Boskalis Cambridge Gulf Marine Sand Proposal

EPBC Referral No. 2025/10106

Commonwealth
ENVIRONMENTAL MANAGEMENT PLAN (C-EMP)




Prepared for Boskalis Australia Pty Ltd by EcoStrategic Consultants

In support of Project Referral under Part 7 of the Commonwealth *Environment Protection & Biodiversity Conservation Act*

NOVEMBER 2025

Boskalis

ecostrategic
CONSULTANTS

COVER PAGE

Document name:	BKA (2025a), **EPBC Supplementary Report No. 3 - Boskalis Cambridge Gulf - *Commonwealth Environmental Management Plan (C-EMP)*.**
EPBC number:	2025/10106
Project name:	Cambridge Gulf Marine Sand Proposal.
Proponent and ACN / ABN:	Boskalis Australia Pty Ltd. ACN: 099 738 333
Proposed action:	Sourcing and export of up to 70 million m^3 of seabed sand from Cambridge Gulf for up to 15 years from commencement.
Location of the action:	Refer Figure 1 - Location Map. Within the Proposed Operational Area (POA) located in the central part of the main body of Cambridge Gulf in north-east of Western Australia. Centered on 14° 52.00' S and 128° 16.00' E.
Date of preparation of the EMP:	November 2025 (Draft 4 – subject to further review and refinement).
Person accepting responsibility for the EMP: (see also signed declaration below).	At time of this draft: Alwin van den Bosch General Manager **Boskalis Australia Pty Ltd** Suite 1.3 / 9 Havelock St West Perth WA 6005 Tel 08 9327 1000 alwin.vd.bosch@boskalis.com

DECLARATION OF ACCURACY

In making this declaration, I am aware that section 491 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Regulations 2000*. The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: [this is Draft 4 for review - final approved version will be signed]

Name: Alwin van den Bosch

Organization: Boskalis Australia Pty Ltd

Date: [this is Draft 4 for review - final approved version will be dated when signed]

DOCUMENT VERSION CONTROL

Any revisions to the C-EMP that are made once the final version is approved by DCCEEW will be recorded in the Revision Table below, based on the WA EPA template, as agreed by DCCEEW.

MNES Acronyms:

NHP = National Heritage Place (West Kimberley). CMA = Commonwealth Marine Area. TMS = Threatened & Migratory Species.

DOCUMENT REVISION TABLE (as per Attachment 3 of WA EPA (2021) *Templates - EMPs*)				
Document Title: EPBC Supplementary Report No. 3 - Boskalis Cambridge Gulf - *Commonwealth Environmental Management Plan (C-EMP)*				
Revision No.:				
Date revision submitted to DCCEEW: [DD / MM / YYYY]				
Complexity of changes:	Minor Revisions: ☐	Moderate Revisions: ☐	Major Revisions: ☐	
MNES affected:	NHP: ☐	Ramsar Site: ☐	CMA: ☐	TMS: ☐
Proponent's operational requirement timeframe for approval of revision:	<1 month: ☐	<6 months: ☐	>6 months: ☐	Nil: ☐
Reason for Timeframe:				

Change Item No.	C-EMP Section No.	C-EMP Page No.	Summary of Change	Reason for Change
1.				
2.				
3.				
[add as required]				

CONDITIONS OF APPROVAL REFERENCE TABLE

[there are no Conditions of Approval at the time of this version of the C-EMP (Draft 4 Novembert 2025). This C-EMP is developed in response to a request from DCCEEW for BKA to submit an EMP as received by BKA on 29 May 2025, followed by DCCEEW review comments on initial Drafts 1 to 3 of the EMP as received by BKA from 16 July to 19 November 2025. The Conditions of Approval Reference Table will be added to the final version of the C-EMP once any conditions of approval are known]

REFERRAL DOCUMENTATION

This C-EMP is part of a larger set of documents submitted as part of Boskalis Australia's referral under Part 7 of the Commonwealth *Environment Protection & Biodiversity Conservation Act* (EPBC Act), as listed in the table below.

Doc No.	**Reference** (Author/yr)	**Electronic File Names (PDFs)** (except Doc No.s 9 & 10 which are Excel files). As required, these file names are how the reports are referenced in the online referral submitted via the EPBC Act Business Portal https://epbcbusinessportal.environment.gov.au
1	BKA (2024a)	EPBC Referral Report No. 1 - Boskalis Cambridge Gulf - *Description of Proposed Action & Regulatory Framework.*
2	BKA (2024b)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment.* Includes in same document: • Annex 3 - *Drop Camera Video Extracts.* • Annex 4 - *Dry Season Sample Point Specs.* • Annex 5 - *Wet Season Sample Point Specs.* • Annex 6 - *Benthic Taxa per Sample Point - Dry Season Maps.* • Annex 7 - *Benthic Taxa per Sample Point - Wet Season Maps.* • Annex 8 - *Benthic Taxa per Sample Point - Dry Season Graphs.* • Annex 9 - *Benthic Taxa per Sample Point - Wet Season Graphs.* • Annex 11 - *Sediment Contamination Assessment.* • Annexes 1, 2, 10, 12, 13 and 14 are submitted as separate documents as listed below.
3	BKA (2024c)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 1 - *Sand Assessment.*
4	MScience (2024)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 2 - *MScience BCH Methods.*
5	Sensorem (2024)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 10 - *Aerial Drone Lidar Report.*
6	Price & Raaymakers (2024)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 12 - *Cape Domett Turtle Data Report.*
7	Univ. Canberra (2024)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 13 - *Marine eDNA Report.*
8	BKA (2024d)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Marine Mega-fauna Surveys Report.* Includes in same document: • Appendix 1 - *MMF Sightings Master Data Tables.* • Appendix 2 - *MMF Images.* • Appendix 3 - *MMF Sighting Locations.* • Appendices 4 and 5 are submitted as separate Excel files as listed below.
9	BKA (2024e)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Appendix 4 - Species Data - Dry Season* (Excel).
10	BKA (2024f)	EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Appendix 5 - Species Data - Wet Season* (Excel).
11	BKA (2024g)	EPBC Referral Report No. 3 - Boskalis Cambridge Gulf - *Traditional Owner Matters.* Includes in same document: • Annex 1 - *BAC Native Title Determination Map.* • Annex 2 - *MG Native Title Determination Map.* • Annex 3 - *Letter from BAC.* • Annex 4 - *Letter from MG.*

Doc No.	**Reference** (Author/yr)	**Electronic File Names (PDFs)** (except Doc No.s 9 & 10 which are Excel files). As required, these file names are how the reports are referenced in the online referral submitted via the EPBC Act Business Portal https://epbcbusinessportal.environment.gov.au
12	BKA (2024h)	EPBC Referral Report No. 4 - Boskalis Cambridge Gulf - *Impact Assessments.* Includes in same document: • Annex 1 - *Main Datasets Used to Inform Impact Assessments.* • Annex 2 - *Shipping & Oil Spill Risk Assessment.* • Annex 3 - *Plume Mitigation Capability Statement.* • Annex 4 - *Marine Mega-fauna Capability Statement.*
13	PCS (2024a)	EPBC Referral Report No. 5 - Boskalis Cambridge Gulf - *Metocean & Sed Dynamics Initial Report.* • Includes in same document Annex 1 - *Supplementary Technical Note.* • Annex 2 is submitted as a separate document as listed below.
14	PCS (2024b)	EPBC Referral Report No. 5 - Boskalis Cambridge Gulf - Annex 2 - *Factual Data Report.* (NOTE: Superseded by *Updated Factual Data Report* - see Doc No. 19, Referral Report No. 8 - Annex B below).
15	BKA (2024i)	EPBC Referral Report No. 6 - Boskalis Cambridge Gulf - *Consultation.* • Includes in same document Annex 1 - *List of Meeting Minutes.*
16	BKA (2024j)	EPBC Referral Report No. 7 - Boskalis Cambridge Gulf - *Commonwealth Matters.* • Includes in same document Annex 1 - *PMST Report for POA & 10 Km Buffer.*
17	PCS (2025a)	EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Metocean & Sed Dynamics Full Modelling Report.* • Appendices and Annexes are submitted as a separate document each, as listed below.
18	PCS (2025b)	EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Appendices.* • Appendix A - *Model Calibration and Validation Plots.* • Appendix B - *Hydrodynamic and Wave Impact Plots.* • Appendix C - *Sediment Transport Impact Plots.* • Appendix D - *Sediment Plume Modelling Results.*
19	PCS (2025c)	EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Annexes.* • Annex A - *Independent Expert Review.* • Annex B - *Updated Factual Data Report.*
NOTE: The documents listed above were submitted in the initial referral. The documents listed below were submitted after the initial referral.		
20	Nocterra (2025)	EPBC Referral Supplementary Report No. 1 - Boskalis Cambridge Gulf - *Light Assessment.*
21	Resonate (2025)	EPBC Referral Supplementary Report No. 2 - Boskalis Cambridge Gulf - *Noise Assessment.*
22	BKA (2025a)	**THIS DOCUMENT:** EPBC Referral Supplementary Report No. 3 - Boskalis Cambridge Gulf - *Commonwealth Environmental Management Plan (C-EMP).*
23	BKA (2025b)	EPBC Referral Supplementary Report No. 4 - Boskalis Cambridge Gulf - *Additional Information*. • *Current Speeds in the POA & Turtle Swimming Speeds.* • *Analysis of Turtle Satellite Tracking - Cape Domett.* • *Boskalis Capability Sheet - Trailer Suction Hopper Dredgers.*
24	BKA (2025c)	EPBC Referral Supplementary Report No. 5 - Boskalis Cambridge Gulf - *Response to Request for Further Information.*

ACRONYMS

ADCP	Acoustic Doppler Current Profiler
AIMS	Australian Institute of Marine Science
AMSA	Australian Maritime Safety Authority
AWAC	Acoustic Wave & Current profiler (a type of ADCP)
BCH	Benthic communities & habitats
BIA	Biologically Important Area (for various marine species as defined by DCCEEW)
BKA	Boskalis Australia Pty Ltd
C-EMP	Commonwealth Environmental Management Plan
CEO	Commonwealth Environmental Outcome
CG	Cambridge Gulf
CG-SWASP	Cambridge Gulf extension of the WA State-Wide Array Surveillance Program (for marine pests)
CMA	Commonwealth Marine Area
DAFF	Commonwealth Department of Agriculture, Fisheries & Forestry
DBCA	WA Department of Biodiversity, Conservation & Attractions
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment & Water
DEMIRS	WA Department of Energy, Mines, Industry Regulation & Safety
DoT Maritime	WA Department of Transport - Maritime branch
DPIRD	WA Department of Primary Industries & Regional Development
DWER	WA Department of Water & Environmental Regulation
eDNA	Environmental Deoxyribonucleic Acid
EMM	Environmental Management Measure
EMP	Environmental Management Plan
EO	Environmental Outcome (as defined in WA EPA 2024)
EOPCMP	Environmental Outcomes, Performance Criteria & Monitoring Plan (required by DEMIRS under Mining Act)
EPA	(WA) Environmental Protection Authority
EP Act	(WA) *Environmental Protection Act*
EPBC Act	(Commonwealth) *Environment Protection & Biodiversity Conservation Act*
IMO	(United Nations) International Maritime Organization
IMSA	Index of Marine Surveys for Assessments (of WA EPA)
JBG	Joseph Bonaparte Gulf
JBGMP	Joseph Bonaparte Gulf Marine Park
KEF	Key Environmental Factor (as defined by WA EPA)
LAU	Local Assessment Unit (the geographical area covered by this C-EMP)
LiDAR	Light Detection & Ranging
MARPOL	International Convention for the Prevention of Pollution from Ships (effected in Aus through PS(PPS) Act)
MEQ	Marine environmental quality
MFO	Marine fauna observer
MFOA	Marine fauna observation and avoidance
MMF	Marine mega-fauna (large marine animals such as cetaceans, dugong, turtles, crocodiles, sharks etc)
MNES	Matters of National Environmental Significance (under Commonwealth EPBC Act)
NAGD	National Assessment Guidelines for Dredging (2009)

NH	National Heritage
NHP	National Heritage Place (West Kimberley)
NINA	No Injuries - No Accidents (part of Boskalis SHE-Q policy and procedures)
NMFS	National Marine Fisheries Service (of the United States)
PCS	Port & Coastal Solutions (www.portandcoastalsolutions.com)
PMST	Protected Matters Search Tool (for matters protected under the EPBC Act)
POA	Proposed operational area
Proposed action	(the official term from the EPBC Act) - The BKA Cambridge Gulf Marine Sand Proposal and its' associated operations (described in Section 1) (also referred to in this document as 'proposal', 'proposed operation' and 'project')
PS(PPS) Act	(Commonwealth) *Protection of the Sea (Prevention of Pollution from Ships) Act* (administered by AMSA)
S-EMP	State Environmental Management Plan
SEO	State Environmental Outcome
SHE-Q	Safety, Health, Environment & Quality
SIC	Significant impact criteria (for each MNES under the EPBC Act *Significant Impact Guidelines)*
SMS	(shipboard) Safety Management System (under SOLAS)
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan (as required under MARPOL Annex I and AMSA PS(PPS) Act
SRG	Stakeholder Reference Group
SSC	Suspended solids concentration
SWASP	WA State-Wide Array Surveillance Program (for marine pests)
TCA	Threshold Contingency Action (as defined in WA EPA 2024)
THC	Threshold Criteria (as defined in WA EPA 2024)
TMS	Threatened & Migratory Species (as listed under the EPBC Act)
TO	Traditional Owner
TRA	Trigger Response Action (as defined in WA EPA 2024)
TRC	Trigger Criteria (as defined in WA EPA 2024)
TSS	Total suspended solids
WA	Western Australia (State of)

PROJECT LOCATION

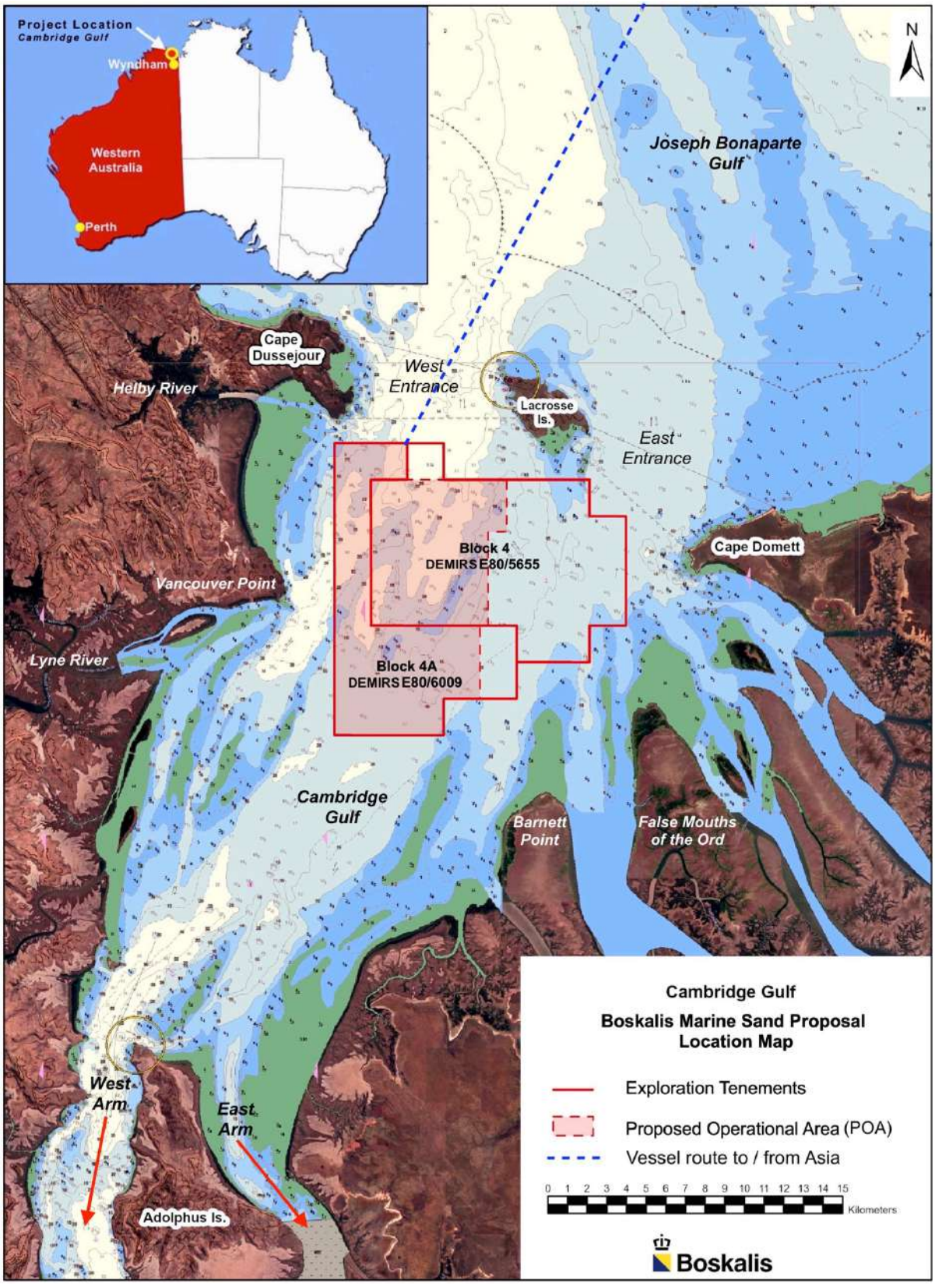

FIGURE 1: *Location of the proposed action in Cambridge Gulf near Wyndham in the northeast of WA.*

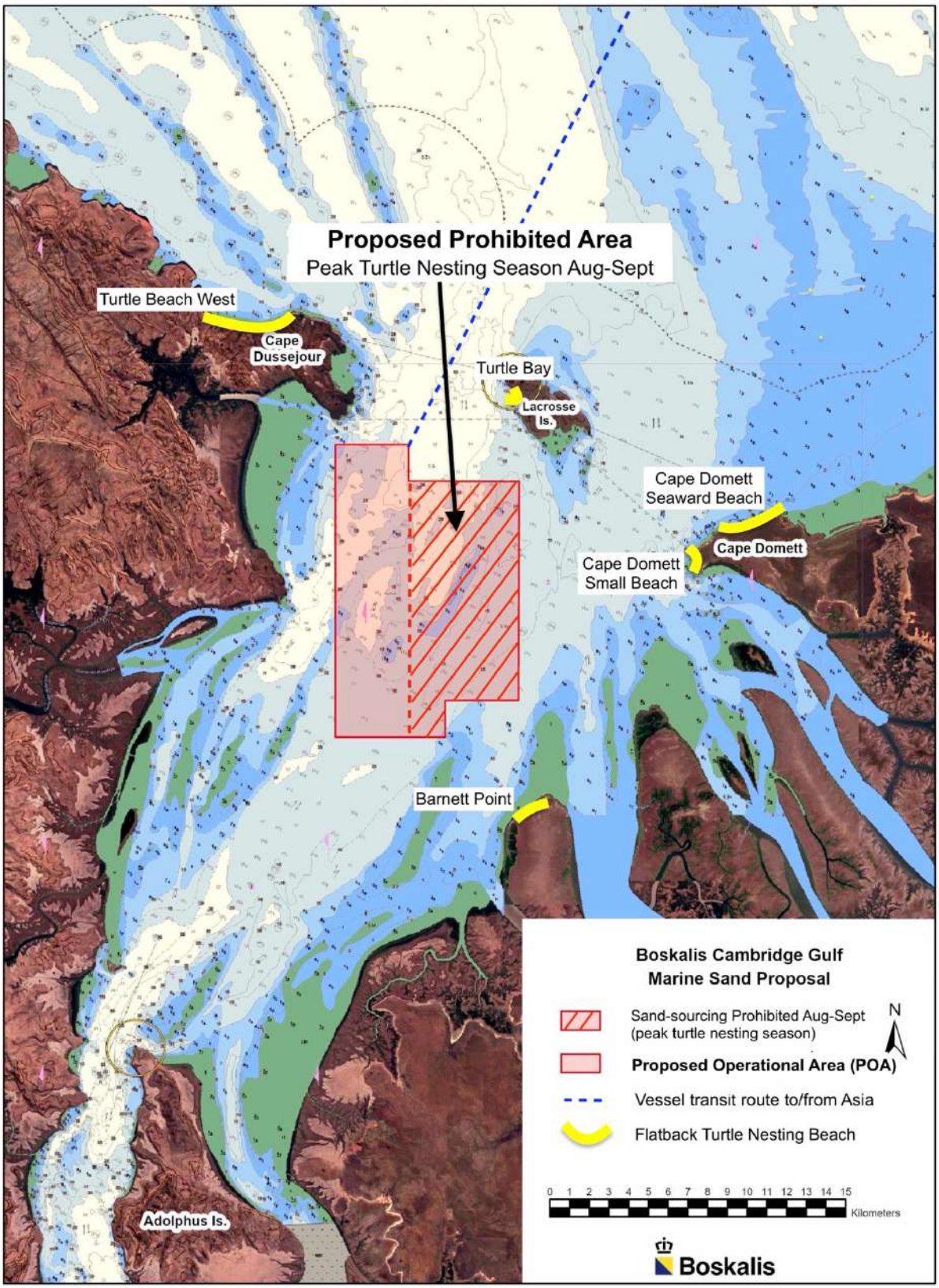

FIGURE 2a: *Proposed Prohibited Area during peak Flatback Turtle Nesting season August – September. Sand-sourcing would be restricted to the western part of the POA only, most distant from the main nesting beaches. Turtle Beach West is geo-screened from the POA by the hills and cliffs of Cape Dussejour.*

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EXECUTIVE SUMMARY

1. The overall purpose of this Commonwealth Environmental Management Plan (C-EMP) is:

   - *To achieve the stated Commonwealth Environmental Outcome (CEO) for each relevant Matter of National Environmental Significance (MNES) by preventing, mitigating, monitoring, managing, reporting and responding to potential significant impacts of the proposed operation on each MNES, in accordance with the EPBC Act Significant Impact Guidelines.*

2. Boskalis Australia Pty Ltd (BKA) is proposing to develop a marine sand-sourcing and export operation in Cambridge Gulf (CG) near Wyndham in the north-east of WA (Figure 1). The proposed operation will use a single Sand Production Vessel (SPV) based on the design principles of a very large Trailer Suction Hopper Dredger (TSHD), with a single suction arm and drag-head (Figure 2).

3. As an environmentally responsible company with stringent corporate environmental and social policies and procedures, BKA has undertaken a very comprehensive set of environmental studies and stakeholder consultations, and self-referred the proposal to the WA Environmental Protection Authority (EPA) under Section 38 of the WA *Environmental Protection Act* (EP Act) in September 2024, and to the Commonwealth Department of Climate Change, Energy, the Environment & Water (DCCEEW) under the *Environment Protection & Biodiversity Conservation Act* (EPBC Act) in January 2025, for their determination of what further environmental assessments might be required, if any.

4. The comprehensive studies and referral documents indicate that the proposed action is not expected to cause any significant impacts, and this C-EMP is designed to further ensure this.

5. Subject to the outcomes of the State and Commonwealth referral processes, BKA plans to apply to the WA Department of Energy, Mines, Industry Regulation & Safety (DEMIRS) to convert a reduced part of the two Exploration Tenements to a single Mining Tenement, shown as the 'proposed operational area' (POA) on Figure 1.

