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Our ref: DEPWS2023/0087

Ms Kylie Fitzpatrick
Department of Environment, Parks and Water Security
PO Box 3675
Darwin NT 0801

Dear Ms Fitzpatrick

Re: Supplementary Environment Report – Department of Defence - HMAS Coonawarra Dredging and Dredged Material Management

The Department of Environment, Parks and Water Security (DEPWS) has assessed the information contained in the above application and provides the following comments:

Flora and Fauna Division

The Flora and Fauna Division have reviewed the Supplementary Environment Report and provided comments in **Attachment 1**. The proponent has addressed the majority of the information requests, however, there is still some uncertainty about the extent and magnitude of potential impacts because of gaps or inadequacies in the information provided.

The majority of this uncertainty can be addressed through improvements to the monitoring plan including appropriate site location through verification of benthic habitat distribution, appropriate and adequate baseline data, trigger thresholds and adaptive management responses. Attachment A provides detailed comment on the issues identified with the current monitoring program. The key remaining information gaps is the omission of a risk assessment for corals and macroalgae.

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, uncertainty remains about the presence and extent of impacts to sensitive benthic habitats due to gaps or inadequacies in the information provided. These gaps should be addressed to ensure robust impact assessment and comprehensive risk management through the Construction Environmental Management Plan (CEMP) and Dredge and Disposal Management Plan (DDMP).

Environment Division

The action may require approvals and licences under other NT legislation administered by the Environment Division such as the *Water Act 1992* (NT) and the *Waste Management and Pollution and Control Act 1998* (NT). All persons are required to comply at all times with the General Environmental Duty under section 12 of the *Waste Management and Pollution Control Act 1998* (NT). To help satisfy the General Environmental Duty, the proponent is advised to take notice of the list of environmental considerations below. The list is not exhaustive and the proponent is responsible for ensuring their activities do not result in non-compliance with NT laws.

A non-exhaustive list of environmental issues that should be considered to meet requirements under NT law are listed below:

1. **Waste**: If the proponent will collect, transport, store, recycle or treat listed wastes on a commercial or fee for service basis as part of the development or operations of the action, then an Environment Protection Approval or Licence may be required to authorise the activity under the *Waste Management and Pollution Control Act 1998* (NT). The proponent should also consider the following Northern Territory Environment Protection Authority (NT EPA) fact sheets:

    - How to avoid the dangers of accepting illegal fill onto your land[1].
    - Illegal Dumping - What You Need To Know[2].

2. **Dust:** The proponent must ensure that nuisance dust and/or nuisance airborne particles are not discharged or emitted beyond the boundaries of the premises as a result of the action.

3. **Noise**: The proponent is to ensure that the noise levels from the proposed premises comply with the latest version of the NT EPA Noise Management Framework Guideline[3].

4. **Erosion and Sediment Control (ESC)**: The proponent must ensure that pollution and/or environment harm does not result from soil erosion. ESC measures should be employed prior to and throughout the construction stage of the development. Larger projects should plan, install and maintain ESC measures in accordance with the current International Erosion and Sediment Control Association (IECA) Australia guidelines and specifications.

    Where sediment basins are required, the Northern Territory Environment Protection Authority recommends the use of at least Type B basins, unless prevented by site specific topography or other physical constraints.

    Basic advice for small development projects is provided by the NT EPA documents: Guidelines to Prevent Pollution from Building Sites[4] and Keeping Our Stormwater Clean[5] both available online.

5. **Water**: If this activity requires the discharge of waste to water or could cause water to be polluted then a waste discharge licence under the *Water Act 1992* (NT) may be required. Please refer to the Guidelines on waste discharge licencing[6].

6. **Storage**: Unless otherwise specified in an Environment Protection Approval or Environment Protection Licence, the proponent should store liquids only in secure bunded areas in accordance with VIC EPA Publication 1698: Liquid storage and handling guidelines, June 2018, as amended. Where these guidelines are not relevant, the storage should be at least 110% of the total capacity of the largest vessel in the area. Where an Environment Protection Approval or Environment Protection Licence is required the proponent must only accept, handle or store at the premises listed waste, including asbestos, as defined by the *Waste Management and Pollution Control Act 1998*, in accordance with that authorisation.

