conditions and climate change.</p> <p>It is not evident that the change in sea floor profile as a result of dredging is incorporated into each model. The post development models appear to include the harbour breakwaters only. If a change in sea floor profile affects waves and tides then this should be incorporated into the post-development model.</p>
Figures 8-3 and 8-4	Tidal flow velocities	<p>The modelling shows that there is negligible change to flow velocities along the coastline encompassed by the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2).</p> <p>AAPA is satisfied that coastal erosion is not anticipated based on changes to tidal flow velocities, subject to satisfactory review of the models by NTEPA and the matters identified in comment 8.1 above.</p>
Figures 8-7 and 8-8	Wave Height	<p>The modelling shows that there is negligible change to wave height along the coastline encompassed by the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2).</p> <p>AAPA is satisfied that coastal erosion is not anticipated based on changes to wave height, subject to satisfactory review of the models by NTEPA and the matters identified in comment 8.1 above.</p>
Figure 8-12	Coastal sedimentation/erosion	<p>Note this model is based on the tidal velocity model and wave height model and therefore its parameterisation, assumptions, and calibration is also dependent on the quality of the related input models. NTEPA needs to be satisfied all three models are appropriate to the location and processes modelled.</p> <p>The modelling shows that there is negligible change to sedimentation or erosion rates along the coastline encompassed by the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2). AAPA is satisfied that coastal erosion is not anticipated based on modelling of sedimentation/erosion by tidal velocity and waves, subject to satisfactory review of the models by NTEPA and the matters identified in comment 8.1 above.</p>

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Figure 8-14	LITLINE profiles	<p>The LITLINE model profiles show existing bathymetry at two locations. It does not appear that the future bathymetry is used in the models. The changes to the sea floor are understood to be dredging around the harbour and deposition of the dredged material at a location offshore.</p> <p>8.1.6 describes updated bathymetry from new surveys as part of this work which are relevant to the baseline model, but it is not clear why the predictive model should not use the future bathymetry.</p>
8.1.4	Shoreline evolution	<p>The modelling shows that there is a change along the coastline encompassed by Restricted Works Area 2 (RWA2) within AAPA Authority Certificate C2019/067, as a result of the prevention of sediment transport southward associated with longshore currents due to the barrier created by the harbour. Up to approximately 15m is eroded along an approximate 75m extent of coastline in RWA2 compared to the baseline model over a 10 year period.</p> <p>It is not described whether the modelled erosion ceases and the coastline reaches a new equilibrium. It is not known whether the model has run for sufficient time to demonstrate when the shoreline becomes stable, therefore the full extent of erosion is not known.</p> <p>RWA2 allows no ground disturbing work beyond a depth of 600mm. Therefore if these model predictions were to occur then the Aboriginal sacred site could be damaged.</p> <p>The SER states that coastal erosion <i>...has resulted from the modelling both with and without the structures. I.e., it is a result of the 10-year period of coastal conditions.</i> However, this statement contrasts with satellite imagery which does not show any significant change to the coast in this area.</p> <p>Information in Appendix L casts doubt on the calibration of this model and its suitability for predicting shoreline evolution as a result of the harbour barriers.</p>
Figure 8-15	Model extent	<p>The model results indicate that the shoreline evolution model does not appear to extend to the Aboriginal sacred site situated 300m to the north referred to in the Environmental Impact Assessment comments and Table 5-1 of the main report. Therefore it does not appear that the potential for deposition at this sacred site has been assessed.</p> <p>There is potential for impact in this area from deposition of sediment dispersed by dredging activity and deposition associated with impeded littoral drift. A Variation to the Authority Certificate C2019/067 should be sought for the protection of the wider potential impact area.</p>
8.1.4	Shoreline evolution	<p>The process of dredging and deposition of dredged material does not appear to be included in the modelling of sediment transport. Marine water quality modelling (8.2.3 below) considers the development of a plume of total suspended solids which predicts deposition near-shore in the vicinity of the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2).</p> <p>The Environmental Referral Report (March 2022) section 9.11.5 also states <i>Sedimentation at this site has been modelled as minimal (less than 2.5 mm).</i></p>

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		The various marine processes appear to be modelled in isolation. Erosion is predicted by longshore current change but deposition is predicted by dispersion of dredged suspended solids. Modelling should account for multiple processes: changes to longshore currents plus suspended sediment dispersion caused by dredging to predict the overall effects.