6. On 27 June 2025 a delegate of the Commonwealth-Minister for the Environment decided that:

   a) the proposed action is a controlled action under the EPBC Act,
   b) it will be assessed by preliminary documentation; and
   c) further information was required to assess relevant impacts of the proposed action.

7. On 16 July 2025 DCCEEW issued a letter to BKA with a Request for Further Information (RFI), under section 95A(2) of the EPBC Act. The RFI includes a request for BKA to submit a revised Environmental Management Plan (EMP), consistent with the Commonwealth *Environmental Management Plan Guidelines* (DCCEEW 2024). This Commonwealth Environmental Management Plan (C-EMP) is submitted in response to that request.

8. In addition to this C-EMP, BKA has also submitted a draft State EMP (S-EMP) to the WA EPA, consistent with the EP Act and related guidance (WA EPA 2024, 2021a, & 2021b).

9. The S-EMP is designed to achieve defined Environmental Outcomes (EOs) for each of six State Key Environmental Factors (KEFs) that are relevant to the proposal; with the KEFs being 1) benthic communities and habitats (BCH), 2) coastal processes, 3) marine environmental quality (MEQ), 4) marine fauna, 5) air quality and 6) social surroundings.

10. Additionally, subject to the outcomes of the State and Commonwealth environmental referral processes, should BKA proceed to applying for a mining licence under the WA *Mining Act*, BKA will also develop and submit the following three linked documents as required under the DEMIRS *Statutory Guidelines for Mining Proposals (Nov 2023)* and related guidance:

    - *Environmental Risk Assessment* (ERA),
    - *Environmental Outcomes, Performance Criteria and Monitoring* (EOPCM) framework; and
    - *Environmental Management System* (EMS).

11. While the C-EMP, S-EMP and DEMIRS plans are separate documents, structured in accordance with the different templates required by each agency, every effort has been made to achieve consistency between them. In particular, in order to facilitate on-site implementation and operational reporting, the technical and operational environmental management measures are the same across the C-EMP, S-EMP and DEMIRS plans, although they are organized slightly differently between the plans. For example;

    - in this C-EMP the operational environmental management measures are aligned with each relevant Matter of National Environmental Significance (MNES), as listed in the EPBC Act,

- in the S-EMP they are aligned with the relevant State KEFs; and

- in the DEMIRS plans they are aligned with the Environmental Factors listed in the DEMIRS *Statutory Guidelines for Mining Proposals (Nov 2023)* (which are similar to but narrower than the State KEFs).

12. While this C-EMP is structured in accordance with the Commonwealth *Environmental Management Plan Guidelines* (DCCEEW 2024) (with some changes in the order of sections to provide a more logical, progressive sequencing); as approved by DCCEEW the environmental outcomes and objectives presented in Section 3 and the environmental management measures presented in Section 4 are based on the WA EPA structure of Environmental Outcomes (EOs), as described in WA EPA (2024, 2021a, & 2021b), and adopts a hybrid outcomes- and objectives-based approach, as described in Sections 3 below.

13. As outlined in EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j), and as listed in Table 1 below, BKA assessed that five of the ten MNES that are listed in the EPBC Act are relevant to the proposal. Three of the five MNES are area-based and are located some distance from the POA. The remaining two MNES categories are Threatened and Migratory Species (TMS), only some of which potentially pass through the POA occasionally. For the purposes of this C-EMP, the TMS categories are combined as the environmental management measures are the same for both, resulting in four MNES categories, as follows:

    - MNES 1: West Kimberley National Heritage Place (NHP) – on the western side of CG and distant from the POA.

    - MNES 2: Ord River Floodplain Ramsar Site – on the eastern side of CG and distant from the POA.

    - MNES 3: Commonwealth Marine Area (CMA) – offshore from CG and distant from the POA (not included further in this C-EMP as not identified as an issue by DCCEEW).

    - MNES 4: Threatened & Migratory Species (TMS) – in particular Australian Snubfin Dolphins (*Orcaella heinsohni*) and Australian Humpback Dolphins (*Sousa sahulensis*), which may occasionally pass through the POA, and nesting sites for Flatback Turtles (*Natator depressus*), which are mainly located on seaward coasts outside of CG, except one site located behind mangroves within CG but away from the POA. Other key listed species found in the general CG area include River Sharks (*Glyphis spp*) and sawfish (*Pristis spp*), although their primary habitat is located well upstream in the mangrove-lined estuarine channels and freshwater rivers that discharge into CG, and not in the deeper, open marine waters of the main body of CG where the POA is located.

14. The environmental management measures (EMMs) described in Section 4 are designed to achieve the specified CEO for each relevant MNES, which are summarized in Table 1 below. The EMMs include the following sequential elements, adapted from WA EPA (2024, 2021a, & 2021b) (as agreed by DCCEEW), and based on the impact mitigation hierarchy:

    a) Potential impacts on MNES – as assessed in BKA's referral reports and consolidated for each MNES in Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j), in accordance with the EPBC Act *Significant Impact Guidelines*.

    b) Risk rating – as presented in tables in Section 2.3.

    c) Impact prevention factors and measures – the factors and measures that will avoid the potential impacts.

    d) Impact mitigation measures – the measures that will further reduce potential impacts and resulting risk.

    e) Commonwealth Environmental Outcome (CEO) – the desired state of the MNES both during and after implementation of the proposed action, based on prevention of any significant impacts on the MNES as defined in the EPBC Act *Significant Impact Guidelines*.

    f) Trigger Criteria (TRC) – measurable indicators that are designed to forewarn of the approach of the Threshold Criteria and prompt trigger response actions to avoid reaching the Threshold Criteria.

    g) Trigger Response Action (TRA) – adaptive management and corrective actions to be taken to avoid reaching the Threshold Criteria and to prevent further exceedance of the TRC.

    h) Threshold Criteria (THC) – measurable indicators that represent the limit of acceptable impact beyond which the EO is not being met and there is likely to be a significant impact on the MNES.

    i) Threshold Contingency Action (TCA) – adaptive management and corrective actions to be taken to mitigate exceeding the TCA and to prevent further exceedance of the TCA.

j) Monitoring (Mon) – the data collection, analysis and reporting arrangements that ensure overall compliance with the C-EMP and with the CEO for each MNES, designed to measure parameters that relate to each TRC and THC and allow for rapid response and adaptive management if required. Includes specification of the required baseline for each monitoring component and the timing of monitoring.

k) Reporting – the arrangements for reporting the results from the monitoring program and overall compliance with the C-EMP and compliance with the CEO for each MNES.

15. In accordance with the DCCEEW *Environmental Management Plan Guidelines* (DCCEEW 2024), this C-EMP also includes background informational sections on *Project Description* (Section 1), including Section 1.1 - *Summary description of the proposed action*, Section - 1.2 *Summary description of the environment of Cambridge Gulf*, including details of the supporting surveys and studies commissioned by BKA, and Section 1.3 describing the *Commonwealth MNES* found in the area.

16. Section 2 - *Potential Environmental Impacts & Risks*, describes the impacts that the proposed action could potentially cause on MNES, which the C-EMP is designed to address. This includes a risk assessment for each potential impact, in accordance with the risk evaluation requirements outlined in the DCCEEW *Environmental Management Plan Guidelines* (DCCEEW 2024). The combined summary impact and risk assessment findings are presented for each MNES in Table 7 to 9 in Section 2.3. The assessment tables apply the impact mitigation hierarchy, identify each potential impact for each significant impact criteria for each MNES, as listed in the EPBC Act *Significant Impact Guidelines,* describe the inherent risk (consequence, likelihood and risk rating) before the application of impact prevention and mitigation measures, and then the residual risk after the application of impact prevention and mitigation measures.

17. The combined impact and risk assessment tables find that the residual risk for all potential impacts for each significant impact criteria for each MNES are either ‘nil’ or ‘low’.

18. The core of the C-EMP is presented in Section 4 - *Environmental Management Measures*, which are presented in table format for each MNES, and detail the potential impacts, risk ratings, impact prevention and mitigation measures and the EOs with associated TRCs, TRAs, THCs, TCAs, monitoring and reporting arrangements for each potential impact type under each MNES.

19. The C-EMP also includes essential supporting sections in Section 5 - *Required Baseline Studies*, Section 6 - *EMP Roles & Responsibilities*, Section 7 - *EMP Reporting*, Section 8 - *Environmental Training*, Section 9 - *Emergency Contacts & Procedures* and Section 10 - *Audit & Review*; with each section developed in accordance with the DCCEEW *Environmental Management Plan Guidelines* (DCCEEW 2024), as well as an additional Section 11 - *Stakeholder Consultation*.

20. Further supporting technical information is provided in the following Annexes:

- Annex 1 - Marine Pests - CG-SWASP Methods.
- Annex 2 - Marine Fauna Observation & Avoidance Measures.
- Annex 3 - SPV Lighting Specifications.
- Annex 4 - Marine Fauna Deflector / Excluder Specifications.
- Annex 5 - Mangrove Mapping Methods.
- Annex 6 - Beach Monitoring Methods.
- Annex 7- Underwater Sound Assessment Methods.
- Annex 8 - Turtle Nesting Beach Light Assessment Methods.

TABLE 1: *Commonwealth Environmental Outcomes (CEOs) for each relevant MNES*

NOTES:

- The sequential numbering of the CEOs is based simply on their order of appearance against each sequential MNES.
- Some CEOs apply to more than one MNES, as listed. The original CEO number sequence is retained when a CEO is repeated.
- The CEOs have a MNES-specific qualifier in italics and brackets at the end, to make it directly relevant to that MNES.
- MEQ = Marine environmental quality.
- CEO 6: Marine Pests: *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.*

MNES	Commonwealth Environmental Outcomes (CEOs)
MNES 1: West Kimberley National Heritage Place (NHP)	– CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the context of natural mangrove dynamics *(including the mangroves in the NHP).* – CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including in intertidal parts of the NHP).* – CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including in intertidal parts of the NHP).* – CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including in intertidal parts of the NHP).* – CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including in intertidal parts of the NHP).* – CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including in intertidal parts of the NHP)* (see note above). – CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics *(including the one nesting beach located in the NHP but outside of CG - Turtle Beach West).*
MNES 2: Ord River Floodplain Ramsar Site	– CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the context of natural mangrove dynamics *(including the mangroves in the Ramsar wetlands).* – CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including into the Ramsar wetland).* – CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including into the Ramsar wetland).* – CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including into the Ramsar wetland).* – CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including into the Ramsar wetland).* – CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including into the Ramsar wetland)* (see note above).
MNES 3: Commonwealth Marine Area (CMA)	– CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including in the CMA)* (see note above).
MNES 4: Threatened & Migratory Species (TMS)	– CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(on turtle nesting beaches).* – CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(on TMS).* – CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including potential impacts on TMS)* (see note above). – CEO 7: Vessel Strikes: No significant negative impacts are caused to populations of surface-dwelling marine fauna in CG from vessel strikes by the SPV. – CEO 8: Underwater Noise: No significant negative impacts are caused to populations of Snubfin Dolphins, Humpback Dolphins and marine turtles in CG from underwater noise emissions from the SPV. – CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics. – CEO 10: SPV Lighting: No significant negative impacts are caused to populations of nesting and hatching Flatback Turtles at nesting beaches in the CG area from the SPV's lighting. – CEO 11: Drag-head Entrainment: No significant negative impacts are caused to populations of large epibenthic animals in CG from entrainment in the SPV's drag-head (including marine turtles and sawfish).

MNES	Commonwealth Environmental Outcomes (CEOs)
	– CEO 12: Peak Turtle Nesting Season Enhanced Measures: No significant negative impacts are caused to populations of inter-nesting Flatback Turtles in the CG area during peak nesting season (August-September).

1. PROJECT DESCRIPTION

1.1 Summary description of the proposed action

1. A detailed description of the proposed action is presented in EPBC Referral Report No. 1 - Boskalis Cambridge Gulf - *Description of Proposed Action & Regulatory Framework* (BKA 2024a) and a summary is presented here for reasons of economy.

2. Boskalis Australia Pty Ltd (BKA) is proposing to develop a marine sand-sourcing and export operation in Cambridge Gulf (CG) near Wyndham in the north-east of WA (Figure 1). The proposed operation will use a single Sand Production Vessel (SPV) based on the design principles of a very large Trailer Suction Hopper Dredger (TSHD), with a single suction arm and drag-head (Figure 2).

3. As an environmentally responsible company with stringent corporate environmental and social policies and procedures, BKA has undertaken a very comprehensive set of environmental studies and stakeholder consultations, and self-referred the proposal to the WA EPA under Section 38 of the WA *Environmental Protection Act* (EP Act) in September 2024, and to the Commonwealth under the *Environment Protection & Biodiversity Conservation Act* (EPBC Act) in January 2025.

4. Key facts relating to the proposal include:

   a) Project lifespan: Up to 15 years from commencement of operations.

   b) Zero coastal or land-based development: The proposal does not involve the construction and operation of any shore-based facilities and does not involve the alteration of the coastline in any way. It will be a 100% vessel-based operation.

   c) Marine area: The proposed operational area (POA) is located in the central part of the main body of CG where there is a significant seabed sand resource, covering an area of ~100 km^2 as shown on Figure 1. Water depths within the area average -25 m MSL. The seabed within and around the POA comprises highly-dynamic sand-waves with very little biota and no significant benthic communities, due to the constantly moving substrate, strong tidal currents (>2 m/s), constantly high suspended sediments and permanent lack of benthic light (see BKA's EP Act Referral Report No. 2 - *Setting & Existing Environment*) (BKA 2024d). Subject to assessment and approval under the WA *Mining Act,* the POA will become the mining tenement.

   d) Single vessel: The proposed operation will involve a Sand Production Vessel (SPV) based generally on the design of a large Trailer Suction Hopper Dredger (TSHD) as shown in Figure 2. It will be an internationally-registered vessel subject to all relevant regulatory requirements of the International Maritime Organization (IMO) and the Australian Maritime Safety Authority (AMSA). While design is conceptual, indicative specifications are Length Overall (LoA) of ~350 m, draft of ~19 m, sand capacity 75K m^3 to 135K m^3 and crew of ~25. While standard TSHDs are typically equipped with two suction arms and drag-heads (one on either side), the SPV will only have one, with a drag-head width of ~6 m. There will be no refuelling or waste discharges in CG.

   e) Zero activity in CG for 86% of time: The SPV will self-load sand in CG for one to two days every two weeks. It will then sail to the sand delivery port in Asia and return to CG two weeks later to repeat the cycle. This means that the SPV will only operate in CG for 52 days per year, or 14% of the time. There will be zero operational activity in CG for 86% of the time during the project's lifespan of up to 15 years.

   f) Sand volumes: Exploration surveys indicate that there is a minimum of 300 million m^3 of sand in the POA and likely several times more. There are several orders of magnitude higher volumes of sand throughout CG overall. It is proposed to export up to 70 million m^3 of sand. This is a maximum of only 23% of the minimum volume of 300 million m^3 of sand estimated to occur in the POA, and a much smaller % of the volume of sand that occurs throughout CG overall. A minimum of 230 million m^3 or 77% of the minimum existing sand resource in the POA will be left in the POA, and likely more.

   g) Low footprint each loading cycle: During each one- to two-day sand loading cycle, the SPV will remove sand over an area of ~0.5 km^2 within the POA, with a drag-head width of ~6 m. The SPV will remove a layer of approximately 40 cm of sand from the seabed during each loading cycle.

   h) End of project seabed condition: At the end of the 15-year project timeframe, if the proposed 70 million m^3 of sand is exported, the area within the proposed operational area will be on average <1m deeper than the pre-project seabed. It will still comprise sand with similar seabed morphology, dynamics and habitat features as before sand sourcing.

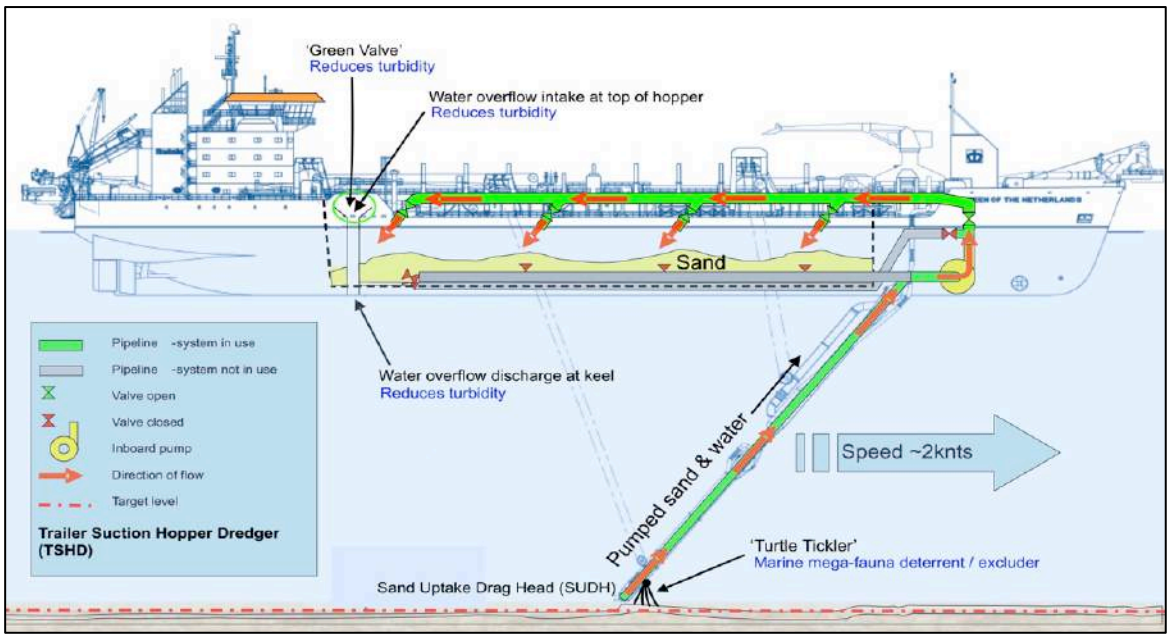

FIGURE 2: *The proposed operation will involve a single Sand Production Vessel (SPV) based generally on the design principles of a large Trailer Suction Hopper Dredger (TSHD) shown here – but adapted specifically for the proposal.*

1.2 Summary description of the Cambridge Gulf environment

1. A detailed description of the environmental conditions, resources and values of the CG area is presented in EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment* (BKA 2024b), and a summary is presented here for reasons of economy.

1.2.1 Local Assessment Unit & C-EMP boundaries

1. The geographical boundary for this C-EMP equates to the Local Assessment Unit (LAU) used by BKA for the wide range of environmental assessment studies carried out or commissioned by BKA in support of the proposal referrals, as described in Section 2 of EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment* (BKA 2024b). While the requirement to define a LAU is stated in the WA EPA technical guidance on benthic communities and habitats (WA EPA 2016b), BKA has used this LAU for the description and assessment of all State KEFs and MNES.

2. The technical guidance (WA EPA 2016b) requires that a spatially-defined LAU should be determined within which potential impacts are assessed. The determination of the LAU boundaries should be specific to the location and should be configured to cover the full area within which impacts might occur from the proposal. This should take into account aspects of the local marine environment such as coastal geomorphology, bathymetry, hydrodynamics, the presence of islands and reefs, biological attributes including the distribution of habitat and community types and ecological connectivity of the area. Jurisdictional and administrative factors such as State coastal waters and marine reserve boundaries should also be taken into account.

3. The technical guidance (WA EPA 2016b) states that while LAU boundaries should be site-specific, marine LAUs in WA would typically be approximately 50 km^2 (e.g a rectangular area defined by a 10 km stretch of coastline extending 5 km offshore or to the 3 nm limit of State Waters). Figure 3 shows the LAU used by BKA for the CG proposal, overlain on the Benthic Habitat Map for CG. The LAU covers a marine area of over 2,800 km^2, very significantly larger than the 50 km^2 reference stated by the EPA. This does not in any way imply potential for impacts throughout the area, but reflects BKA's conservatively precautionary approach to assessment, ensuring that all relevant environmental resources and values of the general area are included.

4. As shown on Figure 3 the LAU is centred on the POA and includes:

   - all coastal and marine areas within the main body of CG,
   - the coasts of Adolphus Island at the southern end of CG and the coasts of Lacrosse Island at the entrance to CG,

- the complex of mangrove-lined inlets and on the eastern side of CG known as the False Mouths of the Ord, which are part of the Ord River Floodplain Ramsar Wetland,
- the three mangrove-lined rivers on the western side of CG, from north to south the Helby, Lyne and Thompson Rivers, which are within the West Kimberley National Heritage Place,
- seaward to include the part of the State North Kimberley Marine Park located just offshore from CG,
- east along the coastline outside of CG to include the beaches east of Cape Domett; and
- west along the coastline outside of CG to include the beaches west of Cape Dussejour.

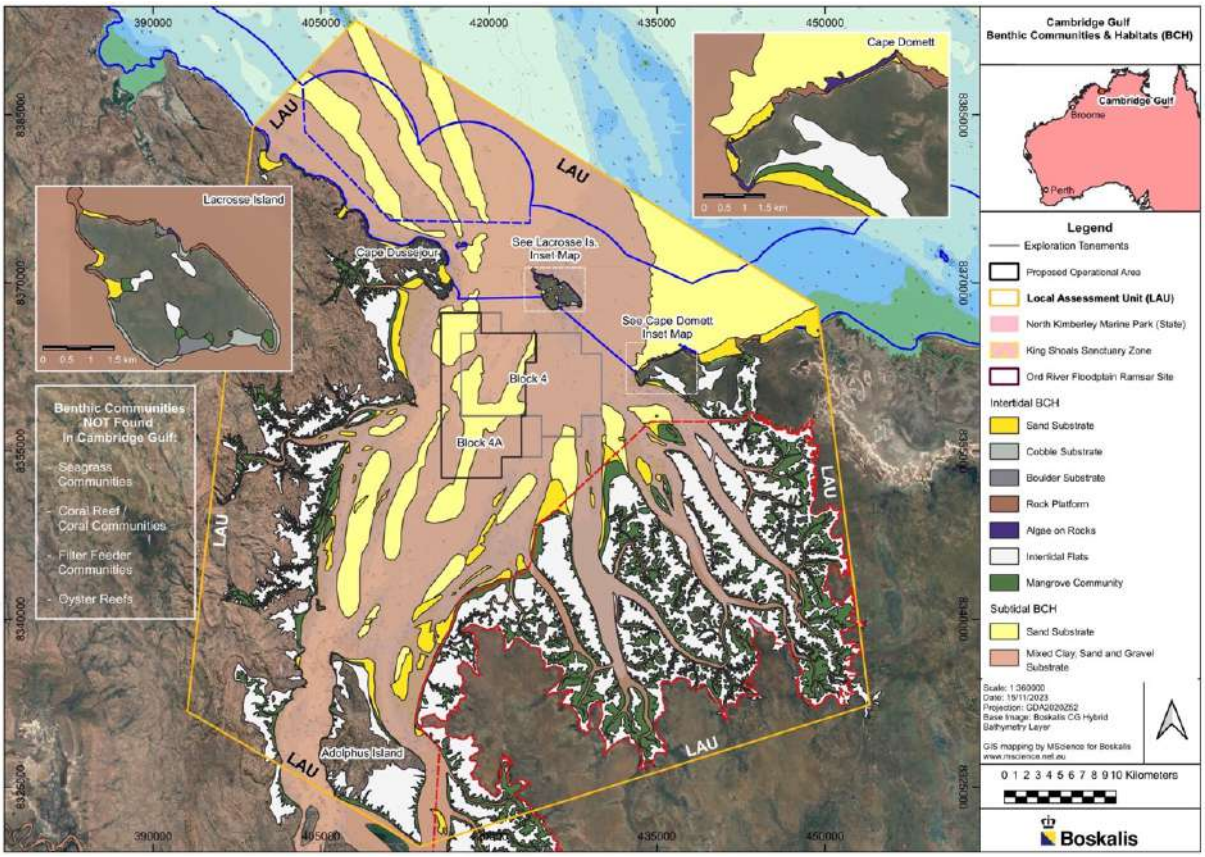

FIGURE 3: *The Local Assessment Unit (LAU) overlain on the Benthic Habitat Map for CG.*

1.2.2 Survey & study findings

1. Section 3 of BKA's EPBC Referral Report No. 2 - *Setting & Existing Environment* (BKA 2024d) describes the surveys and studies undertaken by BKA to support environmental assessment of the proposal, and these are detailed further in Annex 1 of EPBC Referral Report No. 4 - *Impact Assessments* (BKA 2024h), which also includes maps showing the distribution of data collection points for the various datasets. Further details of all relevant data relating to hydrodynamics, sediment dynamics and coastal process assessments undertaken by Port & Coastal Solutions (PCS) for BKA, are contained in PCS (2025b) - *Updated Factual Data Report*, an annex to EPBC Referral Report No. 8 - *Full Modelling Report* (PCS 2025a).