7. **Site Contamination**: If the development proposal relates to a change of land use or if the site is contaminated, including as a result from historical activities such as cyclones, a contaminated land assessment may be required in accordance with the National Environment Protection (Assessment for

[1] https://ntepa.nt.gov.au/__data/assets/pdf_file/0005/285728/factsheet_avoid_danger_accepting_illegal_fill_to_your_land.pdf
[2] https://ntepa.nt.gov.au/__data/assets/pdf_file/0008/285740/factsheet_illegal_dumping_what_you_need_know.pdf
[3] https://ntepa.nt.gov.au/__data/assets/pdf_file/0004/566356/noise_management_framework_guideline.pdf
[4] https://ntepa.nt.gov.au/__data/assets/pdf_file/0010/284680/guideline_prevent_pollution_building_sites.pdf
[5] https://ntepa.nt.gov.au/__data/assets/pdf_file/0006/284676/guideline_keeping_stormwater_clean_builders_guide.pdf
[6] https://ntepa.nt.gov.au/__data/assets/pdf_file/0005/950603/guidelines-waste-discharge-licensing.pdf

Site Contamination) Measure (ASC NEPM). The proponent is encouraged to refer to the information provided on the NT EPA website[7] and the NT Contaminated Land Guidelines[8].

8. **Air**: If the proposed activity will emit pollutants to air, an Environment Protection Approval or Licence and monitoring of emissions may be required under the *Waste Management and Pollution Control Act 1998*. See the NT EPA National Pollutant Inventory advice[9].

In conclusion to this letter, should you have any further queries regarding these comments, please contact the Development Coordination Branch by email DevelopmentAssessment.DEPWS@nt.gov.au or phone (08) 8999 4446.

Yours sincerely

Maria Wauchope
Executive Director Rangelands
8 June 2023

[7] https://ntepa.nt.gov.au/your-environment/contaminated-land/investigating-contaminated-land
[8] https://ntepa.nt.gov.au/__data/assets/pdf_file/0020/434540/guideline_contaminated_land.pdf
[9] https://ntepa.nt.gov.au/your-environment/national-pollutant-inventory

Attachment 1 - Submission on the supplementary environmental report (SER)

Department of Defence– HMAS Coonawarra Dredging and Dredged Material Management

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

Government authority: Department of Environment, Parks and Water Security–Flora and Fauna Division

Section of SER	Theme or issue to be addressed Marine Ecosystems	Assessment of proponent response
	Project timing	The proponent plans to undertake dredging activities during the Dry season. The Flora and Fauna Division recommends that all dredging in the harbour is undertaken during the Wet as it has relatively less impact on environmental windows and life cycle stages of sensitive receptors. If the proponent desires flexibility in the timing of dredging then it is recommended that conditions should be placed on any approval requiring the proponent to provide evidence that environmental windows will remain within natural boundaries and that life cycle stages will not be impacted on (e.g. seagrass flowering, coral spawning, fish/invertebrate larvae, invertebrate larval settlement).
SER Sections 2.3, 2.3.2, 2.3.3, and 2.7.	1. Provide details of the proposed timing, methods and reporting to undertake a baseline marine field survey of benthic habitats and communities to: a) collect underwater video transect data at a sufficient density to produce comprehensive mapping (at an appropriate scale) of the extent of benthic habitats within the predicted zone of impact and zone of influence (see point 2 below). b) identify and describe the type and spatial extent (with consideration of temporal/seasonal variation) of benthic substrates and biota within the zone of impact and zone of influence c) provide sufficient ground-truthed data to assess the accuracy of the DEPWS predictive benthic habitat model through comparison against predictive mapping	The proponent has undertaken a benthic habitat assessment and described the results of this survey in SER Section 2.3. This survey was undertaken in January 2023. The Flora and Fauna Division has concerns with the proponent solely relying on a benthic survey that was undertaken in January. This is due to the following reasons: i. Wet-season water-conditions are generally too turbid to reliably identify benthic biota from towed underwater video methodologies, especially the smaller sized benthic biota, e.g. ability to distinguish between encrusting sponges and ascidians, identify macroalgae and seagrass species (*Halophila* and *Halodule* sp.). As such, the accuracy of the towed video analysis will be constrained during wet season surveys. ii. Seagrass and macroalgal communities are highly variable in spatial distribution and cover between seasons (and years). Undertaking the survey during the Wet season would result in seagrasses being absent or at their smallest extent and in their poorest condition (e.g. reduced above ground biomass, smaller leaves).

