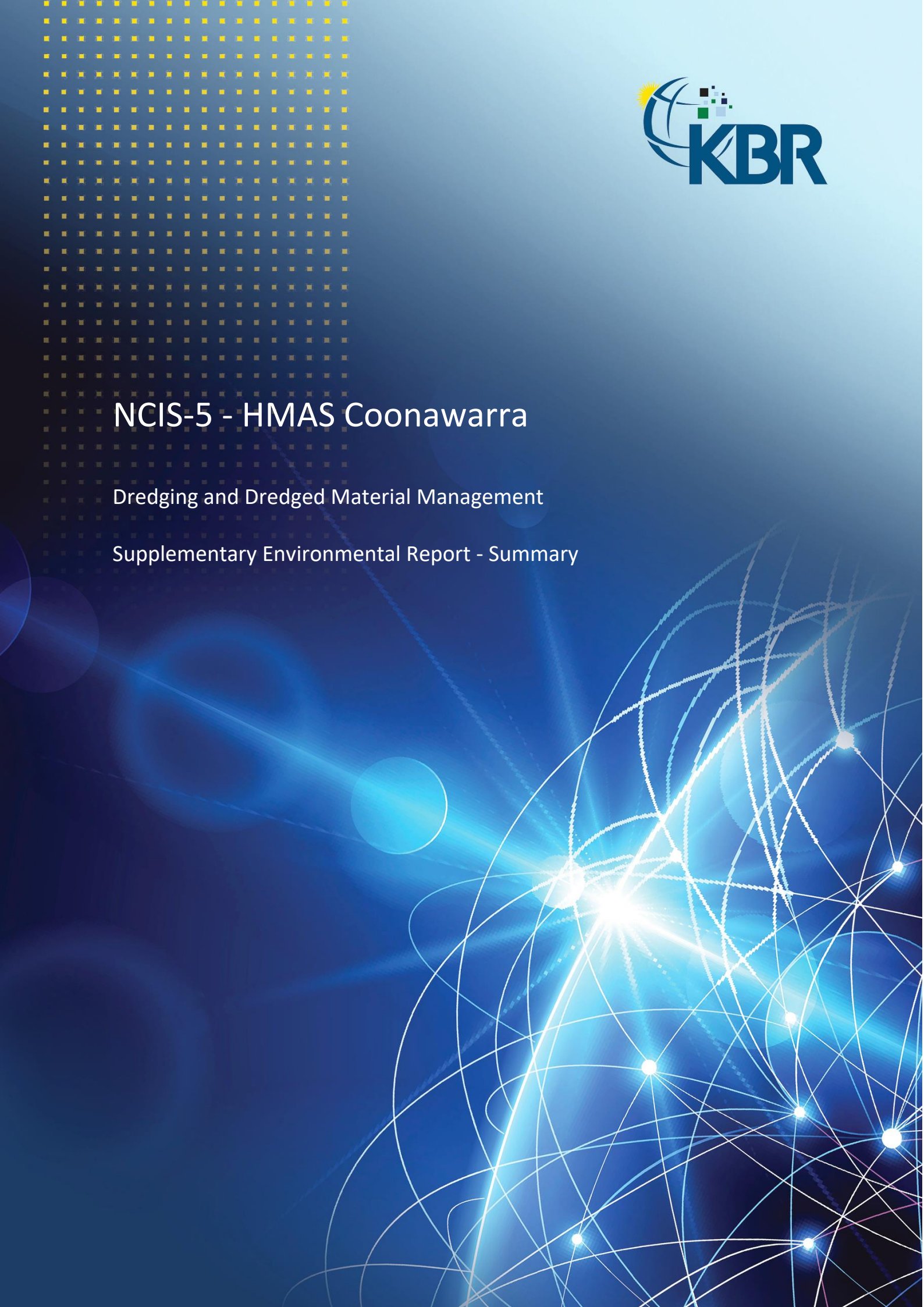
NCIS-5 - HMAS Coonawarra

Dredging and Dredged Material Management

Supplementary Environmental Report - Summary



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Dredging and Dredged Material Management

Supplementary Environmental Report - Summary

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Summary

The Commonwealth Department of Defence (Defence) (the Applicant), proposes to undertake dredging and dredged material disposal at HMAS *Coonawarra*, located approximately 2km north-west of Darwin city centre (Figure 1). A Referral for this proposal was accepted by the Northern Territory Environment Protection Agency (NT EPA) on 4 April 2022 and placed on public display for 20 business days.

On 12 July 2022 the NT EPA issued a Notice of Decision and Statement of Reasons which specified that the required method of environmental impact assessment is assessment by Supplementary Environmental Report (SER). The Decision Notice identified the need for additional information to assess potential significant impacts on the marine environment.