2. BKA has sought to achieve as much scientific certainty as possible by supporting and informing the environmental and MNES descriptions and impact assessments with a comprehensive suite of data. This includes sourcing and using a wide range of pre-existing data from external sources and previous studies of the area; and new data collected by studies carried out or commissioned by BKA. The latter includes both the dry- and wet-season surveys, as follows:

   a) Sand exploration survey February - March 2023. This included the following within Block 4 (E80/5655) (Figure 1):

      - Side-scan sonar and sub-bottom profiler surveys.
      - Vibro-core sampling of the seabed sediments at 35 sites.

- Grab sampling of the seabed sediments at 35 sites, both to asses sediment types and qualitative assessment of benthic biota.
- Drop camera deployment at 17 sites to assess benthic communities and habitats and assess water clarity / turbidity.
- Secchi disc readings at 17 sites to assess water clarity / turbidity.
- Observing for marine-mega fauna (MMF) for two hours per day over nine days, plus incidental observations.
- Nine days of observations of general environmental conditions.

b) Dry season environmental survey July - August 2023. This included the following throughout CG and offshore:

- Replicate (mostly 3) benthic grab samples at 105 sites in CG, 27 sites at King Shoals and several sites offshore, for qualitative and quantitative assessment of benthic biota, and visual descriptions of benthic sediment types.
- Drop camera deployments at 90 sites in CG, 27 sites at King Shoals and several sites offshore, for photographic record.
- Grab samples of sediments at 21 sites in Block 4 for contamination assessment according to NAGD (2009).
- Vertical water quality profiles at 53 sites in CG, 20 sites at King Shoals and 30 sites offshore.
- Midwater total suspended solids (TSS) and chlorophyll sampling at 31 sites in CG, three sites at KS and 20 sites offshore.
- Aerial drone high resolution video and photogrammetry surveys of key intertidal habitats around CG at low tide.
- Aerial drone surveys of all beaches and coastal sand areas around CG that could be turtle nesting areas.
- Eight days of dedicated vessel-based MMF surveys covering >800 km of transects.
- Twenty days of incidental MMF observations.
- Twenty days of observations of general environmental conditions.

c) Wet season environmental survey February - March 2024. This included the following throughout CG:

- High resolution hydrographic survey of the proposed operational area and 1 km buffer, including repeat surveys over a lunar tidal cycle to assess seabed dynamics and changes to seabed morphology.
- Replicate (mostly 3) benthic grab samples at 26 sites in CG and 14 sites at King Shoals, for qualitative and quantitative assessment of benthic biota, plus photographic record and visual descriptions of benthic sediment types.
- Vertical water quality profiles each hour over 13-hour spring tidal cycle at each of three sites in, north and south of the proposed operational area. This included Niskin suspended solids sampling at midwater and near-seabed, and co-deployment of YSI multi-sonde and Aquadopp ADCP for current speed and direction.
- Aerial drone high resolution video and photogrammetry surveys of key intertidal habitats around CG at low tide.
- Aerial drone high resolution (2 cm) LiDAR and photogrammetry surveys of the four main turtle nesting beaches in CG area at low tide.
- eDNA sampling targeting Sawfish and River Sharks at 20 sites in the proposed operational area and up rivers and inlets on west and east coasts of CG.
- Nine days of dedicated vessel-based MMF surveys covering >800 km of transects.
- Twenty days of incidental MMF observations.
- Twenty days of observations of general environmental conditions.

d) In-situ oceanographic and water quality monitoring June 2023 to April 2025. This included:

- In-situ seabed ADCPs / AWACS at 11 sites throughout CG deployed for various periods depending on the site, up to 150 days plus at some sites to give full range of hydrodynamic conditions.
- In-situ seabed light meters and multi-sonde sensors at eight sites throughout CG, to collect long-term near-seabed light (PAR /DLI), turbidity, temperature, salinity and pH data (ongoing).

3. Some key features of the datasets used include:

a) Some of the datasets provide data extending back over many years or decades, which assists in determining seasonal, inter-seasonal and longer-term patterns and trends. These include but are not limited to.

- meteorological data dating back to the 1950s,
- river level and discharge data dating back to the 1960s,
- tidal data dating back to the 1980s,
- satellite imagery dating back to the 1980s and used to assess coastal changes and derive total suspended matter correlations, to assess long-term trends in suspended matter / turbidity; and
- suspended sediments, turbidity and other physical water quality data collected in CG by the Australian Institute of Marine Science (AIMS) from 1999 through 2004.

b) Some of the BKA-collected datasets provide data that had never been collected in CG previously. In addition to informing the environmental and MNES descriptions in this report, they also inform general scientific knowledge and understanding of CG and will help to improve environmental protection and biodiversity conservation in the area. All data collected by BKA can be made freely-available to relevant parties, in addition to submitting via the WA EPA Index of Marine Surveys for Assessments (IMSA). Such 'new' data includes:

- the first known benthic grab sampling in CG and at King Shoals,
- the first known seabed sediment contamination sampling in CG,
- the first known aerial drone surveys of inter-tidal habitats and turtle nesting areas in and near CG,
- the first known high resolution aerial drone LiDAR and photogrammetry surveys of the four main turtle nesting beaches in the CG area, providing a powerful baseline for future monitoring; and
- the first known marine eDNA sampling in CG.

4. To support assessment of potential impacts on Aboriginal cultural heritage, BKA has undertaken what may be the most intensive and comprehensive survey for underwater Aboriginal cultural heritage ever undertaken anywhere in Australia to date. This included comprehensive seabed surveys throughout CG and engaging with the two TO groups on this issue. See EPBC Referral Report No. 3 - *Traditional Owner Matters* (BKA 2024g).

1.2.3 Key assumptions & uncertainties

1. Because the environmental descriptions and impact assessments are supported by a very comprehensive suite of a wide-range of relevant data, they have a high degree of reliability and certainty with no significant key assumptions and uncertainties.

2. The analysis of hydrodynamics, sediment dynamics and coastal process data and related numerical modelling undertaken by PCS for BKA, as reported in Referral Report No. 8 (PCS 2025a), were subject to independent expert review by oceanographic modelling expert Steve Buchan, in accordance with State EPA requirements, and by the Australian Institute of Marine Science (AIMS) for DCCEEW. Both reviews found that the findings of the modelling were accurate and reliable and very well calibrated and validated, being supported by an extremely comprehensive suite of field data.

1.2.4 Summary of environmental resources and values of Cambridge Gulf

1. As a result of the comprehensive field data collection, analysis and modelling activities described in Section 1.2.2 above, a detailed and comprehensive description of the environmental conditions, resources and values throughout the LAU has been assembled. This is reported in detail in EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment* (BKA 2024b), and is summarized below.

a) General conditions:

Cambridge Gulf (CG) is a large, highly dynamic and highly turbid embayment located on the tropical northeast coast of Western Australia (WA) (Figure 1). Geographically, CG is centered on 14° 52.00' S and 128° 16.00' E, facing northwards and seawards to the larger Joseph Bonaparte Gulf. The seaward mouth of CG is bounded to the west by Cape Dussejour and to the east by Cape Domett, with Lacrosse Island located centrally, dividing the mouth into a West Entrance and an East Entrance. The main body of CG extends ~40 km from its seaward mouth upstream to Adolphus Island, with the widest point being ~20 km (Figures 1). The mean water depth throughout CG is approximately 12 m LAT (Wolanski et al 2004) and the mean water depth within the POA is -20.6 LAT with a maximum depth of -44 m LAT (PCS 2025a).

There is a complex system of estuarine inlets located on the east side of CG, just inshore from Cape Domett, lined with relatively narrow bands of fringing mangroves and backed by tidal mudflats and salt-flats, known as the 'False Mouths of the Ord River'. This area includes the Ord River Floodplain Ramsar Wetland.

At Adolphus Island CG splits into West Arm, which extends for another 80 km upstream to the small port town of Wyndham, and East Arm, which is the true lower reach of the Ord River.

The region has a hot, semi-arid climate. The annual average maximum temperature is 35.6 °C (measured at Wyndham), one of the highest in Australia. The annual average rainfall is 500 mm with the majority of this occurring in the wet season November to March. CG is within the tropical cyclone zone and is regularly hit by severe category cyclones.

Five main rivers discharge into CG, the Durack, Forrest, King, Ord and Pentecost, along with a number of smaller tributaries. The total catchment area for CG is approximately 87,000 km^2 with 62% of this being the Ord River catchment (DataWA 2023). Apart from the Ord, which has two dams and significant areas of irrigated agriculture, all of the other rivers are still 'wild', with very little clearing of natural vegetation or development.

Except for the Ord River, which has an overall length of 650 km, all of the rivers are quite small, but can have very high, acute, short-term flows during the tropical wet season. The wet season river discharges can vary by orders of magnitude year to year. There is also significant daily variability in river flows, with very high flows following tropical cyclones only lasting a matter of days (Wolanksi et al 2001).

b) Sand resource:

The rivers that discharge into CG carry large volumes of sediment, especially during extreme wet-season rainfall and run-off events. Over time, these sediment inputs have formed multiple small deltas and tidal flats. The supply of sediment varies significantly due to the high variability in river discharges. Peaks in sediment supply occur in the wet season, with limited sediment supply during the dry season (PCS 2024a). The rivers supply a combination of sand and fine-grained silt and clay. The sediment deposited in CG is subject to regular reworking by the strong tidal currents, resulting in well-sorted sands being present in the main channels (which BKA is assessing as a resource) (PCS 2024a).

There is a minimum volume of 300 million m^3 of sand in the POA, derived from ongoing terrestrial sources in the catchment. This is a small proportion of the total sand resource present in CG overall. The seabed sand-forms comprise large dunes with highly-dynamic sand-waves, with vertical heights ranging from 1 to 8 m and horizontal wavelengths of between 50 and 200 m (Figures 5 & 6). Repeat hydrographic surveys measured horizontal migration of the sand waves over distances of up to 10 m in just 27-days over a lunar tidal cycle, from SSW to NNW (Figures 5 & 6).

c) Hydrodynamics, sediment dynamics & coastal processes:

Hydrodynamics in CG are overwhelmingly dominated by the astronomical tides, with a tidal range of 8 m and extreme current velocities measured in excess of 2.1 m/s (>4 knots). Wind has relatively little effect on hydrodynamics in CG and the wave regime is relatively benight due to short fetch within CG. Sediment dynamics and coastal processes in CG are driven by the tidally-dominated hydrodynamic system, with inputs of terrestrial sediments from the catchment, including large pulses during the wet season. The most important coastal environmental values that are dependent on coastal processes are:

- the mangrove communities around the coast, including the False Mouths of the Ord on the eastern side of CG (which is part of the Ord River Floodplain Ramsar wetland),

- four nesting beaches for Flatback Turtles (*Natator depressus*) located on the seaward coast outside CG, which are more linked to the coastal processes outside of CG, and one Flatback Turtle nesting site at Barnett Point inside CG (SE of the POA), which comprises a stranded beach (chenier) set behind a seaward fringe of mangroves (Figure 7).

d) Benthic communities & habitats (BCH):

Figure 3 shows the BCH map for the LAU based on the studies and surveys conducted and commissioned by BKA. Extreme environmental conditions in CG including an 8 m tidal range, strong tidal currents >2 m/s, very high suspended sediment loads and turbidity, constantly moving seabed substrates, a permanently aphotic benthic zone and major pulses of freshwater and terrestrial sediment inputs during the wet season, significantly inhibit colonization by and survival of benthic biota. Coral, seagrass, macroalgae, sponge-bed or similar significant primary producer communities are not present in the LAU.

The sand substrate within the POA is largely devoid of benthic biota, due to the fact that the sand is unstable and constantly moving, and the permanent aphotic benthic zone in CG. Comprehensive benthic sampling in both the dry and wet seasons found no biota in most sand grab samples from the POA, and the few examples of biota found in sand samples from that area were mainly small amphipods, isopods and brachyurans.

The most significant benthic community in the LAU is a narrow band of mangroves found around most of the coast of CG, with a total area of 350 km^2, backed by extensive, barren mudflats and salt-flats, as shown on Figures 3 and 7.

e) Marine environmental quality (MEQ):

The waters of CG appear to be free of chemical contaminants, with no significant sources of pollution along the immediate coastline or in the broader catchment. The area has normal sea temperature, salinity and pH, with expected variation between the dry- and wet-seasons. The area has relatively low chlorophyll-*a* concentrations, in both the dry- and wet-seasons, extremely high suspended solids and turbidity levels; and very low (zero or near zero) benthic light levels, throughout the year. The main environmental value linked to MEQ is ecosystem health, while lack of human habitation and activity in CG reduces the relevance of MEQ values that are linked to human use.

f) Marine fauna (including MNES species):

The most significant marine fauna in the CG area include small numbers of Australian Snubfin Dolphins (*Orcaella heinshoni*), which are part of a larger population that ranges along the adjacent coastal and inshore waters of Joseph Bonaparte Gulf. There is a breeding, calving, feeding and resting Biologically Important Area (BIA) for Snubfin Dolphins declared over the CG area. Small numbers of Australian Humpback Dolphins (*Sousa sahulensis*) have also been reported in the general area. There is a significant Flatback Turtle (*Natator depressus*) nesting beach at Cape Domett, outside of CG, lesser nesting sites in the area as per c) above, as shown on Figure 8, and an inter-nesting buffer Biologically Important Area (BIA) for Flatbacks declared within a 60 km radius of Cape Domett. Other key listed species found in the general CG area include River Sharks (*Glyphis spp*) and sawfish (*Pristis spp*), although their primary habitat is located well upstream in the mangrove-lined estuarine channels and freshwater rivers that discharge into CG, and not in the deeper, open marine waters of the main body of CG where the POA is located.

g) Air quality:

There is no urban, industrial or other development on the coast or in the immediate catchment of CG that could be potential sources of air pollution. Dry-season bush fires affect air quality through smoke, ash and particulate matter but these are a natural occurrence.

h) Social surroundings:

The social surroundings of CG are strongly influenced by the fact that the area is completely uninhabited, with no road access and no built facilities or infrastructure at all. The area has high aesthetic values in the form of wild, untouched, natural scenery including rugged limestone cliffs along parts of the coast. No non-Aboriginal cultural heritage values including historic shipwrecks were identified in the POA. Consultation with the two relevant TO groups and comprehensive marine surveys have not identified underwater Aboriginal cultural heritage within the POA. There are significant land-based Aboriginal cultural heritage sites on Lacrosse Island and on the adjacent mainland centred on Cape Domett, which will not be impacted in any way by the proposal. Commercial ships that transit to and from the Port of Wyndham are the main existing economic activity in CG, and the coasts and inlets around CG are used for recreational fishing and by one licenced gillnet fisherman.

i) Protected areas:

There are five protected areas in the general vicinity of CG, as shown on Figure 4, as follows:

- The State North Kimberley Marine Park which starts at the seaward entrance to CG along the territorial sea baseline and extends out to the 3 nm limit of State coastal waters.
- The Commonwealth Joseph Bonaparte Gulf Marine Park (JBGMP) located seaward of the State Marine Park, nearly 10 km from the POA.
- The State Ord River Nature Reserve which covers the Ord River Floodplain Ramsar site the east of CG.
- The State Mijing Conservation Park located 20 km inland from the east coast of CG.
- The Balanggarra Indigenous Protected Area which commences 10 km inland from the western coast of CG, and which is within the West Kimberley National Heritage Place (NHP).

j) Matters of National Environmental Significance (MNES):

As outlined in the Executive Summary above and in Section 1.3 below there are four MNES categories in the general area of CG, comprising three area-based MNES which do not overlap with the POA, as shown on Figure 4, and a number of listed TMS, some of which may occasionally transit through the POA, but for which the POA is not their typical habitat, as outlined under point f) Marine fauna, above.

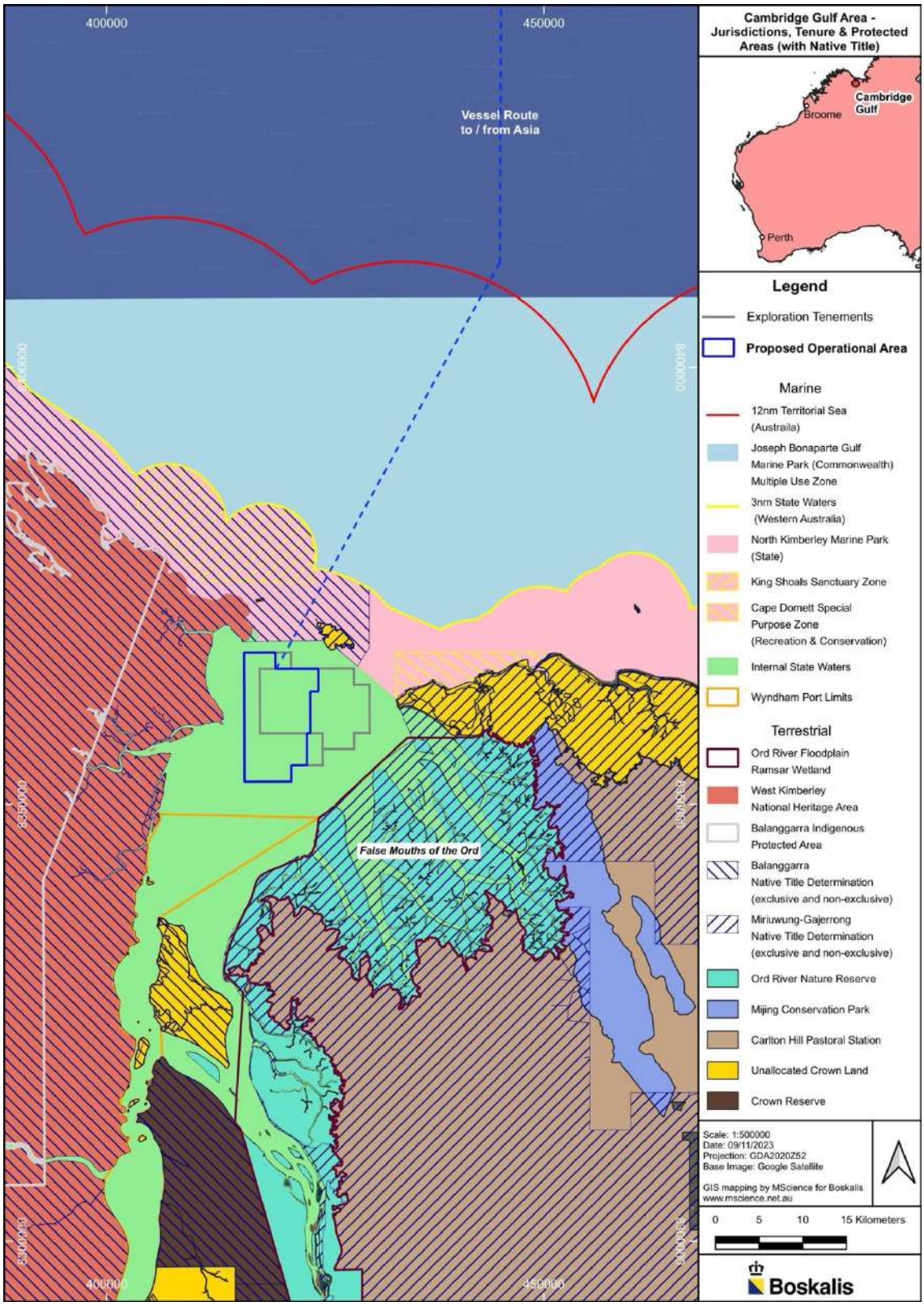

FIGURE 4: *Jurisdictions and tenure in the area including the three Commonwealth area-based MNES (West Kimberley National Heritage Place to the west, the Ord River Floodplain Ramsar Site to the east and Commonwealth waters / JBGMP to the north).*

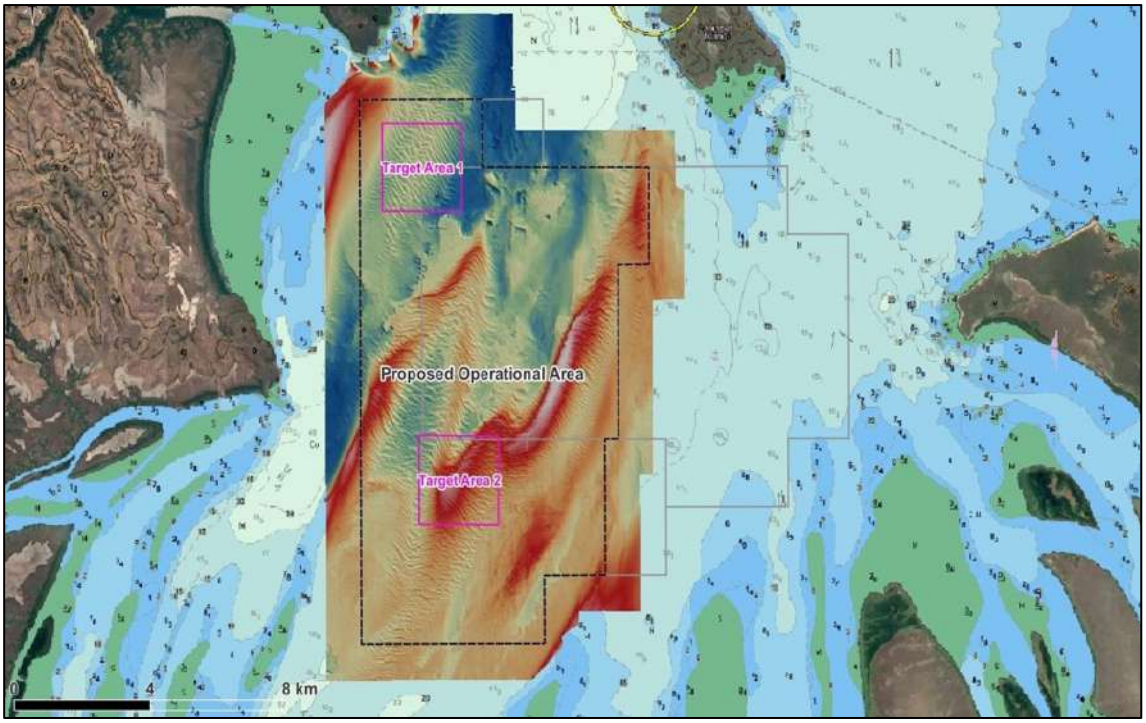

FIGURE 5: *High resolution Multi-beam Echo Sounder (MBES) survey of the POA and 1 km buffer showing the seabed sand-forms in this area. Red indicates higher (shallower) bathymetry and thicker (deeper) bodies of sand.*