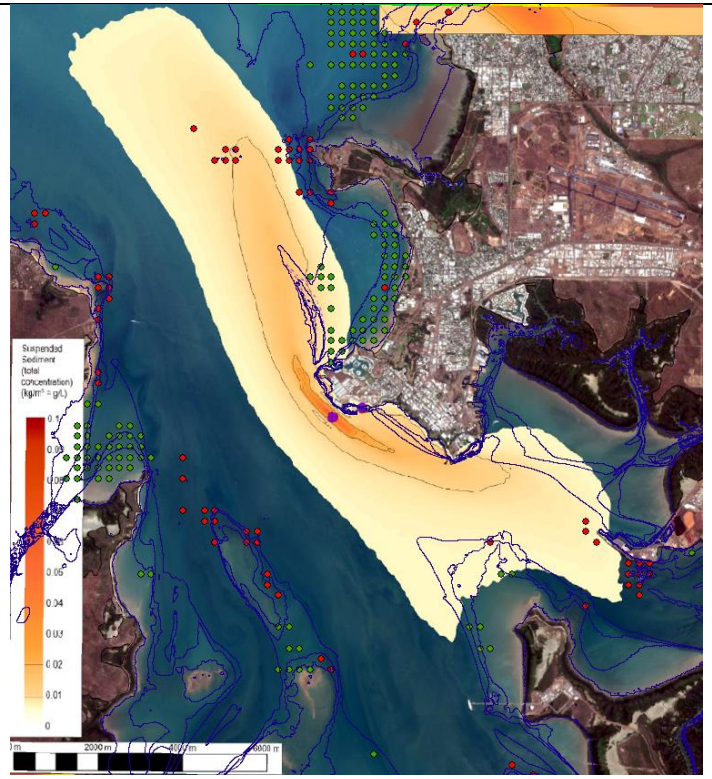

Figure A. SER Figure 3.13 overlayed with known seagrass (green) and coral (red) sites (extracted from DEPaWS databases). Data is summarised over multiple years; seagrass distribution may vary from year to year and season to season.

The proponent has noted that it undertook a benthic habitat assessment for the Zone of Influence and a portion of Fannie Bay. This has been described in the SER Sections 2.3.2 and 2.3.3 and SER Appendix C.

When comparing Figure 3.13 and Appendix C Figure 3, it seems that the assessment was not undertaken for the full extent of the Zone of Influence (ZoI) and only includes Zone of High Influence (ZoHI) and Zone of Low-Medium Influence (ZoL-MI) and a portion of Fannie Bay.

Figure 3.13 of the SER identifies the 90th percentile suspended sediment concentration for Wet season conditions.

If the proponent had undertaken surveys for the full extent of the ZoI then it would have likely identified coral communities within the vicinity of East Point Fish Reserve and Bullocky Point (see Figure A, which overlays the plume extent and known seagrass and coral sites). As the proponent did not identify any corals as being present, the SER did not include a risk assessment for coral communities.

The proponent has adequately discussed the accuracy of the predictive map in comparison to the field data collected in 2023 in SER Section 2.7 within the context of the limitations mentioned above. This information was presented as a "descriptive evaluation".

The proponent has attempted to compare the survey results from January with the predicted habitat map for macroalgal and seagrass distribution. This is unlikely to be meaningful as the model is more likely to represent community distributions in optimal environmental conditions, which would not have been present in January.

The method used to derive the habitat map (SER Figure 2.20) is generally not considered best practice. Habitat polygons were derived through interpolation techniques of transect information and then digitising habitat boundaries (SER Appendix C Section 3.6). It should be noted that all environmental and biological data underpinning the Streten et al 2022 habitat model is available. Use of Streten et al (2022) modelling techniques could have been applied to the existing and newly collected benthic community data to prepare an 'updated' habitat map. The results of the modelling could have been used to directly compare the two map products.