8.2.3 Appendix L 8.4	Deposition of dredged suspended solids	<p>Marine water quality modelling predicts deposition of suspended solids near-shore in the vicinity of the Restricted Works Areas within AAPA Authority Certificate C2019/067 (RWA1 and RWA2) as well as an Aboriginal sacred site approximately 300m to the north (also identified in the Environmental Impact Assessment Report).</p> <p>Deposition within the sacred site boundaries could damage the sacred site.</p> <p>The Environmental Impact Assessment Report expected deposition to be isolated and temporary (i.e. during outgoing tide).</p> <p>It is not evident in this supplementary report that modelling shows deposition is temporary and will be removed by the tidal cycle.</p>
9.1	Culture and heritage	<p>States: <i>The shoreline modelling demonstrated that movement in the shoreline is unlikely to impact upon the RWAs</i></p> <p>This statement is incorrect. The modelling predicted erosion within Restricted Works Area 2 (RWA2) within AAPA Authority Certificate C2019/067, and therefore impact is likely.</p>
10	People	<p>The SER concludes that the potential for impacts to Aboriginal sacred sites are low.</p> <p>AAPA disagrees with this statement. Erosion within an Aboriginal sacred site is a significant impact. Any proposed mitigation activity, such as transportation and distributing of sand around the Aboriginal sacred site would require an amendment to the Authority Certificate and appropriate consultation with Aboriginal custodians.</p>
Appendix C 2.2.2	Significant Aboriginal heritage sites	Note that the Restricted Works Areas within AAPA Authority Certificate C2019/067 include Aboriginal sacred sites only. The certificate does not address all Aboriginal cultural heritage that may exist or be affected by the project.
Appendix C 14.2.2 Table 14-4	Water Extraction	<p>States: <i>It is likely that the contractor will need to obtain water offsite. Permission to access water points has been granted by Power and Water. NTG Road Bores are to be utilised where possible, and where not practical, private/pastoral bores may be nominated.</i></p> <p>Note water extraction is included as an activity within the Subject Land of AAPA Authority Certificate C2019/067. If water is to be extracted elsewhere then a Variation to the Authority Certificate may be required. For example groundwater drawdown may impact groundwater dependent Aboriginal sacred sites.</p>
Appendix C Table 14-6	Cultural Heritage Management Strategy	<p>States: <i>Should any item be encountered which is suspected to be a relic of heritage value or any relic, artefact or material suspected of being of Aboriginal origin,....There may be a requirement for the Heritage Branch (Department of Tourism and Culture), Land Council or AAPA to investigate the findings.</i></p> <p>Note that AAPA does not investigate archaeological finds.</p>

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Appendix C Table 14-8	Erosion and Sediment Control Management Strategy	The performance indicator and monitoring procedures should include the boundary of works area and the Restricted Works Areas within AAPA Authority Certificate C2019/067.
Appendix C Table 14-9	Weed Management Strategy	The monitoring procedures should include: <ul style="list-style-type: none"> <li>Daily site walkover of boundary of works area and the Restricted Works Areas within AAPA Authority Certificate C2019/067.</li> </ul>
Appendix C Table 14-17	Contamination Management Strategy	The control procedures should include: <ul style="list-style-type: none"> <li>prevention of contamination to the Restricted Works Areas within AAPA Authority Certificate C2019/067</li> <li>use, transportation and storage of chemicals be sited at the greatest possible distance from the Restricted Works Areas within AAPA Authority Certificate C2019/067.</li> </ul>
Appendix D 1.3.6	Social and Cultural Environment	States: <i>These sites are protected under the Northern Territory Sacred Sites Act 1989.</i> Please correct the title of the legislation to "Northern Territory Aboriginal Sacred Sites Act 1989".
Appendix D 1.4.5	Predicted changes at RWAs	States: <i>Presence of the proposed structures could induce changes to coastal morphology near these sites, reducing their integrity. Although sediment transport modelling has suggested this will not be the case...'</i> This statement conflicts with the shoreline evolution modelling that identifies erosion of the coastline within a Restricted Works Area identified in AAPA Authority Certificate C2019/067 (RWA2).