A '*Notice of Direction to provide additional information in the SER*' was subsequently issued by the NT EPA on the 14 October 2022. Attachment 1 of the Notice of Direction outlines specific requests for information in relation to the following:

- Sea – Marine Ecosystems: Benthic habitats and communities
- Sea – Marine Environmental Quality: Hydrodynamic model.

A number of submissions in relation to the Referral information were also received from government authorities during the public display period. No submissions from the public or other stakeholders were received. Many of the comments raised in the submissions are also covered in the Notice of Direction.

This SER provides information responding to all of the additional information requests made in Attachment 1 of the Notice of Direction, and the submissions received in relation to the Referral information. The primary purpose of this SER is to increase the level of confidence in modelling predictions and to confirm the extent and type of benthic communities within the predicted zones of impact and influence for the proposed dredging and dredged material disposal activities.

Marine ecosystems

Attachment 1 of the Notice of Direction noted that project specific benthic habitat survey and mapping are required to increase the level of confidence in predicting the potential for significant impacts on benthic communities. The published Referral did address the extent of potential impacts to benthic habitat based on a review of the published results of the surveys for other projects, data obtained from DEPWS and DENR, and field monitoring from the 2013 and 2006 HMAS *Coonawarra* dredge campaigns. It is acknowledged however that additional project specific benthic habitat data would improve confidence in the assessment of potential impacts.

Consequently additional assessment has been undertaken to support not only the proposed current dredging campaign but also future campaigns, including a baseline benthic habitat survey, comparison of the most recent field survey data with the latest available version of the DEPWS predictive benthic habitat model and reanalysis of potential impacts within the predicted zone of impact and zone of influence.

Additional benthic habitat data was also obtained from DEPWS, AIMS and the NT EPA to further understand the marine benthic habitat types likely to occur within the broader project area. Relevant existing benthic habitat data was reviewed and used in the development of the field survey scope.

Figure 1 **Project Locality**

The benthic habitat survey was undertaken from 16 to 18 January 2023 and involved the collection of underwater video transect data and still images within the zones of impact and priority areas within the zone of influence, informed by the results of previous field mapping campaigns and the modelled predictions presented in the published Referral.

The survey effort also included Fannie Bay, although it is not predicted to be within the zone of influence. Additional effort was made to survey areas which have previously been known to support seagrass habitat by capturing supplementary stationary high resolution images to enhance the detection of any seagrass, including seagrass remnants.

Results of the benthic habitat mapping show that the majority of the project area is characterised by bare substrate with very sparse coverage (≤ 10% cover) of filter feeders, primarily sponges, observed in those areas where some hard substrate, such as rock and gravel, is present (Figure 2).

The sparse coverage of filter feeders within the project area is resilient to the existing high sediment load, high current and low light conditions and is widespread and well represented within the harbour.

Seagrass, hard coral and macroalgae communities were not observed anywhere within the survey area.

Outcomes of this assessment and further review and reanalysis of other relevant benthic habitat survey data has provided greater of certainty with regard to the type and extent of sensitive receptors within the predicted zone of impact and zone of influence associated with the proposed activity.

Based on the benthic communities present, potential impact mechanisms are principally associated with direct sediment load, including the effects of suspended sediment concentrations in the water column and deposition. No highly productive or well developed filter feeder habitat was observed during the survey, and based on a review of available literature, it is expected that the low density, low diversity filter feeders present are well adapted to the dynamic sediment transport processes which occur within the project area and can tolerate periodic elevated suspended sediment concentrations.

Marine environmental quality

Supplementary modelling of dredge related sediment behaviour has been undertaken to supplement the modelled outcomes reported in the published Referral.

The objective of the supplementary modelling was to provide an updated assessment of the predicted impacts of dredging and discharge and to fulfill the requirements of the SER process. This additional work addressed the guidance provided in the Western Australian Marine Science Institution (WAMSI) guidelines for modelling for environmental impact assessments (EIAs) and the comments provided in the Notice of Direction.

The model update expands upon the previous studies undertaken, capturing the following:

- Review of additional available datasets from monitoring of previous dredge campaigns
- Development of a 3-dimensional (3D) model as a refinement to previous 2-dimensional (2D) modelling
- Review of the modelling approach in light of the guidance provided in the WAMSI Dredge Science Node '*Guideline on dredge plume modelling for environmental impact assessment*'
- Expanded modelling of sediment deposition and fate
- Review of dredge program based on further dredging contractor advice

The conceptual understanding of the hydrodynamic and sediment transport processes within the project area have been revisited along with the guidance provided in the WAMSI Guideline.