In summary, the Flora and Fauna Division considers that the January benthic survey is unlikely to be sufficient to accurately map the full extent of benthic communities;

		inform the risk assessment from project activities to sensitive habitats; and allow for identifying suitable monitoring sites, if required. The Flora and Fauna Division recommends that additional information is sought by undertaking targeted coral / seagrass / macroalgal benthic survey when seagrass are in peak condition prior to dredging starting to inform risk assessment and the need and placement of monitoring sites within sensitive receptors, if required.
SER Sections 2.3.1 Appendix C	2. Confirm that benthic habitat survey and classification would be undertaken in accordance with the following guidance: a) National Environmental Science Program Field Manuals for Marine Sampling to Monitor Australian Waters b) National Intertidal/Subtidal Benthic (NISB) Habitat Classification Scheme c) Collaborative and Annotation Tools for Analysis of Marine Imagery and Video (CATAMI) classification scheme.	The proponent has applied benthic habitat survey and habitat classification according to accepted guidelines. This has been discussed in Section 2.3.1 and Appendix C of the SER.
SER Section 2.3.4	3. Confirm that comprehensive benthic habitat mapping would be overlain with property boundaries, the nearshore discharge location, the predicted extent of the sediment plume dispersion and deposition effects, and depth contour lines for lowest astronomical tide (LAT), mean low water springs (MLWS), mean low water neaps (MLWN) and mean sea level (MSL).	The proponent has applied contours for LAT, MLWS, MLWN and MSL for relevant maps in Section 2.3.4 and Figures 3.26, 3.35 and 3.36.
SER Sections 2.4, 2.5, 2.6, 2.8	4. Provide detail about how the results of the benthic survey and mapping would be taken into account for each dredging action, using an adaptive management approach. Include detail about how potential impacts (related to sediment deposition, suspended sediment, turbidity and benthic light levels) on sensitive benthic communities and habitats (corals, seagrass, macro algae and filter feeders where presence is confirmed during field surveys) would be managed. Include detail about how benthic impacts from dredge spoil disposal would be monitored and measured, and the expected duration of recovery periods	Section 2.8 of the SER provides a discussion of the principles of adaptive management. The section contains no proposed adaptive management responses except for the WQ site in Fannie Bay. Furthermore, the design of the monitoring program does not allow for an adaptive management approach. Further comments have been provided below for Section 3.9 of the SER and Sections 2.9, 3.12 of Appendix E.

	where impacts are predicted or observed (informed by the revised hydrodynamic model – refer to item below).	
SER Section 2.9 Appendix E	5. Confirm that the draft Dredging and Disposal Management Plan reflects any necessary changes arising from points 1-4.	Section 2.9 summarises the main updates incorporated in the DDMP, with a copy of the updated DDMP included as Appendix E.
Section of SER	**Theme or issue** **Marine Environment Quality**	**Comment**
SER Sections 3.1, 3.2	Additional information is required in the SER to improve confidence in the hydrodynamic model outputs, results, and impact predictions, and to assess the significance of potential impacts of suspended, deposited and remobilised sediments on the marine environment. 1. Provide a detailed justification with information to support the use of a 2D hydrodynamic model for the prediction of dredging impacts from the proposal.	The proponent has implemented a 3D hydrodynamic model to improve modelling outputs. Sections 3.1 and 3.2 presents the supplementary modelling undertaken.
SER Sections 3.3, 3.6 Appendix D	2. Provide details and sources of the baseline data (including from field observations) that has been used in development, calibration and validation of the model to predict and validate the extent of the plume, including any plume validation data available from previous HMAS Coonawarra dredging monitoring programs.	The proponent has used data from previous dredging programs as baseline data to validate the plume modelling outputs (Section 3.3 of the SER and Appendix D). Use of the DEPWS water quality monitoring data is not appropriate as baseline for the current project. The data is biased towards Dry season neap tide conditions, only takes surface waters in the main channels into account and transects are often along environmental gradients. Therefore, the program is not designed to detect short-term spatial water-quality changes which are necessary for dredging related assessments. The proponent has identified a number of data sets that may contribute towards understanding of baseline environmental conditions. However, interpretation of these data are confounded by the following: i. representing sites are not comparable with the project's zone of influence (e.g. INPEX 2010-2012 long-term monitoring data set); and / or ii. are representative of environmental impact assessments and therefore may not represent base line conditions; and/or iii. are limited time series data sets (e.g. a single day, six, and nine days, (WQ monitoring prior 2006 and 2013 Coonawarra Dredging campaign); and / or