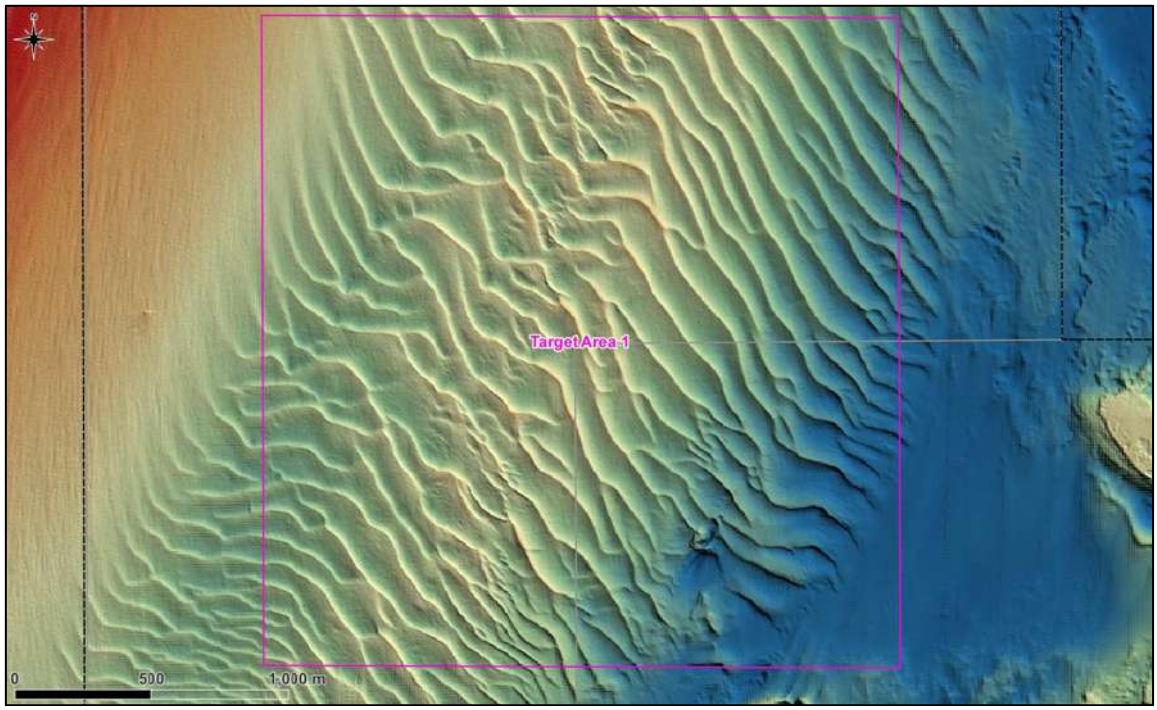

FIGURE 6: *Digital elevation model generated from the high-resolution MBES of Target Area 1 in the POA showing the seabed sand waves. The sand waves have vertical heights ranging from 1 to 8 m and horizontal wavelengths of between 50 and 200 m. Repeat hydrographic surveys measured horizontal migration of the sand waves over distances of up to 10 m over a 27-day lunar tidal cycle.*

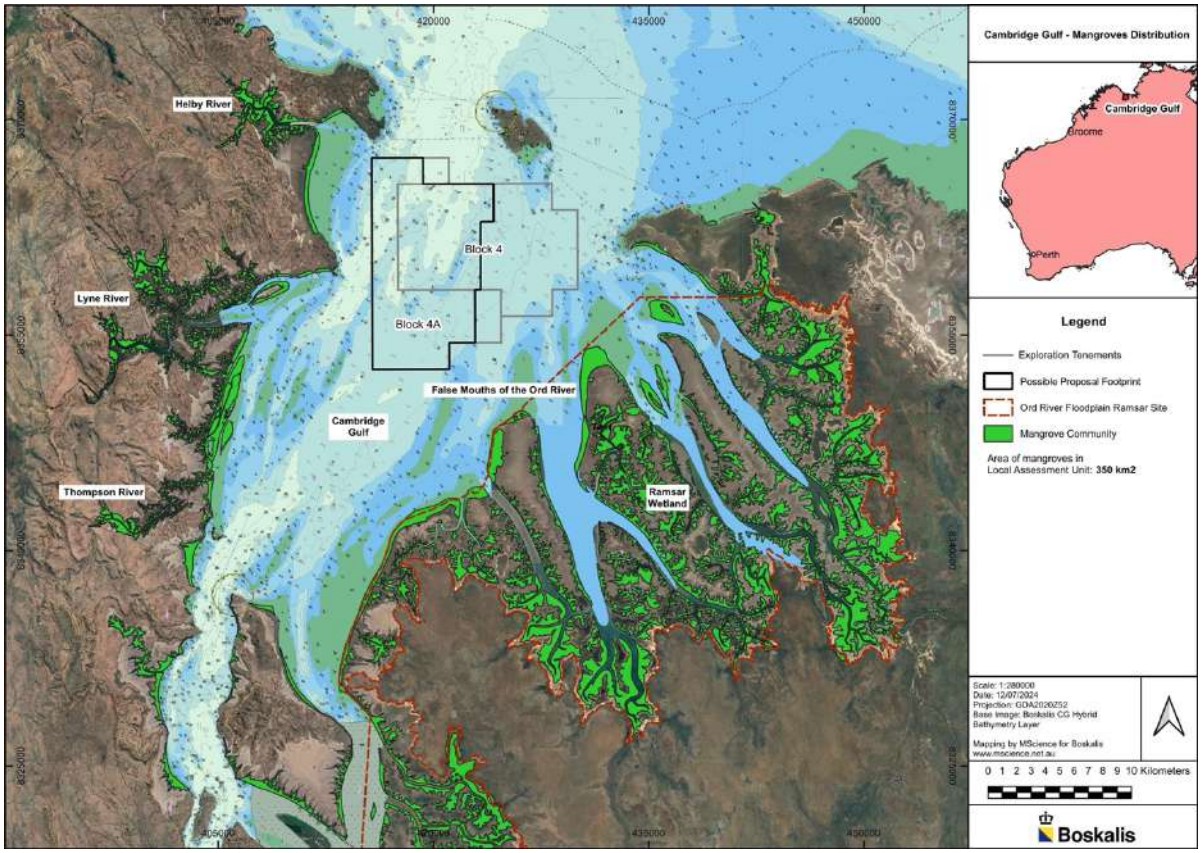

FIGURE 7. *Mangrove cover in Cambridge Gulf (from Geoscience Australia - Digital Earth Australia).*

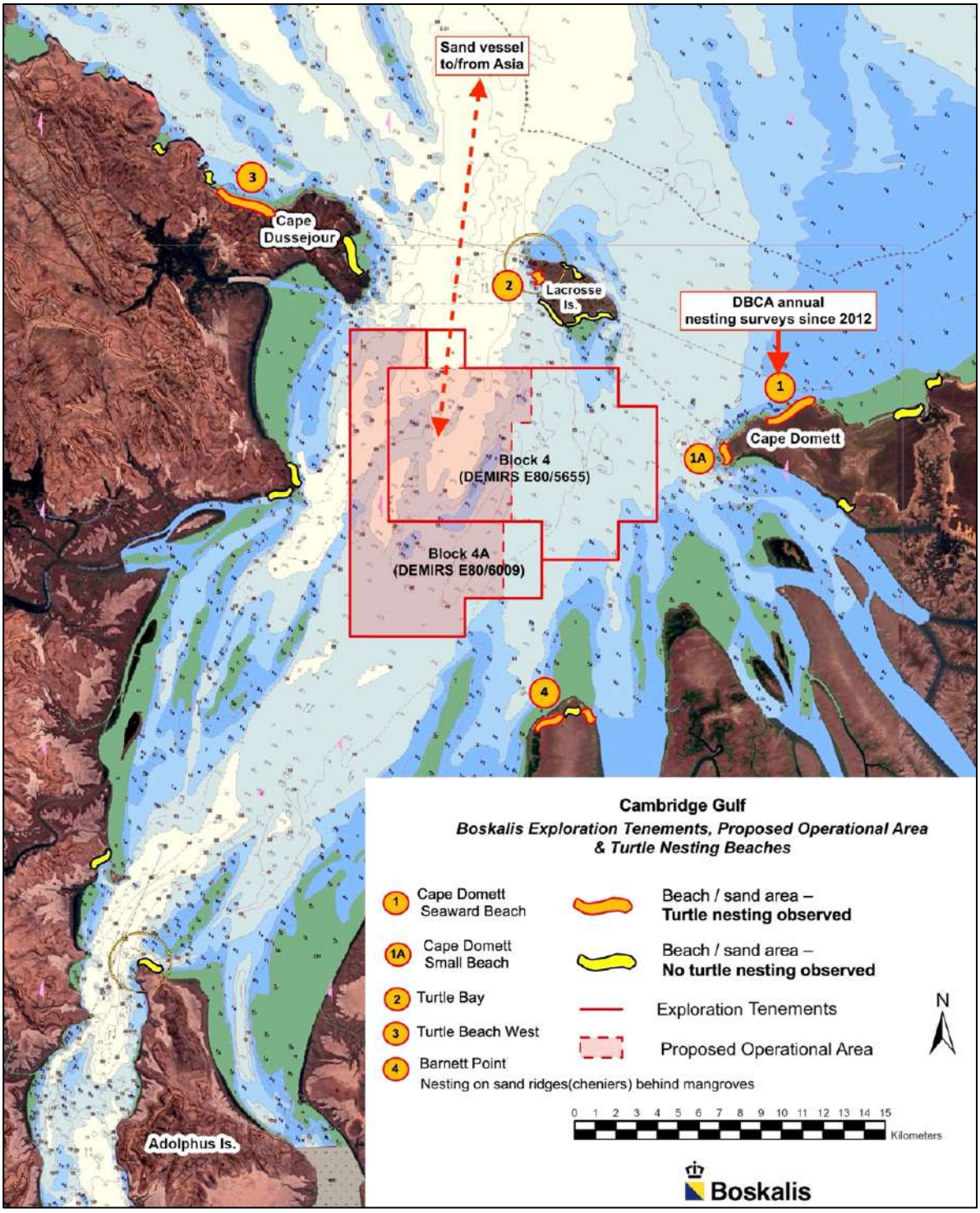

FIGURE 8: *Turtle Nesting Beaches in the CG area.*

1.3 Commonwealth MNES in the area

1. This C-EMP is designed to address the protection of Matters of National Environmental Significance (MNES) as defined under the Commonwealth EPBC Act, that are found in the CG area. A detailed assessment of MNES, including a description of all MNES identified within a 10 km buffer of the POA, and an assessment of potential impacts of the proposed operation on each MNES, is contained in EPBC Act Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).

2. A search of the EPBC Act Protected Matters Search Tool (PMST) found that the POA does not overlap with any area-based MNES, and is located within the general biological range of several threatened species and several migratory species, which are defined as MNES. The PMST search also found that a 10 km buffer around the POA overlaps with the range of some additional MNES species. The MNES identified as potentially being present in the POA are listed in Table 2, and those identified as potentially being present in the 10 km buffer are listed in Table 3.

3. Due to the low resolution of biogeographical range data that supports the PMST, many of the species listed as likely to be present are actually highly unlikely to be in those areas. Large whale species, large shark species, wholly-pelagic offshore species, shore-based bird-species, fully land-based bird species and even some small terrestrial mammals are listed in PMST as being within CG – when local scale data and knowledge of habitat preferences versus environmental conditions in CG indicate that this is highly unlikely or even impossible. This is addressed for each species in Referral Report No. 7 where relevant.

4. The PMST search found that CG is within an inter-nesting buffer Biologically Important Area (BIA) for Flatback Turtles (*Natator depressus*) and a breeding, calving, feeding and resting BIA for the Australian Snubfin Dolphin (*Orvaella heinsohni).*

5. The PMST search found that the 10 km buffer around the POA overlaps slightly with three area-based MNES:

    a) the West Kimberley National Heritage Place (NHP) (the eastern boundary of which follows the west coast of CG),
    b) the Ord River Floodplain Ramsar site located on the eastern side of CG; and
    c) the Commonwealth marine area (CMA) including the JBGMP located offshore from CG.

6. EPBC Act Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j) includes a systematic assessment of the potential for the proposed sand-sourcing operation to cause significant impacts on the identified MNES in accordance with the EPBC Act significant impact criteria for each MNES type, as per the *EPBC Act Significant Impact Guidelines*. The impact assessments considered the nature, scope, scale and duration of the proposed operation, and the application of the impact mitigation hierarchy of avoid, minimize, offset and rehabilitate impacts. The assessments find that the proposed action does not pose a risk of significant impact on any of the identified MNES, as defined by the *EPBC Act Significant Impact Guidelines*.

TABLE 2: *MNES that are present or potentially present within the proposed operational area (POA)*

MNES	Number Identified in PMST	Description / Notes
1. Listed Threatened Species:	**22**	• Refer Section 10 of Referral Report No. 7 for species details. • Some of these are only 'potentially present' in the POA based on their broad geographical ranges, but in fact are not actually present in the POA or even in CG generally (highlighting geo-resolution issues with PMST). • The most significant species are: – Australian Snubfin Dolphin (*Orcaella heinshoni*). Small numbers are observed in CG. – Australian Humpback Dolphin (*Sousa sahulensis*). Small numbers are observed in CG. – Flatback Turtle (*Natator depressus).* There is a globally significant nesting beach on the seaward coast east of Cape Domett and four other lesser nesting sites in the CG area. Peak nesting season is August-September.
2. Listed Migratory Species:	**45**	• Refer Section 10 of Referral Report No. 7 for species details. • Some of these are only 'potentially present' in the POA based on their broad geographical ranges, but in fact are not actually present in the POA or even in CG generally (highlighting geo-resolution issues with PMST). • Many of the migratory species are included in the threatened species above. • The most significant species are the same three as listed under threatened species above, although there are scientific questions as to whether these species actually meet the definition of migratory under the international Convention on Migratory Species.

TABLE 3: *MNES that are present or potentially present within the 10 km buffer*

MNES	Number Identified in PMST	Description / Notes
1. National Heritage:	**1**	West Kimberley National Heritage Place (NHP): • The eastern boundary of the NHP follows the west coast of CG. • The closest distance between the eastern coastal boundary of the NHP and the POA is ~2 km. • The 10 km buffer therefore overlaps the eastern coastal boundary of the NHP. • The main environmental value of the NHP along the west coast of CG is a narrow band of fringing mangroves and the ecological habitat values that they provide.
2. Wetlands of International Importance:	**1**	Ord River Floodplain Ramsar Site: • The Ramsar site is located on the eastern side of CG, including the maize of tidal inlets known as the False Mouths of the Ord River. • The closest distance between the Ramsar Site and the POA is ~6 km. • The 10 km buffer therefore overlaps part of the Ramsar Site. • The main environmental value of the Ramsar site along the east coast of CG is a narrow band of fringing mangroves and the ecological habitat values that they provide.
3. Listed Threatened Species:	**35**	• Refer Section 10 of Referral Report No. 7 for species details. • Some of these are only 'potentially present' in the 10 km buffer based on their broad geographical ranges, but in fact are not actually present (highlighting geo-resolution issues with PMST). • The most significant species are: – Australian Snubfin Dolphin (*Orcaella heinshoni*) (as per Table 2). – Australian Humpback Dolphin (*Sousa sahulensis*) (as per Table 2). – Flatback Turtle (*Natator depressus*) (as per Table 2). – Sawfish (*Pristis spp*) (preferred habitat is upstream areas, not the main body of CG). – River sharks (*Glyphis spp*) (preferred habitat is upstream areas, not the main body of CG).
4. Listed Migratory Species:	**50**	• Refer Section 10 of Referral Report No. 7 for species details. • Some of these are only 'potentially present' in the 10 km buffer based on their broad geographical ranges, but in fact are not actually present (highlighting geo-resolution issues with PMST). • Many of the migratory species are included in the threatened species above. • The most significant species are the same as listed under threatened species above (except for *Glyphis* which are not listed as migratory), and there are scientific questions as to whether these species actually meet the definition of migratory under the international Convention on Migratory Species.

2. POTENTIAL ENVIRONMENTAL IMPACTS & RISKS

2.1 Impact Assessment

1. The Commonwealth *Environmental Management Plan Guidelines* (DCCEEW 2024) state that an EMP should summarise all of the identified threats to each relevant MNES, referring to relevant information provided in the EPBC Act assessment documentation for the proposed action.

2. The guidelines state that the impact assessment should assess the nature and extent of each potential short-term and long-term impact, and any uncertainties regarding the predicted impacts.

3. The guidelines also state that impacts from relevant stages or phases of the proposed action (e.g. pre-construction, construction and operational phases) should be delineated. For this proposed action, there are no pre-construction or construction phases. The SPV will be built in an overseas shipyard and the operational phase will commence when the fully commissioned SPV arrives in CG for the first sand-loading cycle. There will also not be a post-project decommissioning phase – the operation will simply end when the SPV departs CG after the final sand loading cycle, at the end of the project life-time. The impact assessments summarized below therefore address the operational phase only.

4. Systematic and scientific impact assessments are presented in the following documentation, as submitted by BKA in support of the proposal referral under the EPBC Act:

    a) EPBC Referral Report No. 4 - *Impact Assessments* (BKA 2024h): This report assessed potential impacts of the sand-sourcing operation on the following State KEFs:

        - benthic communities and habitats (BCH),
        - coastal processes,
        - marine environmental quality (MEQ),
        - marine fauna,
        - air quality; and
        - social surroundings.

        The impact assessments for each KEF follow the WA EPA impact mitigation hierarchy, sequentially applying impact avoidance (prevention) measures, impact reduction (mitigation) measures, and impact rehabilitation and offset measures, to provide an assessment of potential residual impacts after application of the sequential measures. The impact assessments find that for all KEFs, the impact avoidance and reduction measures are adequate, there is no requirement to apply rehabilitation or offset measures, and there are no significant residual impacts. A similar impact mitigation hierarchy and consideration of remaining residual impacts is also required for EPBC Act assessments, so the findings of Referral Report No. 4 also inform the assessment of potential impacts on MNES.

        The assessment of potential impacts on the KEFs of coastal processes and MEQ are also relevant to the assessment of potential impacts on MNES, in terms of the inter-tidal communities in both the West Kimberley NHP and the Ord River Floodplain Ramsar wetland. Marine fauna is also relevant to the assessment of potential impacts on MNES, in terms of the listed TMS in the CG area. The findings of Referral Report No. 4 have therefore been applied to inform the assessment of potential impacts on MNES.

    b) EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024i): This report includes a systematic assessment of the potential for the proposed sand-sourcing operation to cause significant impacts on each relevant MNES in accordance with the EPBC Act significant impact criteria for each MNES type, as per the *EPBC Act Significant Impact Guidelines*. The impact assessments considered the nature, scope, scale and duration of the proposed operation, and the application of the impact mitigation hierarchy outlined above. The assessments find that the proposed action does not pose a risk of significant impact on any of the relevant MNES, as defined by the *EPBC Act Significant Impact Guidelines*. This is summarized for each MNES in Tables 7 to 9 in Section 2.3 below.

    c) EPBC Referral Report No. 8 - *Full Modelling Report* (PCS 2025a) (with supporting Annexes and Appendices): This report assessed potential impacts of the proposed sand-sourcing operation on the hydrodynamics, sediment dynamics, coastal and beach processes and suspended solids concentrations and turbidity in CG. The assessment is based on detailed analysis of an extremely comprehensive suite of field data from CG and surrounding regions, analysis of historical satellite imagery, and 3D numerical modelling using the DHI MIKE flexible mesh suite of models, which are designed specifically for the assessment of such operations, supported by the comprehensive suite of field data. The modelling applied best-practices as outlined in the WAMSI/CSIRO *Guideline for Dredge Plume Modelling for EIA* (Sun *et al.*, 2020) and the WA *Technical Guidance for EIA of Marine Dredging Proposals* (EPA 2021).

Referral Report No. 8 was subject to two separate independent expert reviews, and both concluded that the findings are accurate and reliable, and the modelling is well calibrated and validated.

The findings of Referral Report No. 8 are relevant to the assessment of potential impacts on MNES, in terms of potential changes to coastal processes in inter-tidal areas of the West Kimberley NHP and the Ord River Floodplain Ramsar wetland, and potential changes to beach processes at the turtle nesting beaches in the CG area. The assessment finds that the potential for such changes is negligible.

d) EPBC Referral Supplementary Report No. 1 - Boskalis Cambridge Gulf - *Light Assessment* (Nocterra 2025): This report assessed potential impacts of SPV lighting on nesting and hatching Flatback Turtles at the five nesting sites in the CG area, in accordance with the DCCEW *National Light Pollution Guidelines for Wildlife* (DCCEW 2023). The assessment found that the SPV lighting will not impact on nesting and hatching turtles at the turtle nesting beaches.

e) EPBC Referral Supplementary Report No. 2 - Boskalis Cambridge Gulf - *Noise Assessment* (Resonate 2025): This report assessed potential impacts of underwater noise from the SPV, in terms of auditory injury and behavioural impacts on dolphins and marine turtles in the CG area, using a risk assessment approach and in accordance with the US NFMS 2024 guidelines and criteria (as required by WA EPA). The assessment found that underwater noise from the SPV will not cause significant impacts on dolphins and marine turtles.

5. The findings of these reports have been combined to provide a summary of potential impacts on each MNES, applying the impact mitigation hierarchy, and are presented along with the risk assessment for each MNES in Tables 7 to 9 in Section 2.3 below. The supporting reports described above should be referred to for the detailed, supporting impact assessments.

2.2 Risk Assessment

1. The Commonwealth *Environmental Management Plan Guidelines* (DCCEEW 2024) set out a framework for qualitative risk assessment that can be applied for assessing the environmental risks associated with a proposed action. It is provided as an example of one approach to risk assessment and DCCEEW does not require that this particular approach be used when preparing an EMP. Never-the-less, BKA has applied them, in order to be consistent with the DCCEEW framework.

2. The DCCEEW risk assessment framework is consistent with international standards for risk assessment, where:

   – ***Risk = Likelihood x Consequence.***

3. The DCCEEW Guidelines provide qualitative likelihood categories as shown in Table 4, qualitative consequence categories as shown in Table 5, and the resulting risk ratings for each combination of Likelihood x Consequence, as shown in Table 6,

4. BKA has applied the DCCEEW risk assessment framework to assesses the risks of each impact type for each MNES, and the results are presented in Tables 7 to 9 in Section 2.3 below.

TABLE 4: *Qualitative Likelihood Categories*

From *Environmental Management Plan Guidelines* (DCCEEW 2024).

Likelihood Category	Likelihood of the event occurring after control strategies have been put in place.
Highly likely	Is expected to occur in most circumstances.
Likely	Will probably occur during the life of the project.
Possible	Might occur during the life of the project.
Unlikely	Could occur but considered unlikely or doubtful.
Rare	May occur in exceptional circumstances.
Nil	Will not occur.

TABLE 5: *Qualitative Consequence Categories*

Adapted from *Environmental Management Plan Guidelines* (DCCEEW 2024).
With focus on MNES significant impact criteria, as defined in the EPBC Act *Significant Impact Guidelines* (DCCEEW 2021).