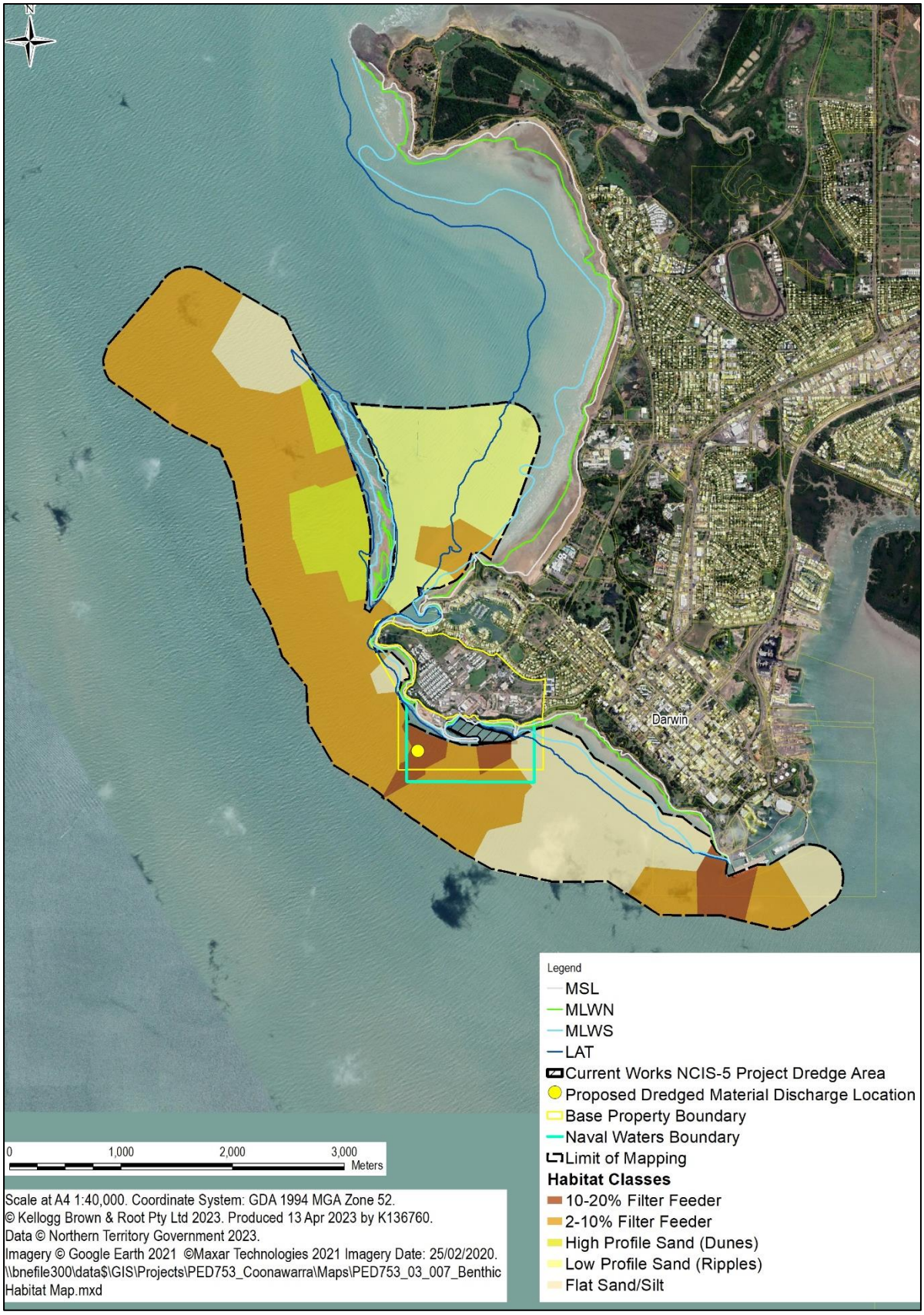

Figure 2 **Benthic habitat map**

The proposed dredging and disposal activities occur within an area of the harbour which is dominated by strong tidal currents and has a well-mixed water column. Measured data shows that current, density and sediment concentrations are typically consistent with depth through the water column. Based on this understanding and the guidance which is applicable to the proposed dredging campaign and project, the use of a 2D model (as reported in the published Referral) was considered to be appropriate for the project purpose. Nonetheless, a 3D model has now been developed to address the comments raised in Table 1 of the Notice of Direction and improve confidence in impact predictions.

The performance of the dredge modelling has been improved through the integration of additional field data collected during the 2006 and 2013 dredging campaigns. An overview of water quality data from these previous campaigns was provided in the published Referral, and additional data was obtained during the SER process. Uniquely, these previous dredge campaigns are comparable to the dredge activities currently proposed for HMAS *Coonawarra*. Data from the monitoring of these previous campaigns has therefore been used to confirm the conceptual understanding of the main sediment processes at the site and to improve the confidence in the dredged sediment modelling.