		iv. placement of loggers at the seabed without differentiating between bed load and water column TSS values (e.g. prior to the 2013 Coonawarra Campaign). As the proponent has acknowledged (NT EPA presentation 19 May 2023), piece meal data collation of existing water quality data was problematic in terms of data analysis due to unclear methods how data was collected and limited time series. The data is inadequate as a baseline for this project. Given the reliance on good baseline data to establish thresholds and triggers, the Flora and Fauna Division recommends that baseline data should be collected at least 6-8 weeks before dredging commences and should continue until at least a month after dredging is completed. As the baseline for this dredging activity is lacking and further dredging in the future is required, the Flora and Fauna Division recommends that monitoring is continued until the next dredging activity commences. This would provide at least two years' worth of data and ensure that there is a long-term data set that allows for: i. collection of data in a consistent way and ii. an assessment of WQ parameters across tidal, seasonal, and temporal scales. This would also allow flexibility around the timing of future dredging activities. The Flora and Fauna Division recommends that, as part of approval conditions, the collected raw and processed data should be provided to NT EPA in csv format with metadata by means of six monthly reporting.
SER Section 3.5 Appendix D	Describe how the baseline and model input data used are consistent with the requirements of the WAMSI Dredge Science Node Guideline on dredge plume modelling for environmental impact assessment (specifically sections 3, 4 and 5 of the guideline).	The proponent has adequately addressed the *requirements* around baseline and model input data that follow methodologies described in WAMSI guidelines on dredge plume modelling. It discussed this in SER Section 3.5, with SER Appendix D Supplementary Dredging Modelling Report providing further details.
SER Section 3.7	Confirm that the timing of baseline data collection corresponds to the time of year that dredging is proposed to occur. As a guide, if dredging is proposed in the dry season/build-up, data should be provided for a minimum of 28 days. If in the wet season, data should be provided for 6-8 weeks (i.e. to capture at least two monsoonal events). Provide the baseline data as part of the	The proponent has discussed this in SER Section 3.7. The Flora and Fauna Division considers that the baseline information is lacking (refer to comments above: Sections 3.3, 3.6 of the SER, Appendix D, dot point 2). No new baseline data has been collected. The analysis of existing baseline data collection relies on historic data which are collected over a single day, six, and nine days (WQ monitoring prior 2006 and 2013 Coonawarra Dredging campaign). This

	information response to this Direction (either from existing or new site specific monitoring).	falls well short of the NT EPA's request of or a minimum of 28 days. If in the Wet season, data should be provided for a period of 6-8 weeks.
SER Section 3.8	3. Describe how the following has been considered in development of the model and the prediction of impacts: a) the composition of TSS b) how TSS concentration data correlates to turbidity (NTU) level data at the proposed monitoring locations (including the two additional locations – refer to item below) c) the relationship between suspended sediment and light availability and quality at the seafloor	The proponent has addressed expected TSS characteristics from dredging and TSS – NTU – PAR relationships in Section 3.8 of the SER and Appendix E (Draft Dredging and Disposal Management Plan). The proponent has committed to a dedicated field sampling program to establish relationships between TSS- NTU – PAR. How this will be undertaken was not provided in the SER or Appendix D. The lack of clarity may lead to unintended outcomes. For example, the TSS – NTU – PAR field sampling program seems to have missed the need for determining the WQ parameter 'dissolved organic matter' (i.e. water colour). This is critical for establishing TSS/NTU – PAR relationships. Further, this relationship should be also established for at least Wet and Dry season conditions, because dissolved organic matter resulting from freshwater runoff through mangrove environments into Darwin Harbour is likely to be variable between seasons. In addition, depth/pressure should be measured as light attenuation is depth dependent. PAR should be also be measured at the surface as this will provide a reference against which light attenuation in the water column can be measured against. Otherwise the PAR measurement will not be able to attribute the light attenuation from TSS in the water column and will be confounded by changes of light intensity at the sea surface (e.g. due to cloud cover or sun angle). None of these considerations have been mentioned in the Referral, SER or SER Appendices. This may lead to poor outcomes such as poor estimates of TSS/NTU – PAR relationships, due to incomplete methodologies and poor sampling design. The Flora and Fauna Division recommends that all proposed monitoring and field sampling programs (see comment below: Item SER Sections 2.9, 3.12 and Appendix E) should have clearly defined objectives with clearly stated methods with measurable outcomes.
SER Sections 3.7, 3.11	5. Revise the monitoring program to include two additional sites as recommended by DEPWS; one along the western side of the Fannie Bay sand bank, as this lies in the major axis of most dredge plume modelling outputs; and at Bennet Shoal, which is likely to contain benthic primary producer habitats.	The proponent has included the two additional recommended monitoring sites (Sections 3.7 and 3.11 of the SER). The Flora and Fauna Division notes that the decision to establish a monitoring site is related to the purposes of monitoring. In the case of Bennett Shoal and Cullen Bay sites it's about impacts to sponges/filter feeders and seagrass, respectively. Therefore, ultimately the position of the sites should depend on the outcome of pre-dredging benthic survey to ensure that they