Consequence Category	What will be the consequence/result if the event does occur.
Critical	Severe and irreversible significant impact on MNES.
Major	Major significant impact on MNES and real danger of continuing.
High	Substantial significant impact on MNES that could be reversed with intensive efforts.
Moderate	Isolated instances of significant impact on MNES that could be reversed with intensive efforts.
Minor	Minor impact on MNES that does not meet the significant impact criteria and can be reversed.
Nil	Will not cause impact on MNES.

TABLE 6: *Risk Ratings*

From *Environmental Management Plan Guidelines* (DCCEEW 2024).

Likelihood	Consequence					
	Nil	**Minor**	**Moderate**	**High**	**Major**	**Critical**
Highly Likely	**Nil**	**Medium**	**High**	**High**	**Severe**	**Severe**
Likely	**Nil**	**Low**	**Medium**	**High**	**High**	**Severe**
Possible	**Nil**	**Low**	**Medium**	**Medium**	**High**	**Severe**
Unlikely	**Nil**	**Low**	**Low**	**Medium**	**High**	**High**
Rare	**Nil**	**Low**	**Low**	**Low**	**Medium**	**High**
Nil	**Nil**	**Nil**	**Nil**	**Nil**	**Nil**	**Nil**

2.3 Combined Impact & Risk Assessment Tables for each MNES

1. The combined summary impact and risk assessment findings are presented for each MNES in Table 7 to 9 below, as follows:

   – TABLE 7: *Combined summary impact & risk assessment for MNES 1 - West Kimberley National Heritage Place (NHP).*
   – TABLE 8: *Combined summary impact & risk assessment for MNES 2 - Ord River Floodplain Ramsar Wetland.*
   – TABLE 9: *Combined summary impact & risk assessment - Threatened & Migratory Species (TMS).*

2. The assessment tables apply the impact mitigation hierarchy, identify each potential impact for each significant impact criteria for each MNES, as listed in the EPBC Act *Significant Impact Guidelines,* describe the inherent risk (consequence, likelihood and risk rating) before the application of impact prevention and mitigation measures, and then the residual risk after the application of impact prevention and mitigation measures.

3. *The combined impact and risk assessment tables find that the residual risk for all potential impacts for each significant impact criteria for each MNES are* ***either 'nil' or 'low'.*** The supporting reports described in Section 2.1 above and cited in Tables 7 to 9 where relevant should be referred to for the detailed, supporting impact assessments.

TABLE 7: *Combined summary impact & risk assessment for MNES 1 - West Kimberley National Heritage Place (NHP)*

* SIC = Significant Impact Criteria for this MNES from the EPBC Act *Significant Impact Guidelines.*

**EMM = Environmental Management Measures (see Section 4 below for details), based on the DCCEEW and WA EPA impact mitigation hierarchy of prevent (avoid), mitigate (reduce), rehabilitate and offset impacts.

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
An action is likely to have a significant impact on a National Heritage place if there is a real chance or possibility that it will cause one or more of the National Heritage values to be: – ***lost,*** – ***degraded or damaged; or*** – ***notably altered, modified, obscured or diminished.***	**Nil** • The NHP Gazettal Notice lists only one NH value for the west coast of CG - *no significant modification by coastal infrastructure.* • The proposed operation does not involve any form of coastal infrastructure. • The proposed operation will not affect any other NH values as none are listed for the west coast of CG.	**Nil**	**Nil**	**Nil**	**Certain** – The NHP Gazettal Notice states with statutory certainty what the NH values are on the west coast of CG - *no significant modification by coastal infrastructure.* – It is certain that the proposed operation will not affect this value as it does not involve any form of coastal infrastructure.	Prevent: Not required. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
Precautionary add-on (mangroves): – The main environmental resource along the west coast of CG (NHP coast) is fringing mangroves. – These are not specifically a NH value – they are similar to other mangroves throughout northern Australia, and are not	Coastal process changes – indirect impacts on mangroves in the NHP: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to coastal mangroves and changing mangrove area and composition.	**Minor** Any potential changes to mangroves will not constitute a significant impact on the NHP as defined by the SIC for NHPs.	**Unlikely** Detailed modelling supported by comprehensive field data show that the potential for changes to hydrodynamics, coastal processes and mangrove areas is negligible.	**Low**	**High** – Supported by systematic, scientific studies and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	Prevent: This potential impact will be avoided as detailed modelling supported by comprehensive field data shows that the potential for changes to hydrodynamics, coastal processes and mangrove areas from the sand sourcing is negligible - see Referral Report No. 8. Mitigate: Not required. Rehab: Not required. Offset: Not required. As a precautionary measure, monitoring of mangroves will	**Minor**	**Unlikely**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
cited as a NH value in the NHP Gazettal. – Never-the-less, while the mangroves are not covered by this SIC, and thus strictly speaking do not need to be included in the assessment for this MNES, BKA has included them in Table 7 because they are located on the NHP coast.						be carried out as outlined in Section 4 - EMMs, below.			
	Accidental oil spill from the SPV – impacts on mangroves in the NHP: A potential accidental oil spill from the SPV could be carried by currents towards the mangroves.	**Moderate** Any potential oil spill impacts on mangroves will not constitute a significant impact on the NHP as defined by the SIC for NHPs.	**Rare** See Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4 - *Impact Assessments.* The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (1.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed. The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention. There is nil possibility of an oil spill from refueling operations as the SPV will not refuel in Australian waters.	**Low**	**High** – Supported by comprehensive data and systematic assessment - See Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4 - *Impact Assessments.*	Prevent: This potential impact will be avoided through the following factors and measures: – Avoid collision as described under 'Likelihood' column to left. – Avoid the SPV running aground and causing an oil spill, as described under 'Likelihood' column to left. – No refueling of the SPV in Australian waters. – Compliance with all relevant maritime laws including MARPOL and the implementing Australian laws as administered by AMSA. Mitigate: The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the rare event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies (see also Section 9.3 below). Rehab: In the rare event of an accidental oil spill occurring and causing impacts on mangroves, BKA would implement an appropriate rehabilitation program, in consultation with relevant stakeholders. Offset: Not required.	**Minor** (consequence will be reduced by the mitigation actions)	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	Marine debris from the SPV – impacts on mangroves in the NHP: Any marine debris discharged from the SPV could be carried by currents towards the mangroves.	**Minor**	**Nil** – Marine debris will not be discharged into the sea from the SPV. – All garbage (e.g from the day-to-day domestic activities of the crew) will be kept on-board and managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	**Nil**	**High** – The statutory regulatory requirements of MARPOL Annex V and the implementing PS(PPS) Act are certain.	Prevent: As described in likelihood column to left. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
	Sewage from the SPV – impacts on mangroves in the NHP: Any sewage discharged from the SPV could be carried by currents towards the mangroves, affecting water quality.	**Minor**	**Nil** – Sewage will not be discharged into CG from the SPV. – All sewage (e.g from the day-to-day domestic activities of the crew) will be stored in holding tank and treated and managed in accordance with MARPOL Annex IV.	**Nil**	**High** – The statutory regulatory requirements of MARPOL Annex IV and the implementing PS(PPS) Act are certain.	Prevent: As described in likelihood column to left. Mitigate: Not required. Rehab: Not required Offset: Not required.	**Nil**	**Nil**	**Nil**
	Turbidity from the SPV – impacts on mangroves in the NHP: Any increased turbidity caused by the sand	**Nil**	**Nil** – The mangroves in CG are highly adapted to extremely high natural turbidity and	**Nil**	**High** – Supported by systematic, scientific studies	Prevent: As described in likelihood column to left. Mitigate: While not required, as precautionary measures the	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	loading operation could be carried by currents towards the mangroves, affecting water quality.		ecologically are not affected by increased turbidity. – Turbidity generated by the SPV will be negligible in the context of the extremely high natural turbidity in CG, as modelled in Referral Report No. 8. – The SPV will only target courser sands, and not fine silts, which are the main cause of turbidity. – Each sand loading cycle will only run for 1-2 days, with a two-week break between each cycle, preventing the incremental build-up of turbidity that can occur when operations are continuous. – The loaded sand will be exported in the SPV, there will not be any dumping in CG.		and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	following turbidity reduction measures will be applied: - Fitting of 'green valve' in the overflow water discharge intake. - Placing the overflow water discharge outlet at the SPV's keel rather than at the gunwale. Rehab: Not required Offset: Not required.			
	Marine pests from the SPV – impacts on mangroves: Any marine pests introduced via the SPV's ballast water or hull biofouling could be carried by currents towards the mangroves, and depending on the species, establish in and affect the mangrove community.	**High**	**Possible** The source areas in SE Asia where the SPV will sail from to enter CG are high-risk areas for marine pest species, and each arrival of the SPV in CG will pose a potential introduction event, every two weeks over 15 years. However, the likelihood of an introduced species actually establishing in	**Medium**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 6 of Referral Report No. 2. – Section 7 of Referral Report No. 4.	Prevent: This potential impact will be avoided through the following measures: – The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act*. – The SPV will implement a biofouling management plan with stringent biofouling prevention, management, mitigation	**High**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			CG is low, due to the extreme environmental conditions and lack of hard substrate in CG, which are inhospitable and not conducive to colonization by marine species, as evidenced by the general lack of benthic biota in CG. **NOTE:** *It should be noted that because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that is detected, could be caused by one or more of these ships, and not by BKA's SPV.*			and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*. – Biofouling management measures will include: – Maintenance of a high-grade, IMO-compliant anti-fouling system on the SPV. – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas. – Scheduled maintenance dry docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention. – Required reporting to Australian authorities as per Commonwealth requirements. Mitigate: Potential impacts will be reduced further through a Cambridge Gulf extension of the WA *State-Wide Array Surveillance Program* for marine pests (CG-SWASP), in consultation with relevant stakeholders and consistent with the existing WA SWASP (refer Annex 1). Rehab: Not required. Offset: Not required.			

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
Precautionary add-on (turtle nesting beaches): – There is one Flatback Turtle nesting beach located on the coast of the NHP – Turtle Beach West to the west of Cape Dussejour, which is outside of CG. – Turtle nesting beaches are not cited as a NH value in the NHP Gazettal. – Never-the-less, while Turtle Beach West is not covered by this SIC, and thus strictly speaking does not need to be included in the assessment for this MNES, BKA has included it in Table 7 because it is located on the NHP coast (albeit outside of CG).		**Minor** Any potential changes to the beach will not constitute a significant impact on the NHP as defined by the SIC for NHPs.	**Rare** Detailed beach profiling and modelling supported by comprehensive field data show that the potential for changes to hydrodynamics, coastal processes and turtle nesting beaches is negligible, and that the beaches are linked more to offshore sediment sources and processes.	Low	**High** – Supported by systematic, scientific studies and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	Prevent: This potential impact will be avoided as detailed beach profiling and modelling supported by comprehensive field data shows that the potential for changes to hydrodynamics, coastal processes and turtle nesting beaches from the sand sourcing is negligible - see Referral Report No. 8. Mitigate: Not required. Rehab: Not required. Offset: Not required. As a precautionary measure, monitoring of turtle nesting beaches will be carried out as outlined in Section 4 - EMMs, below.	**Moderate**	**Rare**	Low

TABLE 8: *Combined summary impact & risk assessment for MNES 2 - Ord River Floodplain Ramsar Wetland*

* SIC = Significant Impact Criteria for this MNES from the EPBC Act *Significant Impact Guidelines.*

**EMM = Environmental Management Measures (see Section 4 below for details), based on the DCCEEW and WA EPA impact mitigation hierarchy of prevent (avoid), mitigate (reduce), rehabilitate and offset impacts.

SIC*	**Potential Impact on SIC**	**Inherent Risk**				**EMMs****	**Residual Risk**		
		Consequence	**Likelihood**	**Risk Rating**	**Data Certainty**		**Consequence**	**Likelihood**	**Risk Rating**
An action is likely to have a significant impact on the ecological character of a wetland of international importance if there is a real chance or possibility that it will result in:									
a) ***areas of the wetland being destroyed or substantially modified,*** NOTE: The proposed action will not cause any direct impacts on the Ramsar wetland, and will not destroy or substantially modify the wetland. The main environmental resource of the Ramsar wetland on the eastern side of CG is a narrow band of fringing mangroves along the coast. Potential indirect impacts on mangroves from changes to coastal processes and from oil spills are therefore assessed for this SIC.	Coastal process changes – indirect impacts on mangroves in the Ramsar wetland: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to coastal mangroves and changing mangrove area and composition.	**Moderate**	**Rare** Detailed modelling supported by comprehensive field data show that the potential for changes to hydrodynamics, coastal processes and mangrove areas is negligible.	**Low**	**High** – Supported by systematic, scientific studies and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	Prevent: This potential impact will be avoided as detailed modelling supported by comprehensive field data show that the potential for changes to hydrodynamics, coastal processes and mangrove areas from the sand sourcing is negligible - see Referral Report No. 8. Mitigate: Not required. Rehab: Not required. Offset: Not required. As a precautionary measure, monitoring of mangroves will be carried out as outlined in Section 4 - EMMs, below.	**Moderate**	**Rare**	**Low**
	Accidental oil spill from the SPV – impacts on mangroves in the Ramsar wetland: A potential accidental	**Moderate**	**Rare** See Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4	**Low**	**High** – Supported by comprehensive data and systematic assessment - See	Prevent: This potential impact will be avoided through the following factors and measures: – Avoid collision as described under	**Minor** (consequence will be reduced by the mitigation actions)	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	oil spill from the SPV could be carried by currents towards the mangroves.		- *Impact Assessments.* The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (1.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed. The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention. There is nil possibility of an oil spill from refueling operations as the SPV will not refuel in Australian waters.		Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4 - *Impact Assessments.*	'Likelihood' column to left. – Avoid the SPV running aground and causing an oil spill, as described under 'Likelihood' column to left. – No refueling of the SPV in Australian waters. – Compliance with all relevant maritime laws including MARPOL and the implementing Australian laws as administered by AMSA. Mitigate: The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies (see also Section 9.3 below). Rehab: In the highly unlikely event of an accidental oil spill occurring and causing impacts on mangroves, BKA would implement an appropriate rehabilitation program, in consultation with relevant stakeholders. Offset: Not required.			

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
b) ***a substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland,***	**Nil** The proposed action will not cause any direct or indirect impacts on the hydrological regime of the wetland. The hydrological regime of the wetland is driven by climate-level factors, in particular the dry-season/wet-season tropical monsoonal cycle, including acute rainfall events associated with tropical cyclones and low-pressure systems. There are no mechanisms whereby the proposed operation could change the climate-level factors of the tropical monsoonal cycle.	**Nil**	**Nil**	**Nil**	**Nil**	Prevent: Not required. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
c) ***the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected,*** NOTE: The proposed action will not cause any direct impacts on *the habitat or lifecycle of native species* in the Ramsar wetland. The main habitat of the Ramsar wetland on the eastern side of CG is a narrow band of fringing mangroves along the coast.	Coastal process changes – indirect impacts on mangroves in the Ramsar wetland: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to coastal mangroves and changing mangrove area and composition.	**Moderate**	**Rare** As per SIC a) above.	**Low**	**High** As per SIC a) above.	Prevent: As per SIC a) above. Mitigate: Not required. Rehab: Not required. Offset: Not required. As a precautionary measure, monitoring of mangroves will be carried out as outlined in Section 4 - EMMs, below.	**Moderate**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
Potential indirect impacts on mangroves from changes to coastal processes and from oil spills are therefore assessed for this SIC.									
d) *a substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health; or* NOTE: The proposed action will not cause any significant impacts on the water quality of the wetland, as outlined in Section 9 of Referral Report No. 4 - *Impact Assessments* (BKA 2025x) and Section 9.3 of Referral Report No. 7 - *Commonwealth Matters* (BKA 2025x). Potential marine debris, sewage and turbidity from the SPV relate to water quality. While the SPV will not discharge marine debris or sewage into CG, and while operation of the SPV will not negatively affect turbidity levels in CG (as assessed in Referral Report No. 8), these potential impacts are assessed for this SIC, in accordance with the precautionary principle.	<u>Marine debris from the SPV — impacts on the Ramsar wetland</u>: Any marine debris discharged from the SPV could be carried by currents towards the Ramsar wetland.	**Minor**	**Nil** – Marine debris will not be discharged into the sea from the SPV. – All garbage (e.g from the day-to-day domestic activities of the crew) will be kept on-board and managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	**Nil**	**High** – The statutory regulatory requirements of MARPOL Annex V and the implementing PS(PPS) Act are certain.	<u>Prevent</u>: As described in likelihood column to left. <u>Mitigate</u>: Not required. <u>Rehab</u>: Not required. <u>Offset</u>: Not required.	**Nil**	**Nil**	**Nil**
	<u>Sewage from the SPV — impacts on the Ramsar wetland</u>: Any sewage discharged from the SPV could be carried by currents towards the Ramsar wetland, affecting water quality.	**Minor**	**Nil** – Sewage will not be discharged into CG from the SPV. – All sewage (e.g from the day-to-day domestic activities of the crew) will be stored in holding tank and treated and managed in	**Nil**	**High** – The statutory regulatory requirements of MARPOL Annex IV and the implementing PS(PPS) Act are certain.	<u>Prevent</u>: As described in likelihood column to left. <u>Mitigate</u>: Not required. <u>Rehab</u>: Not required <u>Offset</u>: Not required.	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			accordance with MARPOL Annex IV.						
	Turbidity from the SPV –– impacts on the Ramsar wetland: Any increased turbidity caused by the sand loading operation could be carried by currents towards the Ramsar wetland, affecting water quality.	**Nil**	**Nil** – The mangroves in the Ramsar wetland are highly adapted to extremely high natural turbidity and ecologically are not affected by increased turbidity. – Turbidity generated by the SPV will be negligible in the context of the extremely high natural turbidity in CG, as modelled in Referral Report No. 8. – The SPV will only target courser sands, and not fine silts, which are the main cause of turbidity. – Each sand loading cycle will only run for 1-2 days, with a two-week break between each cycle, preventing the incremental build-up of turbidity that can occur when operations are continuous. – The loaded sand will be exported in	**Nil**	**High** – Supported by systematic, scientific studies and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	Prevent: As described in likelihood column to left. Mitigate: While not required, as precautionary measures the following turbidity reduction measures will be applied: - Fitting of 'green valve' in the overflow water discharge intake. - Placing the overflow water discharge outlet at the SPV's keel rather than at the gunwale. Rehab: Not required Offset: Not required.	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			the SPV, there will not be any dumping in CG.						

e) ***an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.***	Marine pests from the SPV — impacts on Ramsar wetland: Any marine pests introduced via the SPV's ballast water or hull biofouling could be carried by currents towards the Ramsar wetland, and depending on the species, establish in and affect the wetland.	**High**	**Possible**
			
			The source areas in SE Asia where the SPV will sail from to enter CG are high-risk areas for marine pest species, and each arrival of the SPV in CG will pose a potential introduction event, every two weeks over 15 years.
			
			However, the likelihood of an introduced species actually establishing in CG is low, due to the extreme environmental conditions and lack of hard substrate in CG, which are inhospitable and not conducive to colonization by marine species, as evidenced by the general lack of benthic biota in CG.
			
			NOTE: *It should be noted that because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP*
				Medium	**High**
					Supported by detailed and comprehensive scientific studies, see:
					– Section 6 of Referral Report No. 2.
					– Section 7 of Referral Report No. 4.
						Prevent: This potential impact will be avoided through the following measures:
						– The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act*.
						– The SPV will implement a biofouling management plan with stringent biofouling prevention, management, mitigation and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*.
						– Biofouling management measures will include:
						  – Maintenance of a high-grade, IMO-compliant anti-fouling system on the SPV.
						  – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas.
						  – Scheduled maintenance dry
							High	**Rare**	**Low**

SIC*	**Potential Impact on SIC**	**Inherent Risk**				**EMMs****	**Residual Risk**		
		Consequence	**Likelihood**	**Risk Rating**	**Data Certainty**		**Consequence**	**Likelihood**	**Risk Rating**
			introduction that is detected, could be caused by one or more of these ships, and not by BKA's SPV.			docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention. – Required reporting to Australian authorities as per Commonwealth requirements. Mitigate: Potential impacts will be reduced further through CG-SWASP, in consultation with relevant stakeholders and consistent with the existing WA SWASP (refer Annex 1). Rehab: Not required. Offset: Not required.			

TABLE 9: *Combined summary impact & risk assessment for MNES 4 - Threatened & Migratory Species (TMS)*

NOTE 1: The Criteria for critically endangered or endangered species are used in Table 9, and are also applied to vulnerable species, although the criteria for the latter, while almost identical, are slightly less stringent than those for the former, as specified in the *EPBC Act Significant Impact Guidelines*.

NOTE 2: The key TMS in the CG area and their EPBC Act listings are as follows:
- Australian Snubfin Dolphin (*Orcaella heinshoni*): **Vulnerable & Migratory.**
- Australian Humpback Dolphin (*Sousa sahulensis*): **Vulnerable & Migratory.**
- Flatback Turtle (*Natator depressus:* **Vulnerable & Migratory.**
- Spear-tooth Shark (*Glyphis glyphis*): **Critically endangered. Not Migratory.**
- Northern River Shark *(G. garricki):* **Endangered. Not Migratory** (recent work by Kyne et al suggests changing to Vulnerable).
- Large-tooth (Freshwater) Sawfish *(Pristis pristis*): **Vulnerable & Migratory.**
- Green Sawfish *(Pristsi zijsron):* **Vulnerable & Migratory.**
- Dwarf Sawfish *(Pristis clavata)*: **Vulnerable & Migratory.**

* SIC = Significant Impact Criteria for this MNES from the EPBC Act *Significant Impact Guidelines.*

**EMM = Environmental Management Measures (see Section 4 below for details), based on the DCCEEW and WA EPA impact mitigation hierarchy of prevent (avoid), mitigate (reduce), rehabilitate and offset impacts.

SIC*	**Potential Impact on SIC**	**Inherent Risk**				**EMMs****	**Residual Risk**		
		Consequence	**Likelihood**	**Risk Rating**	**Data Certainty**		**Consequence**	**Likelihood**	**Risk Rating**
An action is likely to have a significant impact on a critically endangered or endangered species (or vulnerable species), if there is a real chance or possibility that it will:									
a) ***lead to a long-term decrease in the size of a population,***	NOTE: The proposed action will not lead to a long-term decrease in the size of a population of any of the key TMS in the CG area, as outlined in Section 10 of EPBC Referral Report No. 4 - *Impact Assessments* (BKA 2024h) and in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). However, there is potential for certain impacts on individual animals, and as a precautionary measure, these potential impacts are assessed for this SIC, for each key TMS, as listed below:								
- ***Snubfin and Humpback Dolphins:***	Vessel strikes by the SPV: Causing potential physical injury to dolphins.	**Minor** (@ population level per SIC)	**Unlikely** The likelihood of encounters between the SPV and Snubfin and	**Low**	**High** Supported by detailed and comprehensive	Prevent: This potential impact will be avoided through the following measures:	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			Humpback Dolphins is low for the following reasons: - The numbers that utilize CG are low and are part of a larger population that also utilizes the inshore waters of JBG and along the coast outside of CG. Their preferred habitat within CG is foraging areas along the coast, away from the deeper, open waters of the POA (although they may occasionally pass through the POA enroute between foraging areas). - Snubfins & Humpbacks are naturally shy and elusive, which unlike other dolphin species, avoid vessels. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.		scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4.	– The factors listed under 'Likelihood' column to left. – Implementation of best-practice marine fauna observation and avoidance (MFOA) measures, in accordance with relevant guidelines (see Annex 2). Mitigate: The MFOA measures above are both an impact prevention and mitigation measure. The program will also generate long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. Rehab: Not required. Offset: Not required.			