The supplementary modelling undertaken represents 3-dimensional effects as an improvement to previous modelling. The 3D modelled 90th percentile suspended sediment concentration is shown in Figure 3. This further modelling work provides improved predictions which have been used to update impact predictions in this SER. This additional assessment did not reveal any significant changes from the previous 2D modelling and impact prediction, but does provide improved confidence that both the 2D and 3D models are able to represent sediment plume behaviours. The 3D model refinements also provide an improved 'tool' for undertaking future assessments. The updated impact predictions are considered to be slightly conservative as there is a slight overprediction in comparison with measured data.

Updated predicted impact

The updated modelling results and the resulting zones of impact and influence, show high suspended sediment concentrations from dredging and discharge related activities will occur periodically within the areas up-current and down-current of the dredge and discharge location.

No benthic communities which are dependent on benthic light availability have been identified within the zones of impact and influence. The nearest area which could at times be sensitive to changes in benthic light availability, is the ephemeral seagrass habitat located to the north of the project (outside of the predicted zone of influence) within Fannie Bay. As shown in Figures 4 and 5 the predicted zones of impact and influence do not reach this area.

Modelling shows that periodic elevated suspended sediment concentrations are predicted to occur during the dredging campaign. Periods of dredging related elevated suspended solids concentrations vary according to the state of the tide, location and the operation of the dredge. Periods when suspended solids concentrations are elevated above background by the dredging are typically of less than 12 hours duration with a near daily return to baseline suspended sediment concentrations. Within these periods suspended solids concentrations high enough to cause stress or adverse effects to benthic communities are typically of 2 to 4 hours duration. Based on the modelling predictions and the results of previous dredging campaigns at HMAS *Coonawarra,* once dredging is complete the system will quickly return (within 3 to 4 days) to its pre dredging water quality condition (i.e. baseline marine water quality conditions).