		adequately placed within the targeted benthic habitat that requires monitoring (see also comments re: Sections 2.9, 3.12 and Appendix E for further comments about monitoring sites). All monitoring sites should at least include telemetered light, turbidity and depth/pressure measurements.
SER Section 3.9	Review the proposed trigger values (TSS <20mg/L in dry season and <30mg/L in wet season) and the 1:1 TSS/turbidity (NTU) correlation, that would initiate a management response during nearshore spoil disposal and include triggers for time duration of exceedances for specific benthic communities including corals, seagrass, macro algae and filter feeders (where presence is confirmed during field survey). Interim triggers should be established from baseline TSS, turbidity and benthic light level data with consideration of the WAMSI Dredge Science Node research reports on ecological thresholds and environmental windows at WAMSI dredging node (link). As an example, in the case that only dry season site-specific data is available, this should be cross referenced with established guideline values (for the benthic communities present) in the WAMSI data, to establish interim guideline values for the wet season, which could be used until sufficient site-specific wet season monitoring data is available. In the case that existing site-specific seasonal baseline monitoring data is not currently available, the proponent should first obtain data for the season in which the initial dredging works are proposed to be undertaken.	The proponent provides a discussion around proposed trigger values and revised Zones of Impact in Sections 3.9 and 3.11 of the SER. The section has considered the WAMSI Dredge Science Node research reports on ecological thresholds and environmental windows at WAMSI dredging node in developing triggers. The section has also defined boundary conditions for establishing various zones of impact. **Zones of Impact.** The Referral (Section 10.3.1 p. 98) and SER (SER Section 3.9) define the outer boundary of the ZoI by the 90th percentile 10 mg/L contour plot for suspended sediments, as defined by dredge plume modelling. The 10 mg/L criteria is based on TSS conditions where benthic communities may experience (detectable) changes in sediment-related environmental quality. The Flora and Fauna Division considers the use of '*…what benthic communities may experience as a detectable change in environmental conditions…*' not sufficient for defining the zone of influence. Species that make up benthic communities have different responses to elevated TSS. Further, the proposed value does not take into account TSS sensitivities for microalgae, zooplankton, pelagic species, etc. The Flora and Fauna Division considers that these values should be used to determine the various zones of impact (e.g. high, medium and low), rather than the zone of influence. The Flora and Fauna Division recommends that the proponent follows Australian Guidelines for Water Quality Monitoring and Reporting[10] which states that the 80th percentile above background conditions are considered a detectable change and thus should be considered the zone of influence. Background levels for the Dry and Wet are respectively 3 and 5 mg/L (SER Section 3.2.2 p. 39). If this approach was followed, then the plume may well extend into East Point Fish Reserve, which is a designated fish nursery area and is known for its phototrophic benthic communities (also see comments above for Sections 2.3, 2.3.2, 2.3.3, and 2.7). Further, the zone of influence is not only determined by elevated suspended sediments, but also deposited suspended sediment (SER Section 3.4.2 Figure 3.25

[10] ANZECC and ARMCANZ, 2000. Australian Guidelines for Water Quality Monitoring and Reporting.