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	Underwater noise from the SPV: Causing potential auditory injury and behavioural impacts on dolphins.	**Minor** (@ population level per SIC)	**Nil** As presented in EPBC Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate 2025), modelling and risk assessment of underwater noise emissions from the SPV indicates that auditory injury and behavioural impacts on dolphins will not be caused, in accordance with US NMFS thresholds (as required by WA EPA).	**Nil**	**High** Supported by systematic, scientific assessment in accordance with best-practice methods, as reported in Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate 2025).	Prevent: EPBC Referral Supplementary Report No. 2 - *Noise Assessment* indicates that auditory injury and behavioural impacts on dolphins will not be caused. Mitigate: While not required given the findings of Supplementary Report No. 2, the following precautionary mitigation factors and measures also apply: - IMO noise reduction measures: The SPV will be a 'purpose-built' vessel and will incorporate relevant best practice noise reduction measures, as per the IMO *Underwater Noise Guidelines* (IMO 2023). - Very low occurrence of these species in the POA (as indicated by dedicated site surveys). - Very low presence of the SPV (1-2 days every 2 weeks with zero presence in CG for 86% of the time during the project lifespan). - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away; and improving the effectiveness of MFOA	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
						measures (see next item). - MFOA measures: As described against 'Vessel Strikes' above, the MFOA measures will also mitigate the potential effects of noise, as sighted animals will be avoided (see Annex 2). - High SSC: The naturally very high suspended sediment concentrations in CG reduce sound propagation (WODA 2015). - High natural noise in CG: The naturally high sound levels from high tidal range can mask other sound sources (Marley et al (2017).			
- ***Flatback Turtle nesting beaches & nesting & hatching turtles:***	Accidental oil spill from the SPV – impacts on turtle nesting beaches: A potential accidental oil spill from the SPV could be carried by currents towards the turtle beaches (although this is unlikely given most beaches are outside of CG).	**Moderate** (@ population level per SIC)	**Rare** See Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4 - *Impact Assessments.* The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (1.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed.	**Low**	**High** Supported by comprehensive data and systematic assessment - See Annex 2 - *Shipping & Oil Spill Risk Assessment* of Referral Report No. 4 - *Impact Assessments.*	Prevent: This potential impact will be avoided through the following factors and measures: – Avoid collision as described under 'Likelihood' column to left. – Avoid the SPV running aground and causing an oil spill, as described under 'Likelihood' column to left. – No refueling of the SPV in Australian waters. – Compliance with all relevant maritime laws including MARPOL and the implementing	**Minor** (consequence will be reduced by the mitigation actions)	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention. There is nil possibility of an oil spill from refueling operations as the SPV will not refuel in Australian waters.			Australian laws as administered by AMSA. Mitigate: The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies (see also Section 9.3 below). Rehab: In the highly unlikely event of an accidental oil spill occurring and causing impacts on mangroves, BKA would implement an appropriate rehabilitation program, in consultation with relevant stakeholders. Offset: Not required.			
	Coastal process changes – indirect impacts on turtle nesting beaches: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to turtle nesting beaches and changing beach morphology and composition.	**Moderate** (@ population level per SIC)	**Rare** Detailed beach profiling and modelling supported by comprehensive field data show that the potential for changes to hydrodynamics, coastal processes and turtle nesting beaches is negligible, and that the beaches are linked more to offshore sediment sources and processes.	**Low**	**High** – Supported by systematic, scientific studies and comprehensive suite of field data. – See EPBC Referral Report No. 8 - *Full Modelling Report.*	Prevent: This potential impact will be avoided as detailed beach profiling and modelling supported by comprehensive field data shows that the potential for changes to hydrodynamics, coastal processes and turtle nesting beaches from the sand sourcing is negligible - see Referral Report No. 8. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Moderate**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
						As a precautionary measure, monitoring of turtle nesting beaches will be carried out as outlined in Section 4 - EMMs, below.			
	SPV Lighting: Potential impacts on nesting and hatching turtles at the nesting beaches in the CG area, when the SPV is operating in CG at night.	**Moderate** (@ population level per SIC)	**Nil** There is no likelihood of this impact as the SPV will be fitted with turtle safe lighting as specified in the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023) and detailed in Annex 3). As presented in EPBC Referral Supplementary Report No. 1 - *Light Assessment* (Nocterra 2025), modelling and risk assessment of light emissions from the SPV (fitted with turtle safe lighting), shows that nesting and hatching turtles at the nesting beaches in the CG area will not be impacted, in accordance with the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023).	**Nil**	**High** Supported by systematic, scientific assessment in accordance with best-practice methods, as reported in Referral Supplementary Report No. 1 - *Light Assessment* (Nocterra 2025).	Prevent: The SPV will be fitted with turtle safe lighting as specified in the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023) and detailed in Annex 3. Mitigate: While not required given the fitting of turtle safe lighting, and the findings of Supplementary Report No. 1, the following precautionary mitigation factors and measures also apply: - Lowest Impact Vessel Route (West Entrance on Figure 1): The SPV will enter and depart CG via West Entrance (west of Lacrosse Island), which is 16 km away from the most important nesting beach at Cape Domett, and geo-screened by both Cape Domett and Lacrosse Island, geo-screened from Turtle Beach West, and 22 km from the nesting site at Barnett Point. - Limited light presence: Light exposure from the SPV will be limited by the fact that the SPV will only operate in CG for one to two nights every two	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
						weeks – there will be zero light source from the SPV in CG for 86% of time during the project lifespan. - Geographical screening: Light exposure from the SPV will also be avoided by the fact that the turtle nesting sites are geographically screened from the POA where the SPV will operate, as described for each nesting site in Nocterra (2025).			
- ***Turtles in the POA*** *(at or near the sea surface and near the seabed):*	Vessel strikes by the SPV: Causing potential physical injury to turtles.	**Minor** (@ population level per SIC)	**Unlikely** The likelihood of encounters between the SPV and marine turtles in the POA is very low for the following reasons: - The numbers of turtles that pass through the POA are very low as indicated by site surveys and given the extreme environmental conditions in the POA. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when loading sand in CG,	**Low**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Sections 1 & 2 of Referral Supplementary Report No. 4.	Prevent: This potential impact will be avoided through the following measures: – The factors listed under 'Likelihood' column to left. – Implementation of best-practice marine fauna observation and avoidance (MFOA) measures, in accordance with relevant guidelines (see Annex 2). Mitigate: The MFOA measures above are both an impact prevention and mitigation measure. The program will also generate long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. Rehab: Not required. Offset: Not required.	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			allowing fauna to move away.						
	Underwater noise from the SPV: Causing potential auditory injury and behavioural impacts on turtles.	**Minor** (@ population level)	**Nil** As presented in EPBC Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate Consultants 2025), modelling and risk assessment of underwater noise emissions from the SPV indicates that auditory injury and behavioural impacts on marine turtles will not be caused, in accordance with US NMFS thresholds (as required by WA EPA).	**Nil**	**High** Supported by systematic, scientific assessment in accordance with best-practice methods, as reported in Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate Consultants 2025).	Prevent: EPBC Referral Supplementary Report No. 2 - *Noise Assessment* indicates that auditory injury and behavioural impacts on marine turtles will not be caused. Mitigate: While not required given the findings of Supplementary Report No. 2, the following precautionary mitigation factors and measures also apply: - IMO noise reduction measures: The SPV will be a 'purpose-built' vessel and will incorporate relevant best practice noise reduction measures, as per the IMO *Underwater Noise Guidelines* (IMO 2023). - Very low occurrence of these species in the POA (as indicated by dedicated site surveys). - Very low presence of the SPV (1-2 days every 2 weeks with zero presence in CG for 86% of the time during the project lifespan). - Very low vessel speed: The SPV will operate at very low speeds (<2 kts) when loading sand in CG, allowing fauna to move away; and	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
						improving the effectiveness of MFOA measures (next item). - MFOA measures: As described against 'Vessel Strikes' above, the MFOA measures will also mitigate potential effects of noise, as sighted animals will be avoided (see Annex 2). - High SSC: The naturally very high suspended sediment in CG reduce sound propagation (WODA 2015). - High natural noise in CG: The naturally high sound levels from high tidal range can mask other sound sources (Marley et al 2017).			
	Drag-head entrainment: Potential entrainment of a turtle when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	**Minor** (@ population level per SIC)	**Unlikely** The likelihood of encounters between the drag-head and marine turtles on the seabed in the POA is very low for the following reasons: - The numbers of turtles that pass through the POA are very low as indicated by site surveys, they do so on or near the surface (away from the drag-head), as the extreme tidal currents, highly	**Low**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Sections 1 & 2 of Referral Supplementary Report No. 4.	Prevent: This potential impact will be avoided through the factors listed under 'Likelihood' column to left. Mitigate: This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			dynamic sand waves and permanent aphotic zone at the seabed in the POA make it implausible that they would remain on or near the seabed in this area. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.			low pump revolutions, providing opportunity for any marine fauna on the seabed to move away. This is a recognized mitigation measure in the Marine Turtle Recovery Plan (DCCEW 2017) and has been accepted as best practice in dredging projects across marine turtle areas of Australia for over ten years. – Marine fauna deflector / excluder ('tickler chains): Fitted to the drag-head as per Annex 4. This is a recognized mitigation measure in the Marine Turtle Recovery Plan (DCCEW 2017) and has been accepted as best practice in dredging projects across Australia for over ten years. Rehab: Not required. Offset: Not required.			
	Peak nesting season considerations: The likelihood of vessel strikes and drag-head entrainment described above could potentially increase during peak turtle nesting season (Aug-Sept), when larger numbers of Flatback Turtles are present at and near the nesting beaches in the area (which are distant from the POA).	**Minor** (@ population level per SIC)	**Possible**	**Low**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Sections 1 & 2 of Referral Supplementary Report No.	The same Prevention and Mitigation measures listed for vessel strikes and drag-head entrainment above will apply during peak nesting season. While the above measures are assessed as being more than adequate for preventing and mitigating the potential for significant impacts on marine turtles in all seasons, as an additional precaution, enhanced measures will be applied	**Minor**	**Unlikely**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
						during the peak Flatback Turtle nesting season, as follows: – Very low SPV presence: The SPV will only be present in the POA for 4 loading cycles of up to 2 days each = max of 8 days presence during the two-month season. – Spatial restriction: Sand-sourcing operations will be restricted to the western half of the POA (furthest from the main nesting beach at Cape Domett) during the season (refer map at Figure 1a). – Doubling MFOA effort: The MFOA program will be doubled from two active observers to four active observers during the season.			
- ***River Sharks:***	Vessel strikes by the SPV: Causing potential physical injury to River Sharks.	**Minor** (@ population level per SIC)	**Unlikely** The likelihood of encounters between the SPV and River Sharks in the POA is very low for the following reasons: - The primary habitat for River Sharks in the CG area is in the Lower Ord River ~35 km upstream from the POA and in the Durack and Pentecost Rivers >80 km upstream from CG. There have	**Low**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Annex 13 of Referral Report No. 2.	Prevent: This potential impact will be avoided through the following measures: – The factors listed under 'Likelihood' column to left. – Implementation of best-practice marine fauna observation and avoidance (MFOA) measures, in accordance with relevant guidelines (see Annex 2). Mitigate: The MFOA measures above are both an impact prevention and mitigation measure. The program will also generate	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			been no observations or records of River Sharks in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - The adults of these two species typically swim in mid waters below the sea surface, which mitigates the likelihood of vessel strike. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.			long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. Rehab: Not required. Offset: Not required.			
	Drag-head entrainment: Potential entrainment of a shark when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	**Minor** (@ population level per SIC)	**Unlikely** The likelihood of encounters between the drag-head and River	**Low**	**High** Supported by detailed and comprehensive scientific studies, see:	Prevent: This potential impact will be avoided through the factors listed under 'Likelihood' column to left.	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			Sharks is very low for the following reasons: - The primary habitat for River Sharks in the CG area is in the Lower Ord River ~35 km upstream from the POA and in the Durack and Pentecost Rivers >80 km upstream from CG. There have been no observations or records of River Sharks in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - The adults of these two species typically swim well above the seabed, which mitigates the likelihood of drag-head entrainment. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when		– Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Annex 13 of Referral Report No. 2.	Mitigate: This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at low pump revolutions, providing opportunity for any marine fauna on the seabed to move away. This has been accepted as best practice in dredging projects across Australia for over ten years. – Marine fauna deflector ('tickler chains): Fitted to the drag-head as per Annex 4. This has been accepted as best practice in dredging projects across Australia for over ten years. Rehab: Not required. Offset: Not required.			

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			loading sand in CG, allowing fauna to move away.						
- ***Sawfish:***	Drag-head entrainment: Potential entrainment of a sawfish when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	**Minor** (@ population level per SIC)	**Possible** The likelihood of encounters between the drag-head and the three key Sawfish species is very low for the following reasons: - The primary habitat for Sawfish in the CG area is in the upstream rivers, creaks and tidal inlets located well upstream from the POA. There have been no observations or records of Sawfish in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - The SPV will only be present in CG for 1 to 2 days every 2 weeks. - The SPV will operate at very low speeds (<2 knots) when loading sand in CG,	**Low**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 9 of Referral Report No. 2. – Section 10 of Referral Report No. 4. – Annex 13 of Referral Report No. 2.	Prevent: This potential impact will be avoided through the factors listed under 'Likelihood' column to left. Mitigate: This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at low pump revolutions, providing opportunity for any marine fauna on the seabed to move away. This has been accepted as best practice in dredging projects across Australia for over ten years. – Marine fauna deflector ('tickler chains): Fitted to the drag-head as per Annex 4. This has been accepted as best practice in dredging projects across Australia for over ten years. Rehab: Not required. Offset: Not required.	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			allowing fauna to move away.						
- ***All species:*** NOTE: While the SPV will not discharge marine debris, this potential impact on TMS is assessed for this SIC, in accordance with the precautionary principle.	Marine debris from the SPV – impacts on TMS: Any marine debris discharged from the SPV could impact on TMS in CG.	**Minor** (@ population level per SIC)	**Nil** – Marine debris will not be discharged into the sea from the SPV. – All garbage (e.g. from the day-to-day domestic activities of the crew) will be kept on-board and managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	**Nil**	**High** – The statutory regulatory requirements of MARPOL Annex V and the implementing PS(PPS) Act are certain.	Prevent: As described in likelihood column to left. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
b) *reduce the area of occupancy of the species,*	**None** The proposed action will not lead to a reduction of the area of occupancy of the species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	**Nil**	**Nil**	**Nil**	**Nil**	Prevent: Not required. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
c) *fragment an existing population into*	**None** The proposed action will not fragment an existing	**Nil**	**Nil**	**Nil**	**Nil**	Prevent: Not required. Mitigate: Not required.	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
two or more populations,	population into two or more populations, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).					Rehab: Not required. Offset: Not required.			
d) *adversely affect habitat critical to the survival of a species,*	**None** The proposed action will not adversely affect habitat critical to the survival of a species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	**Nil**	**Nil**	**Nil**	**Nil**	Prevent: Not required. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
e) *disrupt the breeding cycle of a population,*	The proposed action will not disrupt the breeding cycle of a population, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). However, given that Snubfin Dolphins are believed to breed / calve in CG and given the Flatback Turtle nesting beaches in the general area (mainly outside of CG), the impacts relating to Snubfin Dolphins and Flatback Turtles under SIC a) above are relevant.	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	**Low**	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	As per items pertaining to Snubfin Dolphins and Flatback Turtles under SIC a) above.	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
f) ***modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,***	**None** The proposed action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	**Nil**	**Nil**	**Nil**	**Nil**	Prevent: Not required. Mitigate: Not required. Rehab: Not required. Offset: Not required.	**Nil**	**Nil**	**Nil**
g) ***result in invasive species that are harmful to a critically endangered or endangered (or vulnerable) species becoming established in the endangered or critically endangered (or vulnerable) species' habitat,***	Marine pests from the SPV – impacts on TMS: Any marine pests introduced via the SPV's ballast water or hull biofouling that could potentially harm TMS.	**High**	**Possible** The source areas in SE Asia where the SPV will sail from to enter CG are high-risk areas for marine pest species, and each arrival of the SPV in CG will pose a potential introduction event, every two weeks over 15 years. However, the likelihood of an introduced species actually establishing in CG is low, due to the extreme environmental conditions and lack of hard substrate in CG, which are inhospitable and not conducive to colonization by marine species, as evidenced by the general lack of benthic biota in CG. **NOTE:** *It should be noted that because*	**Medium**	**High** Supported by detailed and comprehensive scientific studies, see: – Section 6 of Referral Report No. 2. – Section 7 of Referral Report No. 4.	Prevent: This potential impact will be avoided through the following measures: – The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act*. – The SPV will implement a biofouling management plan with stringent biofouling prevention, management, mitigation and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*. – Biofouling management measures will include: – Maintenance of a high-grade, IMO-	**High**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
			there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that is detected, could be caused by one or more of these ships, and not by BKA's SPV.			compliant anti-fouling system on the SPV. – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas. – Scheduled maintenance dry docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention. – Required reporting to Australian authorities as per Commonwealth requirements. Mitigate: Potential impacts will be reduced further through CG-SWASP, in consultation with relevant stakeholders and consistent with the existing WA SWASP (refer Annex 1). Rehab: Not required. Offset: Not required.			
h) *introduce disease that may cause the species to decline;*	This issue is assessed in Section 3.2 – *Pathogens & Diseases*, of EPBC Referral Supplementary Report No. 5 - *Response to Request for Further Information* (BKA 2025c).								
	Potential diseases via ballast water & vessel strikes:	**Moderate**	**Rare**	**Low**	As per items pertaining to Marine	As per items pertaining to Marine Pests and Vessel Strikes above.	**Minor**	**Rare**	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	- The assessment in Section 3.2 of Supplementary Report No. 5 finds that the only aspects of the operation which could have relevance to diseases in listed TMS in CG are ballast water discharges and potential vessel strikes causing injury, and thus potential infection, in an individual animal. Comprehensive impact prevention, mitigation, monitoring and response actions are proposed for both of these aspects, as outlined above.	As per items pertaining to Marine Pests and Vessel Strikes above.	As per items pertaining to Marine Pests and Vessel Strikes above.		Pests and Vessel Strikes above.				
	<u>Potential pathogens in seabed sand</u>: - Section 3.2 of Supplementary Report No. 5 also systematically assesses the potential risk of pathogens being already present in the seabed sands in CG, and of these being disturbed and mobilized by the sand-sourcing operation, and subsequently affecting TMS in CG. It finds that the risk is negligible. This is because the sand is naturally highly mobile and constantly suspended by the strong tidal currents in	**Minor** (diseases in marine turtles and dolphins usually affect individual animals and do not have population-level impacts per EPBC significant impact criteria).	**Rare** (the assessment in Section 3.2 of Supplementary Report No. 5 finds that the likelihood may be 'nil', but 'rare' is used here on a precautionary basis).	**Low**	**High** Supported by systematic, scientifically-based risk assessment as presented in Section 3.2 of Supplementary Report No. 5.	EMMs are not required, however, as a precautionary measure monitoring for signs of pathogens and diseases in TMS is included in the Marine Fauna Observation monitoring program under CEO 7 (pls refer Table 15). Any evidence of pathogens and diseases in TMS will be reported to relevant authorities.	**Minor** (diseases in marine turtles and dolphins usually affect individual animals and do not have population-level impacts per EPBC significant impact criteria).	**Rare** (the assessment in Section 3.2 of Supplementary Report No. 5 finds that the likelihood may be 'nil' but 'rare' is used here on a precautionary basis).	**Low**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	CG, and is thus already naturally 'highly disturbed', and the sand sourcing will not alter this. The operation will also not contribute to creating environmental stress and immuno-suppression in TMS (e.g. through changed water quality, temperature etc), which for most pathogens are the main triggers for disease outbreaks in TMS.								
i) ***interfere with the recovery of the species.***	**None** The proposed action will not interfere with the recovery of any of the relevant species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). This issue is assessed further in EPBC Referral Supplementary Report No. 5 - *Response to Request for Further Information* (BKA 2025c), which *inter-alia* reviews potential implications of the proposed operation against all elements of the: – DCCEEW Conservation Advice for each species, including elements	**Nil**	**Nil**	**Nil**	**Nil**	<u>Covered by all items above.</u> The EMMs to be implemented by BKA as presented in this C-EMP, including the data that will be generated by the proposed monitoring programs, will contribute to improved understanding of the species and to their conservation and recovery.	**Nil**	**Nil**	**Nil**

*SIC**	Potential Impact on SIC	Inherent Risk				EMMs**	Residual Risk		
		Consequence	Likelihood	Risk Rating	Data Certainty		Consequence	Likelihood	Risk Rating
	relating to species recovery, – *Recovery Plan for Marine Turtles in Australia, 2017-2027*; and – *Sawfish & River Sharks Multi-species Recovery Plan, 2015.* The assessment in Supplementary Report No. 5 finds that the proposed operation will not contribute to the key threats listed in the conservation advice and recovery plans, will not pose a risk of significant impact on these species that might affect their recovery, consistent with the EPBC Act significant impact guidelines and criteria.								

3. C-EMP PURPOSE, OUTCOMES & OBJECTIVES

3.1 Overall Purpose, Rationale & Approach

1. The overall purpose of this C-EMP is:

   - *To achieve the stated Commonwealth Environmental Outcome (CEO) for each relevant Matter of National Environmental Significance (MNES) by preventing, mitigating, monitoring, managing, reporting and responding to potential significant impacts of the proposed operation on each MNES, in accordance with the EPBC Act Significant Impact Guidelines.*

2. In agreement with DCCEEW, the approach adopted for the environmental management measures (EMMs) in this EMP is based on the WA EPA guidance on EMPs (EPA 2024 and EPA 2021a), and adopts a hybrid outcomes- and objectives-based approach, as described in Sections 2.2 to 2.3 below.

3. The EMMs described in Section 4 are designed to achieve the specified CEOs for each relevant MNES, and include the following sequential elements, adapted from the WA EPA guidance on EMPs (EPA 2024 and EPA 2921a), and based on the impact mitigation hierarchy:

   a) Potential impacts on the MNES – as assessed in BKA's referral reports in accordance with the EPBC Act *Significant Impact Guidelines* and summarized in Tables 7 to 9 in Section 2.3 above.

   b) Risk rating – as presented in Tables 7 to 9 in Section 2.3 above.

   c) Impact prevention factors and measures – the factors and measures that will avoid the potential impacts.

   d) Impact mitigation measures – the measures that will further reduce potential impacts and resulting risk.

   e) Commonwealth Environmental Outcome (CEO) – the desired state of the MNES both during and after implementation of the proposed action, based on prevention of any significant impacts on the MNES as defined in the EPBC Act *Significant Impact Guidelines*.

   f) Trigger Criteria (TRC) – measurable indicators that are designed to forewarn of the approach of the Threshold Criteria and prompt trigger response actions to avoid reaching the Threshold Criteria.

   g) Trigger Response Action (TRA) – adaptive management and corrective actions to be taken to avoid reaching the Threshold Criteria and to prevent further exceedance of the TRC.

   h) Threshold Criteria (THC) – measurable indicators that represent the limit of acceptable impact beyond which the CEO is not being met and there is likely to be a significant impact on the MNES.

   i) Threshold Contingency Action (TCA) – adaptive management and corrective actions to be taken to mitigate exceeding the TCA and to prevent further exceedance of the TCA.

   j) Monitoring (Mon) – the data collection, analysis and reporting arrangements that ensure overall compliance with the C-EMP and with the CEOs for each MNES, designed to measure parameters that relate to each TRC and THC and allow for rapid response and adaptive management if required. Includes specification of the required baseline for each monitoring component and the timing of monitoring.

   k) Reporting – the arrangements for reporting the results from the monitoring program and overall compliance with the EMP and compliance with the CEO for each MNES.