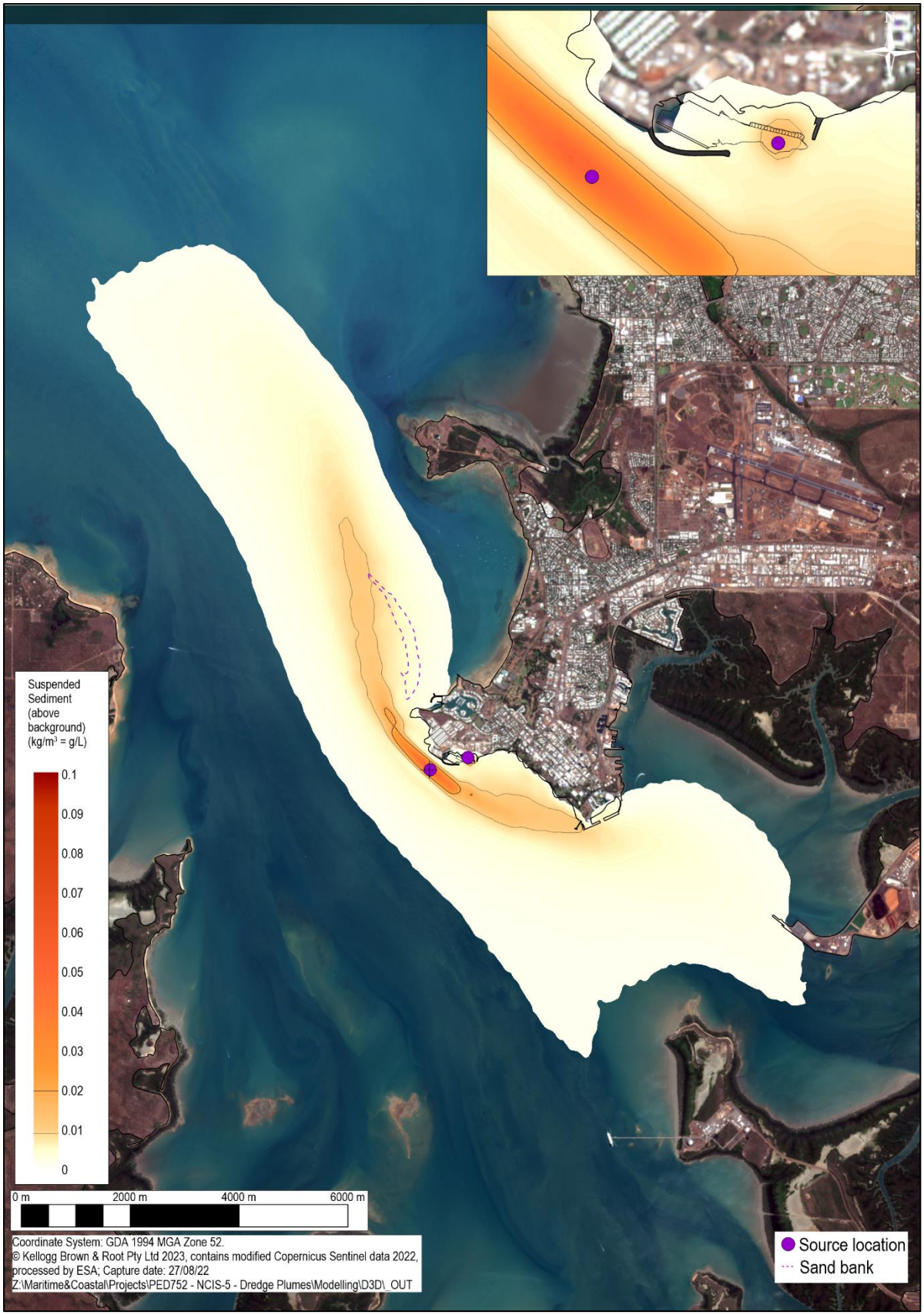

Figure 3 **90th Percentile suspended sediment concentrations above background from CSD with nearshore discharge**

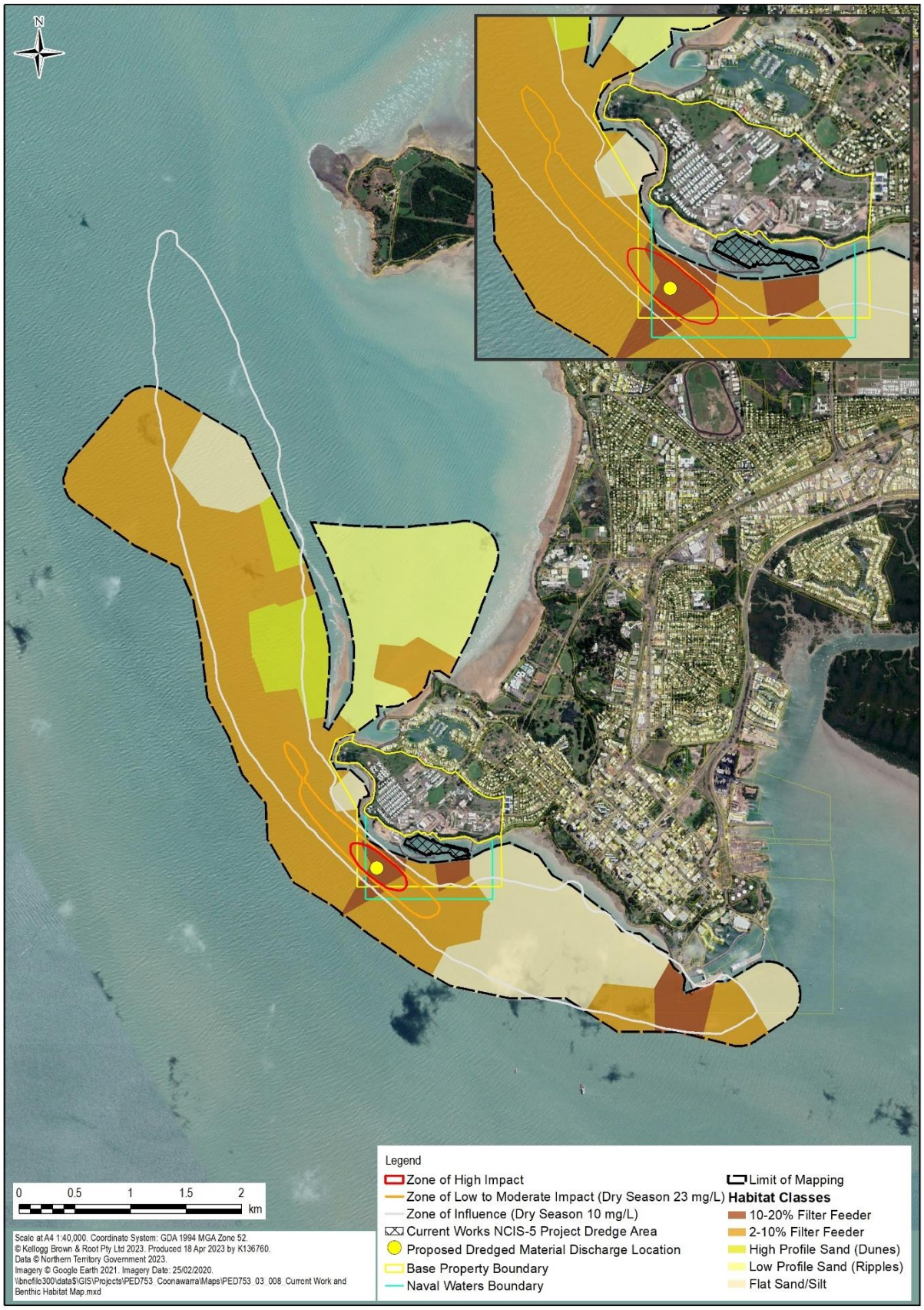

Figure 4 **Benthic habitats within the 90th percentile suspended sediment concentration zones of impact and influence (Includes 3 mg/L background – Dry Season)**