		p.61). Therefore for completeness, the SER could have incorporated this into Figure 3.33 (SER Section 3.9, p.81). In the absence of locally derived environmental windows, the proponent has used those derived by WAMSI dredging science node to establish zones of impact. Zones of impact are species specific and thus the proponent used TSS sensitivities for sponges - the most dominant benthic community type identified during the benthic habitat survey (SER Section 2.3.3 and Appendix C). The SER proposed the 90th percentile of 23 mg L^{-1} contour as the boundary between Zone of Medium and High impact. The Flora and Fauna Division agrees with approach taken, but has concerns around the interpretation of WAMSI derived environmental windows. The assessment seems to consider sponges solely as heterotrophic. However, this is not the case; they can be phototrophic or heterotrophic or a mixture between the two (mixo-trophic). As such, in establishing the zones of impact both TSS and light should be considered, if phototrophic sponges are present. Given that the benthic habitat survey did not assess whether phototrophic sponges were present, the precautionary approach should be taken and the most conservative TSS and light attenuation values provided in Table 1 in Pineda et al (2017[11]) could be used. This would imply that zones of impact would be defined as: low - ≤10 mg L^{-1} and DLI ≥1; moderate - >10 mg L^{-1} and DLI <1 and high - ≥30 mg L^{-1} and DLI ≤0.5 (DLI: Daily Light Integrals). The zone of high impact should also include direct smothering at the dredge spoil disposal site. Given that the sedimentation of TSS in low energy environments will occur, but mortality of benthic communities are unlikely, this zone could be defined as a zone of low impact. As light conditions have not been established and cannot be used yet as a trigger, it is recommended that a monitoring site is selected with high sponge coverage and is monitored for light and NTU parameters. The monitoring should include monitoring of bio indicators, such as bleaching, necrosis and mucus production in order to compare with results from WAMSI dredging science node (see Pineda et al 2017). Results from this monitoring program will inform risk assessment for future dredging activities and monitoring requirements. The Flora and Fauna Division does note that in the case where corals, macroalgae and/or seagrass are present, then zones of impact should be determined for each

[11] Pineda et al 2017 Effects of dredging-related stressors on sponges: laboratory experiments. WAMSI Dredging Science Node Theme 6 Report Project 6.4, November 2017. (Table 1, Page vii)

		community group and methodologies presented by Jones et al (2019[12], and visually presented in Figure 17, p. 24) could be employed to derive final zones of impact. This may need to be applied if the zone of influence is adjusted to the 80thpercentile above baseline conditions. **Triggers**. Sections 3.9 and 3.11 of the SER seem to infer that there are no management responses required, except for Fannie Bay. Consequently, there is only one trigger value discussed which aims to identify whether the plume enters into Fannie Bay or not. The trigger is set at 30 NTU based on 6 hourly average. The Flora and Fauna Division has a number of concerns with these two sections. i. If the aim is to establish whether the plume enters Fannie Bay, then the trigger should be based on similar principles as establishing the zone of influence. In other words, based on the 80th percentile of 3 NTU (dry season) or 5 NTU (wet season) and not 30 NTU as this is representative of the zone of high TSS impact boundary (see above comments re determining zones of influence and impacts). ii. The 6 hourly averaging seems inappropriate given that the proponent has identified that *the duration of 'high peak' periods* [of TSS] *are typically short and range between 2 to 4 hours* and that *sediment concentrations are predicted to be less than 20 mg L^{-1}*[i.e. ≈20 NTU] *for 90% of the time* (SER Section 3.2.2). iii. The SER or Appendix E (Dredge and Disposal Management Plan) provide no management actions associated with an exceedance of this trigger, except for an investigation of the source of potential elevated TSS. The Flora and Fauna Division recommends that this trigger should be revised and that meaningful management actions should be put in place. The proponent concludes that there will be no detrimental impacts to sensitive receptors. The SER seems to have concluded that therefore there is no need for developing triggers for management actions when thresholds for sensitive receptors are reached, nor is there a requirement for reactive monitoring. Counter intuitively, the Draft Dredge and Disposal Management Plan proposes a WQ reference site in Fannie Bay, near East Point. The Flora and Fauna Division does not agree with this approach because there has been no validation of the modelled plume behaviour and many mitigating factors are based on uncertainties around model parameters and/or mitigation based on assumption (e.g. background TSS, wind characteristics during dredging, bed shear

[12] Jones et al 2019. Synthesis report: Defining thresholds and indicators of coral response to dredging related pressures. WAMSI Dredging Science Node Theme 4.