4. A separate S-EMP has been developed to address the relevant State Key Environmental Factors (KEFs) under the WA *Environmental Protection Act*, which are broader than the Commonwealth MNES. However, for consistency the EOs and related environmental management measures are the same where relevant (e.g. the State KEF of 'marine fauna' has the same EO's and related environmental management measures as the Commonwealth MNES of 'threatened species').

3.2 Outcomes-based & objectives-based EMPs

1. The WA EPA guidance on EMPs (EPA 2024 and EPA 2921a) describe both outcomes-based and objectives-based EMPs, with a preference for outcomes-based EMPs where possible. The WA EPA will consider objectives-based EMPs when

outcome-based conditions are not practical, considering the nature of the proposed operation. The DCCEEW advised that they will accept this approach for this proposed action.

2. Section 3.3 describes the proposed CEO for each Commonwealth MNES. The CEOs are based on an outcomes-based EMP as preferred by the WA EPA, based on the guidance in EPA (2021a). However, given the maritime, vessel-based nature of the proposed operation, some of the CEOs and supporting TRCs and THCs are also objective-based / management-based – so this may be considered a hybrid outcomes- and objectives-based approach.

3. As outlined in WA EPA (2021a) an EO is the state of the environment at a point in time during or after proposal implementation. EOs should:

    a) reflect specific and measurable environmental states,
    b) have a clear boundary, size, extent, or limit; and
    c) be associated with the achievement of one or more of the WA EPA's objectives for environmental factors.

4. The CEOs have been designed to comply with point 3.a) above in that they reflect the environmental state for each MNES as measured during BKA's baseline surveys and studies, as described in Section 1.2.2 above. Additional baseline surveys will be carried before commencement of the proposed operation, as described in Section 5, so as to provide up-to-date data on baseline environmental conditions. Any potential future changes will be able to be measured through follow-up surveys and monitoring during and after implementation of the proposed operation.

5. The CEOs have also been designed to comply with point 3.b) above in that their boundaries for assessment and monitoring align with the Local Assessment Unit (LAU) adopted by BKA for the environmental assessment of the proposal, as described in Section 1.2.1 above.

3.3 Environmental Outcomes for Commonwealth MNES

1. Because DCCEEW assesses potential impacts on MNES in accordance with the significant impact criteria specified in the Commonwealth *Significant Impact Guidelines,* in order to facilitate ease of assessment by DCCEEW, the CEOs have been developed against each relevant significant impact criteria for each MNES, as presented in Tables 10 to 12 below.

2. A further bases for the allocation of CEOs against each MNES is provided in the combined risk and impact assessment tables in Section 2.3 above.

3. For consistency and coordination, the CEOs and associated environmental management measures (EMMs) for each MNES are derived from and based on the EOs for each relevant State Key Environmental Factor (KEF), as presented in the separate State EMP submitted to the WA EPA. It is necessary to present the State and Commonwealth EMPs separately as they have differing overall templates and required document structures, they relate to different legislation and jurisdictions, and each regulatory agency needs to be able to assess and regulate in accordance with their respective regulatory mandates. For clarity and differentiation, the State EMP uses the term and acronym State Environmental Outcome (SEO), while this EMP uses the term and acronym Commonwealth Environmental Outcome (CEO).

4. Proposed CEOs for each MNES, aligned with the significant impact criteria for each MNES, are presented in a separate table for each MNES, as follows:

    - TABLE 10: *Commonwealth Environmental Outcomes (CEOs) for MNES 1 - West Kimberley National Heritage Place (NHP).*
    - TABLE 11: *Commonwealth Environmental Outcomes (CEOs) for MNES 2 - Ord River Floodplain Ramsar Wetland.*
    - TABLE 12: *Commonwealth Environmental Outcomes (CEOs) for MNES 4 - Threatened & Migratory Species (TMS).*

5. These form the basis for the outcome-focussed EMMs and the associated Trigger and Threshold Criteria and Actions as presented in the EMM tables in Section 4 below.

6. Use of the term 'significant impact' in a CEO is based on the significant impact criteria specified in the Commonwealth *Significant Impact Guidelines*, as relevant to each MNES.

TABLE 10: *Commonwealth Environmental Outcomes (CEOs) for MNES 1 - West Kimberley National Heritage Place (NHP)*

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**

An action is likely to have a significant impact on a National Heritage place if there is a real chance or possibility that it will cause one or more of the National Heritage values to be:
• *lost,*
• *degraded or damaged; or*
• *notably altered, modified, obscured or diminished.*
	(MEQ = Marine environmental quality).
	• The West Kimberley NHP Gazettal Notice states that the eastern boundary of the NHP follows the western coastline of CG. While 'coastline' is not defined in the Notice, for the purpose of this EMP it is assumed to be the low-tide mark, and thus any inter-tidal environments and communities, including mangroves, along the western coastline of CG are assumed to be within the NHP.
	• The NHP Gazettal Notice lists only one NP value for the west coast of CG. It states that the west coast of CG has NP value in that it is part of the much larger West Kimberley coastal region that *does not have significant modification by coastal infrastructure*. The proposed operation will not affect this value as it does not involve any form of coastal infrastructure.
	• The main environmental resource along the west coast of CG is a narrow band of fringing mangroves, although these are not specifically a National Heritage value – they are similar to other mangrove communities throughout northern Australia, and mangroves are not cited as a NP value in the NHP Gazettal Notice. The proposed action will not cause any direct impacts on the mangroves along the coast of the NHP or anywhere else in CG.
	• Potential indirect impacts on the mangroves include potential changes to coastal processes caused by the proposed sand sourcing in the POA. This was assessed in detail in Referral Report No. 8 - *Full Modelling Report* (PCS 2025a), which found that potential changes to coastal processes are negligible. This assessment was confirmed by two separate independent expert reviews of Referral Report No. 8.
	• Potential indirect impacts on the mangroves also include a potential accidental oil spill from the SPV when operating in CG, which could be carried by wind and currents into the mangroves. Oil spill risk was assessed in Annex 2 - *Shipping & Oil Spill Risk Assessment* in EPBC Referral Report No. 4 - *Impact Assessments* (BKA 2024h), and the risk was found to be low, including through the application of best-practice spill prevention, mitigation and response measures.
	• Never-the-less, despite the fact that mangroves in the NHP are not specifically a National Heritage Value, and despite the fact that the proposed operation will not cause any direct impacts on mangroves, and the risk of indirect impacts on mangroves through potential changes to coastal processes is negligible, and from a potential oil spill is low, as a precautionary measure the CEOs for the NHP include the protection of mangroves from:
	  • potential changes to coastal processes caused by the sand sourcing in the POA (CEO 1);
	  • a potential accidental oil spill from the SPV (CEO 2).
	• While the SPV will not discharge marine debris or sewage into CG, while operation of the SPV will not negatively affect turbidity levels in CG (as assessed in Referral Report No. 8), and while all ballast water from the SPV will be treated in accordance with IMO and Commonwealth Biosecurity Act requirements, as further precautionary measures, the CEOs for the NHP include the protection of the inter-tidal areas of the NHP from these factors (CEOs 3 to 6).
	• There is one Flatback Turtle nesting beach located on the coast of the NHP – Turtle Beach West to the west of Cape Dussejour, which is outside of CG. Turtle nesting beaches are not cited as a NH value in the NHP Gazettal. Never-the-less, while Turtle Beach West is not an NH value, and thus strictly speaking does not need to be included in the assessment for this MNES, BKA has included CEO 9 for the NHP because one beach is located on the NHP coast (albeit outside of CG).
		– CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the context of natural mangrove dynamics *(including the mangroves in the NHP).*
		– CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including in intertidal parts of the NHP).*
		– CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including in intertidal parts of the NHP).*
		– CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including in intertidal parts of the NHP).*
		– CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including in intertidal parts of the NHP).*
		– CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including in intertidal parts of the NHP).*
		– CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics *(including the one nesting beach located in the NHP but outside of CG - Turtle Beach West).*

TABLE 11: *Commonwealth Environmental Outcomes (CEOs) for MNES 2 - Ord River Floodplain Ramsar Wetland*

MEQ = Marine environmental quality.

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
An action is likely to have a significant impact on the ecological character of a wetland of international importance if there is a real chance or possibility that it will result in:	• As with the West Kimberley NHP on the west coast of CG, the main environmental value of the Ramsar site on the eastern side of CG is a narrow band of fringing mangroves along the coast and the ecological habitat values that they provide. • The proposed CEOs for the Ramsar site are therefore based on the protection of mangroves with a similar bases and rationale for the NHP as listed above.	
• *areas of the wetland being destroyed or substantially modified,*	• The proposed action will not cause any direct impacts on the mangroves or other parts of the Ramsar wetland, and will not destroy or substantially modify the wetland. • As for the NHP above, the risk of indirect impacts on mangroves in the Ramsar wetland through potential changes to coastal processes is negligible, and from a potential oil spill is low. However, as a precautionary measure the CEOs for this significant impact criterion include the protection of mangroves in the Ramsar wetland from: – potential changes to coastal processes caused by the sand sourcing in CG (CEO 1); and – a potential accidental oil spill from the SPV (CEO 2).	• CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the context of natural mangrove dynamics *(including the mangroves in the Ramsar wetlands).* • CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including into the Ramsar wetland).*
• *a substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland,*	• The proposed action will not cause any direct or indirect impacts on the hydrological regime of the wetland. The hydrological regime of the wetland is driven by climate-level factors, in particular the dry-season/wet-season tropical monsoonal cycle, including acute rainfall events associated with tropical cyclones and low-pressure systems. There are no mechanisms whereby the proposed operation could change the climate-level factors of the tropical monsoonal cycle.	Not required.
• *the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected,*	• The proposed action will not cause any direct impacts on the habitat of native species that are dependent on the wetland. • Potential indirect impacts on mangrove habitats are addressed by CEOs 1 and 2. • The proposed action will not cause any significant impacts on the lifecycle of native species that are dependent on the wetland, as outlined in Section 9.3 of EPBC Referral Report No. 7- *Commonwealth Matters* (BKA 202hi).	As per CEOs 1 and 2 (not repeated).

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
• *a substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health; or*	• The proposed action will not cause any significant impacts on the water quality of the wetland, as outlined in Section 9 of Referral Report No. 4 - *Impact Assessments* (BKA 2024h) and Section 9.3 of Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). • Potential marine debris, sewage and turbidity from the SPV relate to water quality. While the SPV will not discharge marine debris or sewage into CG, and while operation of the SPV will not negatively affect turbidity levels in CG (as assessed in Referral Report No. 8), as further precautionary measures, the CEOs for the Ramsar wetland include the protection of the Ramsar wetland from these factors (CEOs 3 to 5).	• CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including into the Ramsar wetland).* • CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including into the Ramsar wetland).* • CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including into the Ramsar wetland).*
• *an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.*	• As with any similar commercial ship, the SPV will carry ballast water when not loaded with cargo (sand), and the hull below the waterline will present a surface for potential biofouling, both of which are potential vectors for the translocation of potential marine pest species. • This is assessed in Section 7.3.7 of EPBC Referral Report No. 4 - *Impact Assessments*, and the risk was found to be low, including through the application of best-practice prevention, mitigation and response measures. • This includes compliance with the IMO Ballast Water Convention, IMO Biofouling Guidelines and the Commonwealth *Biosecurity Act and Regulations,* which are cited in the EPBC Act *Significant Impact Guidelines* as accepted measures to prevent significant impact. • CEO 3: Marine Pests, is therefore included to address this. *It should be noted that because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.*	• CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including into the Ramsar wetland)* (see note to left)).

TABLE 12: *Commonwealth Environmental Outcomes (CEOs) for MNES 4 - Threatened & Migratory Species (TMS)*

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
NOTE: The Criteria for critically endangered or endangered species are listed below, and are also applied to vulnerable species, although the criteria for the latter, while almost identical, are slightly less stringent than those for the former, as specified in the *EPBC Act Significant Impact Guidelines.* *An action is likely to have a significant impact on a critically endangered or endangered species (or vulnerable species), if there is a real chance or possibility that it will:*	**NOTE:** The EPBC Act listings for the key TMS in the CG area are as follows: • Australian Snubfin Dolphin (*Orcaella heinshoni*): **Vulnerable & Migratory.** • Australian Humpback Dolphin (*Sousa sahulensis*): **Vulnerable & Migratory.** • Flatback Turtle (*Natator depressus:* **Vulnerable & Migratory.** • Spear-tooth Shark (*Glyphis glyphis*): **Critically endangered. Not Migratory.** • Northern River Shark *(G. garricki):* **Endangered. Not Migratory.** (recent work by Kyne et al suggests changing to Vulnerable). • Large-tooth (Freshwater) Sawfish *(Pristis pristis*): **Vulnerable & Migratory.** • Green Sawfish *(Pristsi zijsron):* **Vulnerable & Migratory.** • Dwarf Sawfish *(Pristis clavata)*: **Vulnerable & Migratory.**	
• *lead to a long-term decrease in the size of a population,*	• The proposed action will not lead to a long-term decrease in the size of a population, as outlined in Section 10 of EPBC Referral Report No. 4 - *Impact Assessments* (BKA 2025x) and in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2025x). Snubfin and Humpback Dolphins: • Small numbers of Snubfin and Humpback Dolphins are found in CG, which are part of a larger population that also utilizes the inshore waters of JBG and along the coast outside of CG. Their preferred habitat within CG is foraging areas along the coast, away from the deeper, open waters of the POA, although they may occasionally pass through the POA enroute between foraging areas. It is therefore necessary to implement impact prevention, mitigation and monitoring measures to avoid potential vessel strikes by the SPV on dolphins, and to avoid potential impacts of underwater noise from the SPV on dolphins, as provided by CEOs 7 and 8 respectively. Flatback Turtles: *Nesting beaches & nesting & hatching turtles:* • There is a very significant Flatback Turtle nesting beach at Cape Domett, on the seaward coast outside of CG, three other lesser nesting beaches in the general area, also outside of CG, and one nesting site located behind mangroves at Barnett Point inside CG. • The proposed operation will not cause any direct impacts on the turtle nesting beaches. • Potential indirect impacts on the turtle nesting beaches include potential changes to beach processes caused by the proposed sand sourcing in the POA. This was assessed in detail in Referral Report No. 8 - *Full Modelling Report* (PCS 2025), which found that potential changes to beach processes are negligible. This assessment was confirmed by two separate independent expert reviews of Referral Report No. 8.	Snubfin and Humpback Dolphins (also applies to any dolphin species and any other surface-dwelling species): • CEO 7: Vessel Strikes: No significant negative impacts are caused to populations of surface-dwelling marine fauna in CG from vessel strikes by the SPV. • CEO 8: Underwater Noise: No significant negative impacts are caused to populations of Snubfin Dolphins, Humpback Dolphins and marine turtles in CG from underwater noise emissions from the SPV. Flatback Turtles (also applies to any marine turtle species although these are generally not found in CG): *Nesting beaches & nesting & hatching turtles:* • CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including on turtle nesting beaches).* • CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
	• Potential indirect impacts on the turtle nesting beaches also include a potential accidental oil spill from the SPV when operating in CG, which could be carried by wind and currents towards the turtle nesting beaches (although this is unlikely for most nesting sites which are located outside of CG). Oil spill risk was assessed in Annex 2 - *Shipping & Oil Spill Risk Assessment* in EPBC Referral Report No. 4 - *Impact* Assessments (BKA 2025x), and the risk was found to be low, including through the application of best-practice spill prevention, mitigation and response measures. • Potential indirect impacts on nesting and hatching turtles at the turtle nesting beaches also include the effects of light from the SPV (which will operate at night when loading sand in the POA). This was assessed in detail in accordance with the DCCEW *National Light Pollution Guidelines for Wildlife* (DCCEW 2023), as reported in EPBC Referral Supplementary Report No. 1 - *Light Assessment.* This assessment found that light from the SPV will not impact on nesting and hatching turtles at the turtle nesting beaches. • Never-the-less, despite the fact that the proposed operation will not cause any direct impacts on turtle nesting beaches, and the risk of indirect impacts as listed above is negligible to low, as a precautionary measure the CEOs include the protection of the turtle nesting beaches and nesting and hatching turtles from: – potential changes to beach processes caused by the sand sourcing in the POA (CEO 9), – a potential accidental oil spill from the SPV (CEO 2); and – SPV lighting (CEO 10). *Turtles in the POA (at or near the sea surface and at or near the seabed):* • While site surveys as reported in EPBC Referral Report No. 2 - Annex 14 - *Marine Mega-fauna Surveys Report* (BKA 2025x), and review of satellite tracking data and assessment of current velocities in CG versus turtle swimming speeds, as reported in EPBC Referral Supplementary Report No. 4 - *Additional Information* (BKA 2025x), indicate very low likelihood of marine turtles being present in the POA, as a precautionary measure the CEOs include measures to avoid: – potential vessel strikes by the SPV on turtles (CEO 7), – potential impacts of underwater noise from the SPV on turtles (CEO 8); and – potential entrainment of turtles in the SPV's drag-head (CEO 11). *Peak nesting season (Aug-Sept):* • While the above measures are assessed as being more than adequate for preventing and mitigating the potential for significant impacts on marine turtles in all seasons, as an additional precaution, enhanced vessel strike and drag-head prevention and mitigation measures are proposed during the peak Flatback Turtle nesting season in the CG area (Aug-Sept), as provided by CEO 12. River Sharks: • As reported in Section 9.4.6 of EPBC Referral Report No. 2 - *Setting & Existing Environment* (BKA 2024b), Kyne et al (2021) reported sampling juvenile Speartooth Sharks in the Lower Ord River ~35 km upstream from the main body of CG, and juvenile Northern River Sharks in the Lower Ord River	beaches in the LAU, in the context of natural beach dynamics. • CEO 10: SPV Lighting: No significant negative impacts are caused to populations of nesting and hatching Flatback Turtles at nesting beaches in the CG area from the SPV's lighting. *Turtles in the POA (at or near the sea surface and at or near the seabed):* • CEO 7: Vessel Strikes: As above. • CEO 8: Underwater Noise: As above. • CEO 11: Drag-head Entrainment: No significant negative impacts are caused to populations of epibenthic animals near the seabed in CG from entrainment in the SPV's drag-head (including marine turtles, sharks and sawfish). *Peak nesting season (Aug-Sept):* • CEO 12: Peak Turtle Nesting Season Enhanced Measures: No significant negative impacts are caused to populations of inter-nesting Flatback Turtles in the CG area during peak nesting season (August-September). River Sharks: • CEO 7: Vessel Strikes: As above. Sawfish: • CEO 11: Drag-head Entrainment: As above. Other matters: • CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including on TMS).*

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
	and in the Durack and Pentecost Rivers >80 km upstream from CG, in 2015 and 2019, consistent with their preference for less saline, upstream waters of rivers and estuaries. • There are no records of these two species in the more saline, deeper marine waters of the main body of CG where the POA is located. Marine eDNA sampling commissioned by BKA did not identify evidence of River Sharks, as reported in EPBC Referral Report No. 2 - Annex 13 - *Marine eDNA Report* (Univ. Canberra 2024). However, the occasional adult could potentially pass through the POA during inshore/offshore movements. • The adults of these two species typically swim in mid waters below the sea surface, which mitigates the likelihood of vessel strike, and also well above the seabed, which mitigates the likelihood of entrainment in the SPV's drag-head (the drag-head operates on the seabed). Never-the less, as a precautionary measure the CEOs include measures to avoid: – potential vessel strikes by the SPV on sharks (CEO 7); and – potential entrainment of sharks in the SPV's drag-head (CEO 11). <u>Sawfish:</u> • As reported in Section 9.4.5 of EPBC Referral Report No. 2 - *Setting & Existing Environment* (BKA 2024b), the upstream areas of the rivers and creeks that discharge into CG provide habitat that may be suitable for the three EPBC-listed species of Sawfish that occur in northern WA waters. However, no previously published papers, reports or verifiable data could be found confirming their presence in CG. Marine eDNA sampling commissioned by BKA did not identify evidence of these three species, as reported in EPBC Referral Report No. 2 - Annex 13 - *Marine eDNA Report* (Univ. Canberra 2024). • However, because there is suitable habitat in coastal and upstream parts of CG, despite the lack of survey data showing their presence, the occasional adult could potentially pass through the POA during inshore/offshore movements. Because these are epibenthic species, there is potential for entrainment in the SPV's drag-head when it is operating in the POA, albeit with a very low likelihood. Accordingly, CEO 11 on drag-head entrainment is applicable to sawfish. <u>Other matters:</u> • The *Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans* (Commonwealth of Australia 2018), identifies marine debris as a key threatening process for marine vertebrates, including dolphins, marine turtles, sharks and sawfish. • While the SPV will not discharge marine debris into CG, as a further precautionary measure, the CEOs for TMS include the protection of TMS from marine debris (CEO 3).	
• *reduce the area of occupancy of the species,*	• The proposed action will not lead to a reduction of the area of occupancy of the species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	Not required.

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
• *fragment an existing population into two or more populations,*	• The proposed action will not fragment an existing population into two or more populations, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	Not required.
• *adversely affect habitat critical to the survival of a species,*	• The proposed action will not adversely affect habitat critical to the survival of a species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	Not required.
• *disrupt the breeding cycle of a population,*	• The proposed action will not disrupt the breeding cycle of a population, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). • However, given that Snubfin Dolphins are believed to breed / calve in CG and the Flatback Turtle nesting beaches in the general area (mainly outside of CG), implementation of impact prevention, mitigation and monitoring measures is prudent and necessary. All of the CEOs listed for TMS above cover this.	As per all CEOs listed for TMS above (not repeated).
• *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,*	• The proposed action will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j).	Not required.
• *result in invasive species that are harmful to a critically endangered or endangered (or vulnerable) species becoming established in the endangered or critically endangered (or vulnerable) species' habitat,*	• CEO 6: Marine Pests covers this.	As per CEO 6: Marine Pests (not repeated).
• *introduce disease that may cause the species to decline; or*	• This issue is assessed in Section 3.2 - *Diseases & pathogens*, of EPBC Referral Supplementary Report No. 5 - *Response to Request for Further Information* (BKA 2025c). • The assessment finds that the only aspects of the operation which could have relevance to diseases and pathogens in listed marine species in CG are ballast water discharges and potential vessel strikes causing injury, and thus potential infection, in an individual animal. Comprehensive impact prevention, mitigation, monitoring and response actions are proposed for both of these aspects, as outlined in CEO 6: Marine Pests and CEO 7: Vessel strikes. • Section 3.2 of Supplementary Report No. 5 also systematically assesses the potential risk of pathogens being already present in the seabed sands in CG, and of these being disturbed and mobilized by the sand-sourcing operation, and subsequently affecting TMS in CG. It finds that the risk is negligible. This is because the sand is naturally highly mobile and constantly suspended by the strong tidal currents in CG, and is thus already naturally 'highly disturbed', and the sand sourcing will not alter this. The operation will also not contribute to creating environmental stress	As per CEO 6: Marine Pests and CEO 7: Vessel strikes (not repeated).