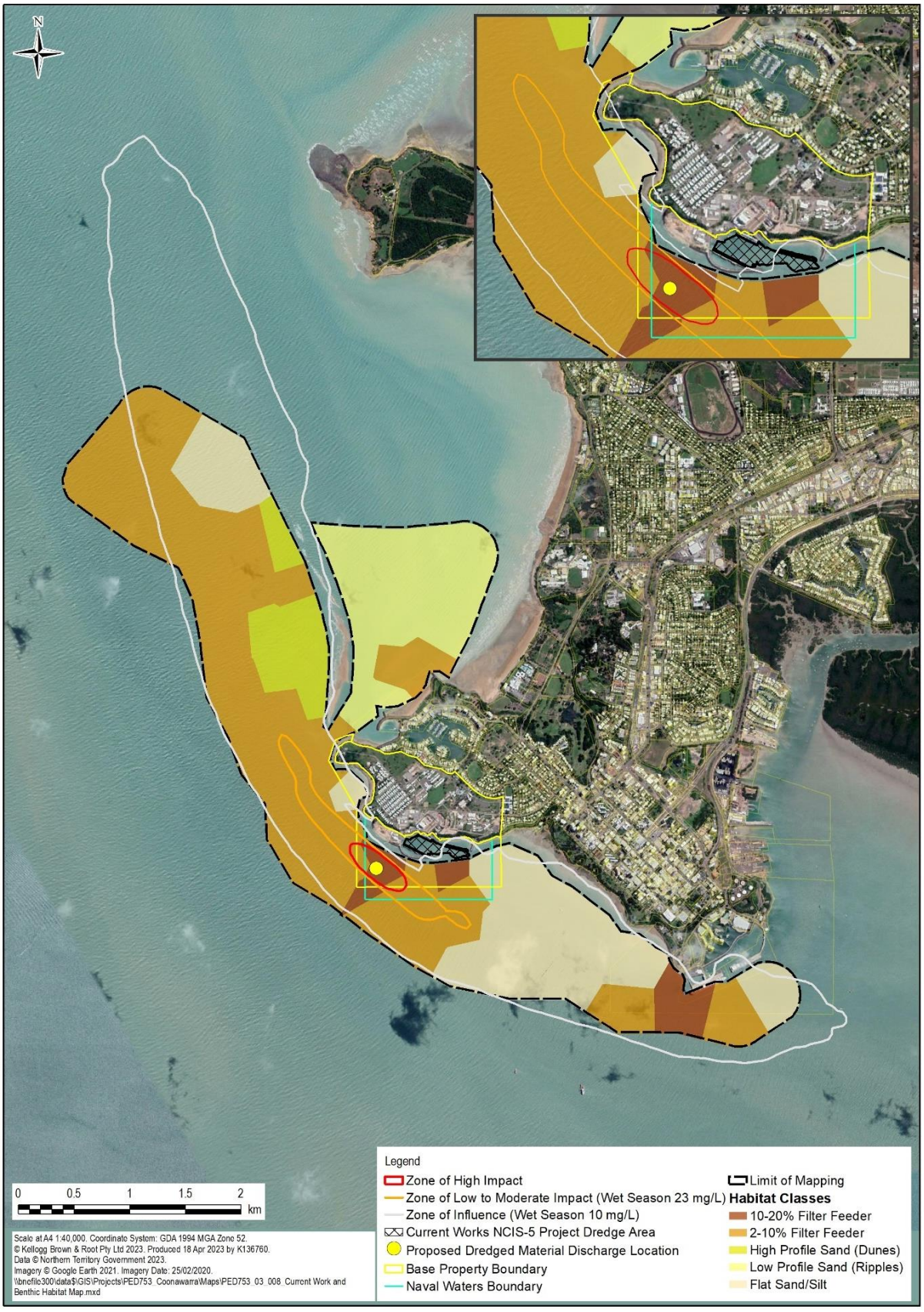

Figure 5 **Benthic habitats within the 90th percentile suspended sediment concentration zones of impact and influence (Includes 5 mg/L background – Wet Season)**

Based on modelling results, the fact that dredging operations will not be continuous, (i.e. typically daylight hours, six days a week with multiple stoppages) and that natural elevated suspended sediment concentrations occur frequently as part of the normal variation within the harbour where filter feeders are present, it is unlikely that permanent impacts would occur.

The initial deposition of coarse material (small percentage of larger, heavy particles contained in the dredged sediment) in the immediate vicinity of the discharge location will directly affect benthic habitat with some temporary reduction of abundance, species diversity and productivity likely (Figure 6).