Appendix D 1.6.3 Table 1-2 2.2.2	Culture and heritage impacts	Degradation of sites of cultural significance is identified as a medium risk, to be mitigated by sediment redistribution. The method of sediment redistribution is not described in detail but is understood to mean excavation from sites of sediment accumulation, transportation, and deposition at sites of erosion.  This activity is not included in the Authority Certificate C2019/067 and would require a Variation to the Authority Certificate and additional consultation with Aboriginal custodians. Note that in Authority Certificate C2019/067 Restricted Works Area 1 states no work shall take place, and in Restricted Works Area 2 no ground disturbing work is permitted beyond the depth of 600mm.  The excavation of sand from another location and distribution south of the harbour in perpetuity is not considered to be a sustainable mitigation strategy. A sustainable ongoing restoration plan needs to be developed.  Rather than accepting such impacts and incorporating such mitigation measures the proposed harbour should be designed and modelled to identify the minimum impact configuration.
Appendix D 2.1 Table 2-1	Monitoring	Authority Certificate C2019/067 includes monitoring as an activity and can be undertaken within the Restricted Works Area 2 (RWA2) but no works shall take place in RWA1.  The rate of erosion is not clear from the modelling to determine an appropriate survey frequency. A 5 yearly basis may not be frequent enough to prevent damage in RWA2. If damage is to be prevented then the survey and mitigation needs to be at the rate of retreat of the shoreline.

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		<p>The trigger for a management response states: <i>Average shoreline position recedes by 5m compared to baseline</i>. AAPA does not accept that the shoreline can be allowed to retreat within a restricted work area. Such an action may be offence under the Sacred Sites Act. In principle triggers should pre-empt change to the environment at sensitive receptors and apply mitigation, not allow the change to occur.</p>
Appendix K 5, 6, 8	Sea level rise Modelling of cyclones	<p>An allowance for sea level rise is described but it is not clear whether this has been applied to the models.</p> <p>Wave heights and tidal levels have been determined from cyclone data, but it is not clear whether these have been applied to the models to show whether the breakwater design exacerbates the effects of natural extreme cyclone conditions.</p> <p>See comment main report 8.1 Coastal processes modelling.</p>
Appendix L	Bathymetry of dredged sea floor	<p>Each model is described in more detail in this appendix. The bathymetry of the sea floor is a model parameter, and as per comments in Section 8 of the main report, it is not known whether the change in sea floor profile as a result of dredging is incorporated into the model.</p> <p>Current bathymetry is described so it is assumed that the models use the existing sea floor in the baseline model and harbour scenario model, and the harbour barriers are imposed for the harbour scenario to compare wave heights, tidal velocity, and sediment transport with the baseline. The harbour scenario should include post development bathymetry rather than current (baseline) bathymetry.</p>
Appendix L	Shoreline Evolution Modelling	<p>7.4.2 States: <i>Figure 7-8 has resulted from the modelling both with and without the structures. I.e., it is a result of the 10-year period of coastal conditions or the assumptions related to sediment mobility, rather than the influence of the structures.</i></p> <p>This figure shows the modelled coastline inland from the current coastline based on model inputs using 2000-2010 metocean input data. However satellite imagery of the coastline between 2000 and 2020 does not suggest the coastline has moved, and is actually stable.</p> <p>7.3.4 states: <i>Based on a review of historic imagery this shoreline appears to have been relatively (dynamically) stable over the last 10 years, and would be considered to be in equilibrium for the existing wave climate and tidal regime.</i></p> <p>This suggests the model has not calibrated to the baseline conditions. There is uncertainty whether the model can represent the coastline conditions and therefore whether the model is fit for design optimisation and predictive use.</p> <p>7.5 states: <i>Given the uncertainty in the modelling and implications for potential environmental impact and ongoing sand management effort, it is recommended that routine monitoring of the shoreline position adjacent the facility be undertaken once it is constructed.</i></p> <p>If a model is not calibrated to the conditions it does not seem appropriate that it has been used for design, and its uncertain predictive ability is mitigated by monitoring after construction.</p> <p>Models have been used to optimise the design in terms of the stability of the breakwaters but apparently not to optimise the design to minimise coastal erosion. Further calibration and modelling should be conducted to optimise the breakwater design to minimise coastal erosion.</p>