		stress thresholds, expected reduced time of dredge operations, no spillage from leaks/barges) are yet to be tested by means of proposed WQ monitoring and sampling programs. In the absence certainty around the modelled plume behaviour and expected TSS, the proponent should have discussed contingencies in the case that dredging has unexpected outcomes by means of developing triggers for management actions when thresholds for sensitive receptors are reached. Further, the WQ reference site is obsolete if the SER and Draft Dredge and Disposal Management Plan accepts WAMSI guidelines which recommends triggers to be absolute values (i.e. no comparisons to a reference site). The Flora and Fauna Division recommends that the proponent use absolute trigger values and replace the WQ reference site with a monitoring site within a coral habitat in the northern tip of the predicted dredge plume (see Figure A, and comments for Sections 2.3, 2.3.2, 2.3.3, and 2.7.) As such, the Flora and Fauna Division recommends that further information is required around the triggers, thresholds and management actions. The proponent could also consider recommendations provided in Jones et al 2019.
SER Section 3.4 Appendix D	Describe how sediment deposition modelling has been developed, including for fine and coarse material and report on the time duration, magnitude and extent of deposition, the deposited sediment thickness, and the fate of deposited sediments. Describe how the model has been designed, calibrated and validated to assess impacts related to sediment behaviour, transport pathways, fate, and deposition.	The proponent has discussed in SER Section 3.4 and SER Appendix D (Supplementary Dredging Modelling Report) sediment deposition modelling for fine and coarse material. It has provided magnitude and extent of deposition, the deposited sediment thickness, and the fate of deposited sediments (SER Section Figure 3.25). As with many dredging activities, there is no sampling program put in place to validate the magnitude and extent of deposition, and the deposited sediment thickness. The Flora and Fauna Division recommends that a sampling program is put in place to validate sediment deposition modelling outputs.
SER Section 3.10.9	Demonstrate through survey, monitoring and modelling results that the proposed site for nearshore disposal is suitable for the avoidance of potential significant impacts to marine ecosystems.	The SER has discussed the suitability of the nearshore disposal location in SER Section 3.10. Given that the site was previously used twice for dredge spoil disposal the benthos is unlikely to be in optimal condition and therefore could be considered the site of choice. The wider environmental impacts are unlikely to be significant, providing above comments are addressed and that all monitoring and sampling programs are

		designed to have clearly defined objectives, methods with measurable outcomes (see comments below for Sections 2.9, 3.12 and Appendix E).
SER Sections 2.9, 3.12 Appendix E	Review and update the Draft Dredging and Disposal Management Plan to reflect any necessary changes arising from points 1-8 above.	The proponent has reviewed and updated the Draft Dredging and Disposal Management Plan (SER Appendix E) to reflect the supplementary information in Sections 2.9 and 3.12 of the SER. In light of Flora and Fauna Division's comments on the SER and its Appendices the following suggestions are provided for the planned monitoring and WQ sampling programs: i. The Draft Dredge and Disposal Management Plan should include Monitoring and WQ sampling programs that are designed to have clearly defined objectives, methods, and outcomes. ii. All monitoring sites should be telemetered and at least include light (surface and seafloor), turbidity and depth/pressure. This will allow for reactive management actions, if required, and allow for identification of faulty equipment. Approval should be conditioned that faulty equipment is replaced within a certain period, given logistical considerations. iii. The reference WQ site in Fannie Bay seems inappropriate as it reflects a low energy environmental condition, which is almost opposite of the conditions near Coonawarra basin. This site could be replaced with a telemetered site placed in coral habitat near East Point. iv. Sampling program to validate spatial extent of predicted plume should be daily at least over a full neap-spring tidal cycle, not the proposed 5 days. Further validation of 3D plume behaviour could be characterised for tidal and neap-spring cycles using ADCP transects v. Satellite analysis of surface TSS values to assist with validation of predicted plume modelling should be increased from monthly to at least weekly. Image analysis should be validated with *in situ* TSS sampling. vi. Verification of bed height using multibeam echosounder after dredging has been completed should be also undertaken for zone of High and Medium impact. vii. Validation of modelled sediment deposition is missing and should be included into the planned monitoring and sampling programs.