The majority of the material to be dredged consists of fine sediments, and modelling shows that the extent and thickness of fine sediment deposition is very low. The highest fine sediment deposition predicted is within the HMAS *Coonawarra* basin, where the majority of dredging is to be undertaken. The modelled thickness of fine material deposition within this dredge area is approximately 10 mm. Beyond the basin area, fine material deposition is lower with some nearshore areas to the north and east of the basin predicted to receive between 1 mm and 5 mm, some smaller areas closer to the basin receiving up to 8 mm.

Recolonisation (recovery) of filter feeder communities in the initial deposition area near the discharge will be influenced by alterations to the substrate that may occur as a result of dredging and dredged material discharge. As shown by the benthic habitat assessment, the presence of filter feeders present within the vicinity of the discharge location is evidence of recovery from similar effects during the previous dredging campaign. It is also likely that upon cessation of the discharge activities, the presence of deposited harder substrate material will provide increased opportunities for the regrowth of filter feeders.

With respect to suspended sediment related stresses beyond this area, studies have shown that sponges with morphologies consistent with those in the project area are capable of recovery from exposure to the predicted range of suspended solids conditions within weeks of the cessation of elevated concentrations (WAMSI, 2019).

Adaptive management approach

The key elements of the adaptive management approach for the proposed dredging campaign and for the planning and assessment for future dredge campaigns include:

- Baseline water quality data collection
- Sediment plume characterisation/behaviour measurements carried out during dredging
- Water quality monitoring during dredging
- Further modelling refinements for future campaigns

The primary impact mechanisms for focus will be suspended sediment concentrations and coarse sediment deposition.

The adaptive management approach proposed will focus on confirming the adequacy of sediment plume predictions by monitoring and collecting water quality data. This data can also be used to improve modelled predictions for future dredging campaigns.

A precautionary approach will be adopted to manage the potential for seagrass to be present in Fannie Bay. A water quality monitoring station will be established in Fannie Bay prior to and during dredging to monitor dredging effects. Although hydrodynamic modelling results do not predict that impacts associated with suspended sediment plumes are likely to extend into the shallow nearshore areas of Fannie Bay, water quality data will be recorded for the duration of dredging and used as measured evidence to compare with the modelled predictions.

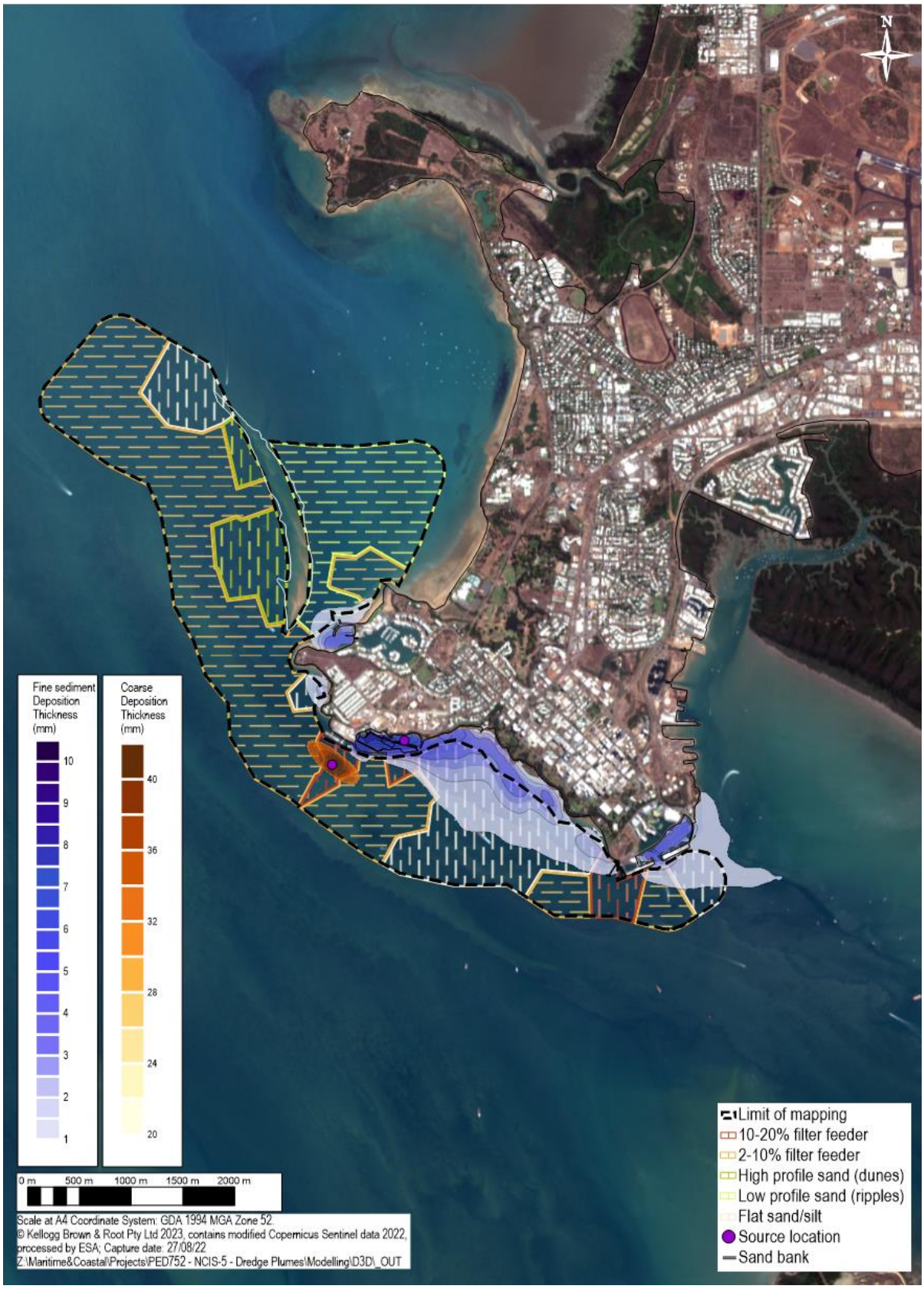

Figure 6 **Comparison of benthic habitats and sediment deposition thickness (mm) following the completion of dredging**

The current dredging campaign is scheduled to occur in the dry season, and a baseline water quality monitoring program has been scheduled to obtain representative turbidity (NTU), total suspended sediment (TSS) and photosynthetically active radiation (PAR) data, which will be both temporally relevant, and available prior to the commencement of dredging.

This data will be used to further define the relationship between TSS (mg/L) and turbidity (NTU) and examine the relationship between turbidity and light availability at the seafloor (PAR). This data and refinement of these relationships will be used to support the management of current and future dredging and discharge related activities.

The site specific data collected during the current dredging will also support the assessment and management of future dredging campaigns at HMAS *Coonawarra*. This will include sediment plume investigation and characterisation to confirm that the extent and nature of suspended sediment plumes generated during dredging and discharge (and therefore impacts) are within the modelled predictions.

Updated draft Dredging and Disposal Management Plan

The draft Dredging and Disposal Management Plan (DDMP) has been updated based on the outcomes of the recent benthic habitat field survey and an improved understanding of those sensitive receptors within the predicted zone of impact and zone of influence.

Outcomes of the supplementary 3D modelling, refinements of the proposed trigger values, zones of impact and influence and amendments to the monitoring program proposed to be implemented during dredging have also been incorporated into the updated DDMP for the project.

Conclusion

The additional assessment and modelling undertaken for the SER has not identified any major changes to the outcomes published in the Referral assessment.

The results of the benthic habitat assessment have narrowed the types of sensitive receptors and potential impact mechanisms and show that there is a low potential for impact on benthic habitats within the predicted zones of impact and influence.

Supplementary modelling represents 3-dimensional effects as an improvement to previous modelling. There is now an improved confidence that both the 2D and 3D models are able to represent plume behaviours. The addition of the 3D model provides an improved ‘tool’ for undertaking assessment, with impact predictions considered to be slightly conservative based on measured data from previous dredge campaigns.

As outlined in the SER, collection of further baseline data is scheduled, including water quality (NTU, TSS and PAR). Monitoring at these same locations and the same range of parameters will also be undertaken during dredging, along with plume characterisation to confirm the outcomes of this assessment and for use to support future dredging campaigns.

The benthic communities in the project area consist of bare substrate and patches of sparse filter feeder communities. Based on a review of available literature and the results of studies undertaken in the field, these low density, low diversity filter feeders are well adapted to the dynamic current and sediment transport processes which occur within the project area.

Based on modelling results, the fact that dredging operations will not be continuous and that elevated suspended sediment concentrations consistent with the modelled predictions occur frequently as part of the natural variation in areas of the harbour where these sparse filter feeder communities are present, it is unlikely that permanent impacts would occur.

The predicted zones of impact and influence do not extend into Fannie Bay and the risk to potential seagrass habitat is considered to be low.

The presence of filter feeders within the vicinity of the discharge location is evidence of recovery from the previous similar dredging campaigns and similar recovery in this area would be expected after the proposed campaign. In areas beyond the initial coarse material deposition, the periodic elevated suspended sediment concentrations are likely to result in some stresses to the filter feeders present. Studies have also shown that sponges with morphologies consistent with those present within the project area are capable of recovery from the effects of elevated suspended solids within weeks of the cessation of elevated concentrations (WAMSI, 2019).

Based on the outcomes of the further assessment presented in this SER, implementation of the updated project specific DDMP and evidence from previous similar dredging campaigns conducted at HMAS *Coonawarra*, the residual risk to the environment remains low and the impacts predicted are unlikely to be significant.