EPBC Act Significant Impact Criteria	**Bases & Rationale for the CEOs**	**CEOs**
	and immuno-suppression in TMS (e.g. through changed water quality, temperature etc), which for most pathogens are the main triggers for disease outbreaks in TMS. • As a precautionary measure monitoring for signs of pathogens and diseases in TMS is included in the Marine Fauna Observation monitoring program under CEO 7 (pls refer Table 15).	
• *interfere with the recovery of the species.*	• The proposed action will not interfere with the recovery of any of the relevant species, as outlined in Section 10 of EPBC Referral Report No. 7 - *Commonwealth Matters* (BKA 2024j). • This issue is assessed further in EPBC Referral Supplementary Report No. 5 - *Response to Request for Further Information* (BKA 2025c), which *inter-alia* reviews potential implications of the proposed operation against all elements of the: – DCCEEW Conservation Advice for each species, including elements relating to species recovery, – *Recovery Plan for Marine Turtles in Australia, 2017-2027*; and – *Sawfish & River Sharks Multi-species Recovery Plan, 2015.* • The assessment in Supplementary Report No. 5 finds that the proposed operation will not contribute to the key threats listed in the conservation advice and recovery plans, will not pose a risk of significant impact on these species that might affect their recovery, consistent with the EPBC Act significant impact guidelines and criteria; and the measures to be implemented by BKA as presented in this CEMP, including the data that will be generated by the proposed monitoring programs, will contribute to improved understanding of the species and to their conservation and recovery.	All of the CEOs for TMS as listed above will contribute to the recovery of the species.

Listed Migratory Species

The CEOs (and the associated EMMS in Section 4 below) for the Listed Migratory Species are the same as for the Listed Threatened Species above, and the two categories are combined for the purposes of this EMP.

As listed in the first row for TMS above, of the eight key species that are the subject of this CEMP, all except the two River Shark species are classified as Migratory under the EPBC Act.
However, the scientific bases for listing Australian Snubfin Dolphins, Australian Humpback Dolphins, Flatback Turtles and the three sawfish species as 'migratory' is highly questionable. The definition of migratory species under the EPBC Act is derived from the international *Convention on Migratory Species* (CMS), and comprises species where:

> *'. . . the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries'*.

There is no scientific evidence that for any of the species listed above, a significant proportion cyclically and predictably cross one or more national jurisdictional boundaries. On the contrary, studies to date indicate that the Australian populations of all of these species remain mainly in Australian waters, and even within specific areas within Australian waters, with genetically distinct sub-populations or stocks.

It would seem that the 'migratory' designation of each of these species under the EPBC Act requires review.

4. ENVIRONMENTAL MANAGEMENT MEASURES

1. The Environmental Management Measures (EMMs) are presented in table format as per Attachment 2 - Outcome-based EMP, of WA EPA (2021) *Templates – EMPs*, with a separate table for each of the four relevant MNES, as follows:

   - TABLE 13: *EMMs for MNES 1 - West Kimberley National Heritage Place (NHP)*.
   - TABLE 14: *EMMs for MNES 2 - Ord River Floodplain Ramsar Site*.
   - TABLE 15: *EMMs for MNES 4 - Threatened & Migratory Species (TMS)*.

2. Because the WA EPA template is focussed more on 'monitoring' impacts than 'preventing and mitigating' impacts, and because a complete EMP should ideally include the latter, the template has been strengthened by adding two additional left-hand columns – *Impact Prevention* and *Impact Mitigation.*

3. The CEOs are derived from Tables 10 to 12 above, and the same sequential numbering is used. Some EOs apply to more than one MNES. The original sequential numbering is used when a CEO is repeated.

4. The Trigger Criteria (TRCs), Trigger Response Actions (TRAs), Threshold Criteria (THC), Threshold Contingency Actions (TCA) and Monitoring (Mon) measures associated with each CEO are coded with a cascading numbering system, e.g.

TABLE 13: *EMMs for MNES 1: West Kimberley National Heritage Place (NHP)*

NOTE 1: Hybrid outcomes- and objectives-based: This EMM's in this table are structured as an outcomes-based EMP as preferred by the WA EPA, based on a modification of the template in EPA (2021). However, given the maritime, vessel-based nature of the proposed operation, and the practical challenges of applying outcome-based indicators to maritime operations, some of the CEOs and in particular the supporting Trigger Criteria and Threshold Criteria are also objective-based / management-based – so this may be considered a hybrid outcomes- and objectives-based EMP.

NOTE 2: No impacts on NH values / precautionary inclusion of mangroves: The NHP Gazettal Notice lists only one National Heritage (NH) value for the west coast of CG - *no significant modification by coastal infrastructure.* The proposed action does not involve any form of coastal infrastructure, so will not impact on this NH value. The proposed action will not affect any other NH values as none are listed for the west coast of CG. The main environmental resource along the west coast of CG (NHP coast) is fringing mangroves. These are not specifically a NH value – they are similar to other mangroves throughout northern Australia, and are not cited as a NH value in the NHP Gazettal. Never-the-less, while the mangroves are not covered by the EPBC significant impact criteria for this NHP, and thus strictly speaking do not need to be included in the EMMs for this MNES, BKA has included them in Table 13 because they are located on the NHP coast, and in accordance with the precautionary principle.

NOTE 3: No impacts from marine debris, sewage & turbidity / precautionary inclusion of these factors: While the SPV will not discharge marine debris or sewage into CG, and while operation of the SPV will not negatively affect turbidity levels in CG (as assessed in Referral Report No. 8), these factors are still included in Table 13, in accordance with the precautionary principle.

*Potential Impact: For further details please refer Table 7 - *Combined summary impact & risk assessment* for this MNES, in Section 2.3 above.

**Reporting: All monitoring reports will be submitted to relevant regulatory agencies and the Stakeholder Reference Group (SRG) (refer Section 11.2 below) and made publicly available (on project web site).

Commonwealth MNES: MNES 1 - West Kimberley National Heritage Place (NHP).
Purpose of the EMMs: To achieve each CEO by preventing, mitigating, monitoring, managing, reporting and responding to potential impacts of the proposed operation on the NHP, and especially the coastal mangroves.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
Coastal process changes – indirect impacts on mangroves in the NHP: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to coastal mangroves and changing mangrove area	There is no overlap between the POA and the NHP and there will not be any direct impacts on the NHP. Detailed modelling supported by comprehensive field data shows negligible changes to hydrodynamics, coastal processes and mangrove areas. Confirmed by two independent expert reviews.	Not required as impacts are avoided. To be confirmed further by monitoring as precautionary measure.	CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the	TRC 1.1: Measured 2% reduction in mangrove cover in the LAU relative to pre-project baseline (surveyed before initial operations commence as per Annex 5) that cannot be explained by non-project causes (e.g cyclones,	TRA 1.1: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field	THC 1.1: Measured 5% reduction in mangrove cover in the LAU relative to pre-project baseline (surveyed before initial operations commence as per Annex 5) that cannot be	TCA 1.1.1: Immediately undertake detailed review and root-cause analysis to determine if the measured change is attributable to the operation, in consultation with the Department, and assess any need for changes to the operation, including any need to cease operations. TCA 1.1.2: If TCA 1.1.1 concludes that	Mon 1.1: Baseline mangrove mapping immediately before commencement of operations. Biennial (every 2 years) GIS mapping of mangrove cover in the LAU using remote sensing from open-source satellite imagery,	Baseline mangrove mapping immediately before commencement of operations. Biennial mangrove mapping (in April after end of cyclone season).	Baseline report within one month of completion of mapping. Biennial mangrove reports within one month of completion of mapping – by end of May.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
and composition.	See Referral Report No. 8 (PCS 2025a).		context of natural mangrove dynamics *(including the mangroves in the NHP).*	heatwaves, changes in catchment sediment inputs). See Annex 5 for technical basis of 2 yrs & 2%.	monitoring if required.	explained by non-project causes (e.g. cyclones, heatwaves, changes in catchment sediment inputs). See Annex 5 for technical basis of 2 yrs & 5%.	the measured change is attributable to the operation, implement the actions agreed with the Department, including, if necessary, cease operations. TCA 1.1.3: If deemed necessary in consultation with the Department, implement other potential interventions such as mangrove restoration. TCA 1.1.4: Engage independent review by relevant subject matter expert(s) of likely causes and effectiveness of mitigation measures, to the satisfaction of the Department. TCA 1.1.5: If operations are ceased, they may only resume once the Department is satisfied that: - The causes have been adequately addressed. - Appropriate mitigation and management measures are in place.	building on pre-commencement baseline (see Section 5 below). Assessment of environmental factors that could cause changes to mangroves. See Annex 5 for technical details of mangrove monitoring.		
Accidental oil spill from the SPV – impacts on mangroves in the NHP: A	There is nil possibility of an oil spill from refueling operations as	Compliance with all relevant maritime laws including	CEO 2: MEQ - Oil Spills: No significant negative impacts from	TRC 2.1: Spill occurs but does not cause significant	TRA 2.1.1: Immediately activate SOPEP to mitigate the	THC 2.1: Spill occurs and causes significant negative	TCA 2.1.1: Immediately activate SOPEP to mitigate the effects of the spill.	Mon 2.1.1: Flag-State and Classification Society surveys, inspections and	Before commencement of project and thence every five years (as	Before commencement of project and thence every five years (as

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
potential accidental oil spill from the SPV could be carried by currents towards the mangroves.	the SPV will not refuel in Australian waters. The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (2.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed. The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention.	MARPOL and the implementing Australian laws as administered by AMSA. The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies (see Section 9.3 below).	accidental oil spills from the SPV *(including in intertidal parts of the NHP).*	negative impacts on NHP and especially mangroves.	effects of the spill. TRA 2.1.2: Undertake operational review and implement corrective action to prevent future incidents.	impacts on BCH and especially mangroves.	TCA 2.1.2: In consultation with relevant regulatory agencies, implement any required environmental cleanup and restoration measures. TCA 2.1.3: Undertake operational review and implement corrective action to prevent future incidents.	audits of SPV compliance with IMO regulations, including spill prevention measures and SOPEP. Mon 2.1.2: Port-State Control inspections and audits of SPV compliance with IMO and AMSA regulations, including spill prevention measures and SOPEP.	per IMO ship survey requirements). Random.	per IMO ship survey requirements). Whenever Port-State Control inspections are carried out (at discretion of the regulator). **PLUS:** Any and all spills that might occur to be reported immediately to all relevant State and Commonwealth authorities (see Sections 8 & 9 below)
Marine debris from the SPV – impacts on mangroves in the NHP: Any marine debris discharged from the SPV could be carried by currents towards the mangroves.	Marine debris will not be discharged into the sea from the SPV. All garbage (e.g from the day-to-day domestic activities of the crew) will be kept on-board and managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged	Not required as impact will be fully prevented. See TRAs and TCAs for actions in the highly unlikely event of accidental discharge of	CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including in intertidal parts of the NHP).*	TRC 3.1: Marine debris is accidentally discharged into the sea from the SPV but does not enter the NHP.	TRA 3.1.1: Immediately deploy tender vessel to recover the marine debris from the sea if safe to do so. TRA 3.1.2: Undertake operational review and	THC 3.1: Marine debris is accidentally discharged into the sea from the SPV and enters the NHP.	TCA 3.1.1: Immediately deploy tender vessel to recover the marine debris from the NHP if safe to do so. TRA 3.1.2: Undertake operational review and implement corrective action to prevent future incidents.	Mon 3.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard Garbage Management Plan.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	marine debris from the SPV.			implement corrective action to prevent future incidents.			Mon 3.1.2: Port-State Control inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard Garbage Management Plan.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
Sewage from the SPV – impacts on mangroves in the NHP: Any sewage discharged from the SPV could be carried by currents towards the mangroves, affecting water quality.	Sewage will not be discharged into CG from the SPV. All sewage (e.g. from the day-to-day domestic activities of the crew) will be stored in holding tank and treated and managed in accordance with MARPOL Annex IV.	Not required as impact will be fully prevented.	CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including in intertidal parts of the NHP)*.	Not required as impact will be fully prevented and it is technically implausible that accidental discharges could occur (sewage will be held on board in closed holding tank when in CG).	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Mon 4.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with MARPOL Annex IV, including Shipboard Sewage Treatment Plant.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).
								Mon 4.1.2: Port-State Control inspections and audits of SPV compliance with MARPOL Annex IV, including Shipboard Sewage Treatment Plant.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
Turbidity from the SPV – impacts on mangroves in the NHP: Any increased turbidity caused by the sand loading	The mangroves in CG are highly adapted to extremely high natural turbidity and ecologically are not affected by increased turbidity.	While not required, as precautionary measures the following turbidity reduction measures will be applied:	CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including in*	Not required as impact will be fully prevented and it is ecologically implausible that turbidity	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
operation could be carried by currents towards the mangroves, affecting water quality.	Turbidity generated by the SPV will be negligible in the context of the extremely high natural turbidity in CG, as modelled in Referral Report No. 8 (Section 6). The SPV will only target courser sands, and not fine silts, which are the main cause of turbidity. Each sand loading cycle will only run for 1-2 days, with a two-week break between each cycle, preventing the incremental build-up of turbidity that can occur when operations are continuous. The loaded sand will be exported in the SPV, there will not be any dumping in CG.	- Fitting of 'green valve' in the overflow water discharge intake. - Placing the overflow water discharge outlet at the SPV's keel rather than at the gunwale.	*intertidal parts of the NHP).*	would affect mangroves.						
<u>Marine pests from the SPV – impacts on mangroves</u>: Any marine pests introduced via the SPV's ballast water or hull biofouling could be carried by currents towards the mangroves, and depending on the species,	This potential impact will be avoided through the following measures: – The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act*. – The SPV will implement a	Potential impacts will be reduced further through an *Cambridge Gulf extension of the WA State-Wide Array Surveillance Program* for marine pests) (CG-SWASP), in consultation	<u>CEO 6: Marine Pests</u>: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including in intertidal*	<u>TRC 6.1.1</u>: Compliance checks find that shipboard ballast water treatment system is not operating in compliance with IMO and Aus requirements. <u>TRC 6.1.2</u>: Compliance	<u>TRA 6.1</u>: Undertake operational review and implement corrective action to prevent future non-compliance.	<u>THC 6.1</u>: CG-SWASP detects potential introduced species in CG.	<u>TCA 6.1.1</u>: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field monitoring if required, and eradication measures if necessary and feasible.	<u>Mon 6.1.1</u>: Maintenance of IMO-compliant Ballast Water Management Records on the SPV and reporting as required by the Commonwealth *Biosecurity Act*. <u>Mon 6.1.2:</u> Maintenance of IMO-compliant	On-board records kept updated continuously.	Reports submitted online to Australian biosecurity authorities before every arrival to CG (every two weeks) per Biosecurity Act requirements.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
establish in and affect the mangrove community. **NOTE:** *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. It is therefore essential that cooperative, joint arrangements are agreed between BKA, WA DPIRD-Biosecurity, Cmwlth DAFF-Biosecurity, KPA, CGL and other port users, <u>for the implementation of CG-SWASP, as is applied at other SWASP sites in WA.</u>*	biofouling management plan with stringent biofouling prevention, management, mitigation and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*. – Biofouling management measures will include: – Maintenance of a high-grade, IMO-compliant anti-fouling system on the SPV. – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas. – Scheduled maintenance dry docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention. – Required reporting to Australian authorities as	with relevant stakeholders. Refer Annex 1 for technical details of CG-SWASP.	*parts of the NHP).*	checks find that the SPV's biofouling management plan and procedures do not comply with IMO and Aus requirements.			**NOTE:** *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.* <u>TCA 6.1.2</u>: Undertake operational review and implement corrective action to prevent future incidents.	Bio-fouling Management Records on the SPV and reporting as required by the Commonwealth *Biosecurity Act* and WA Vessel Check.	"	"
								<u>Mon 6.1.3</u>: Port-State Control inspections by Australian biosecurity authorities.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
								<u>Mon 6.1.4:</u> Implement CG-SWASP (based on monitoring of bio-fouling settlement plates and consistent with the existing WA SWASP). Refer Annex 1 for technical details of CG-SWASP.	Biannual (winter and summer) monitoring of bio-fouling settlement plates.	Biannual reports. **PLUS:** Any IMP introductions that might be detected to be reported immediately to all relevant State and Commonwealth authorities (see Sections 8 & 9 below).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	per Commonwealth requirements.									
Coastal process changes – indirect impacts on turtle nesting beaches: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to turtle nesting beaches and changing beach morphology and composition.	There is no overlap between the POA and the turtle nesting beaches and there will not be any direct impacts on the beaches. Detailed modelling supported by comprehensive field data shows negligible changes to hydrodynamics, sediment dynamics and beach processes. Confirmed by two independent expert reviews. – See Referral Report No. 8 (PCS 2025).	Not required as impacts are avoided. To be confirmed further by monitoring as precautionary measure.	CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics *(including the one nesting beach located in the NHP but outside of CG - Turtle Beach West).*	TRC 9.1: Measured 2% reduction in any turtle nesting beach in the LAU over two years that cannot be explained by non-project causes (e.g cyclones, changes in natural sediment inputs). See Annex 6 for technical basis of 2 yrs & 2%.	TRA 9.1: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field monitoring if required.	THC 9.1: Measured 5% reduction in any turtle nesting beach in the LAU over two years that cannot be explained by non-project causes (e.g cyclones, changes in natural sediment inputs). See Annex 6 for technical basis of 2 yrs & 5%.	TCA 9.1.1: Immediately undertake detailed review and root-cause analysis to determine if the measured change is attributable to the operation, in consultation with the Department, and assess any need for changes to the operation, including any need to cease operations. TCA 9.1.2: If TCA 9.1.1 concludes that the measured change is attributable to the operation, implement the actions agreed with the Department, including, if necessary, cease operations. TCA 9.1.3: If deemed necessary in consultation with the Department, implement other potential interventions such as beach replenishment. TCA 9.1.4: Engage independent review by relevant subject matter expert(s) of likely causes and effectiveness of mitigation measures,	Mon 9.1: Baseline high-resolution aerial drone LiDAR and ortho-photographic surveys of all five turtle nesting beaches in the LAU, before commencement of operations. Biennial (every 2 years) high-resolution aerial drone LiDAR surveys of all five turtle nesting beaches in the LAU, building on pre-commencement baseline and 2024 survey by Sensorem for BKA (see Section 5 below). Assessment of other environmental factors that could cause changes to beaches (e.g cyclones, changes in natural sediment inputs).	Baseline LiDAR and ortho-photographic surveys before commencement of operations. Biennial LiDAR and ortho-photographic surveys (in April after end of cyclone season).	Baseline report within one month of survey. Biennial reports within one-month of survey – by end of May.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
							to the satisfaction of the Department. TCA 9.1.5: If operations are ceased, they may only resume once the Department is satisfied that: - The causes have been adequately addressed. - Appropriate mitigation and management measures are in place.			

TABLE 14: *EMMs for MNES 2: Ord River Floodplain Ramsar Site*

NOTE 1: Hybrid outcomes- and objectives-based: This EMM's in this table are structured as an outcomes-based EMP as preferred by the WA EPA, based on a modification of the template in EPA (2021). However, given the maritime, vessel-based nature of the proposed operation, and the practical challenges of applying outcome-based indicators to maritime operations, some of the CEOs and in particular the supporting Trigger Criteria and Threshold Criteria are also objective-based / management-based – so this may be considered a hybrid outcomes- and objectives-based EMP.

NOTE 2: Precautionary inclusion of mangroves: There is no overlap between the POA and the Ramsar wetland and there will not be any direct impacts on the wetland. The main environmental resource of the Ramsar wetland on the eastern side of CG is a narrow band of fringing mangroves along the coast. Potential indirect impacts on mangroves from potential changes to coastal processes and from oil spills are therefore included, in accordance with the precautionary principle.

NOTE 3: No impacts from marine debris, sewage & turbidity / precautionary inclusion of these factors: While the SPV will not discharge marine debris or sewage into CG, and while operation of the SPV will not negatively affect turbidity levels in CG (as assessed in Referral Report No. 8), these factors are still included in Table 14, in accordance with the precautionary principle.

*Potential Impact: For further details please refer Table 8 - *Combined summary impact & risk assessment* for this MNES, in Section 2.3 above.

**Reporting: All monitoring reports will be submitted to relevant regulatory agencies and the Stakeholder Reference Group (SRG) (refer Section 11.2 below) and made publicly available (on project web site).

Commonwealth MNES: MNES 2 - Ord River Floodplain Ramsar Wetland.
Purpose of the EMMs: To achieve each CEO by preventing, mitigating, monitoring, managing, reporting and responding to potential impacts of the proposed operation on the Ramsar Wetland, and especially the coastal mangroves.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
Coastal process changes – indirect impacts on mangroves in the Ramsar wetland: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to coastal mangroves and changing	There is no overlap between the POA and the Ramsar wetland and there will not be any direct impacts on the wetland. Detailed modelling supported by comprehensive field data shows negligible changes to hydrodynamics, coastal processes and mangrove areas. Confirmed by two independent expert reviews.	Not required as impacts are avoided. To be confirmed further by monitoring as precautionary measure.	CEO 1: Coastal Processes & Mangroves: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of mangrove cover in the LAU, in the context of	TRC 1.1: Measured 2% reduction in mangrove cover in the LAU relative to pre-project baseline (surveyed before initial operations commence as per Annex 5) that cannot be explained by non-project causes (e.g cyclones, heatwaves,	TRA 1.1: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field monitoring if required.	THC 1.1: Measured 5% reduction in mangrove cover in the LAU relative to pre-project baseline (surveyed before initial operations commence as per Annex 5) that cannot be explained by non-	TCA 1.1.1: Immediately undertake detailed review and root-cause analysis to determine if the measured change is attributable to the operation, in consultation with the Department, and assess any need for changes to the operation, including any need to cease operations.	Mon 1.1: Baseline mangrove mapping immediately before commencement of operations. Biennial (every 2 years) GIS mapping of mangrove cover in the LAU using open-source satellite imagery, building on pre-commencement	Baseline mangrove mapping immediately before commencement of operations. Biennial mangrove mapping (in April after end of cyclone season).	Baseline report within one month of mapping. Biennial mangrove reports within one month of mapping – by end of May.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
mangrove area and composition.	See Referral Report No. 8 (PCS 2025).		natural mangrove dynamics *(including the mangroves in the Ramsar wetland).*	changes in catchment sediment inputs). See Annex 5 for technical basis of 2 yrs & 2%.		project causes (e.g. cyclones, heatwaves, changes in catchment sediment inputs). See Annex 5 for technical basis of 2 yrs & 5%.	TCA 1.1.2: If TCA 1.1.1 concludes that the measured change is attributable to the operation, implement the actions agreed with the Department, including, if necessary, cease operations. TCA 1.1.3: If deemed necessary in consultation with the Department, implement other potential interventions such as mangrove restoration. TCA 1.1.4: Engage independent review by relevant subject matter expert(s) of likely causes and effectiveness of mitigation measures, to the satisfaction of the Department. TCA 1.1.5: If operations are ceased, they may only resume once the Department is satisfied that:	baseline (see Section 5 below). Assessment of environmental factors that could cause changes to mangroves. See Annex 5 for technical details of mangrove monitoring.		

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
							- the causes have been adequately addressed; and - appropriate mitigation and management measures are in place.			
Accidental oil spill from the SPV – impacts on mangroves in the Ramsar wetland: A potential accidental oil spill from the SPV could be carried by currents towards the mangroves.	There is nil possibility of an oil spill from refueling operations as the SPV will not refuel in Australian waters. The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (2.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed. The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention.	Compliance with all relevant maritime laws including MARPOL and the implementing Australian laws as administered by AMSA. The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies.	CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including in the Ramsar wetland).*	TRC 2.1: Spill occurs but does not cause significant negative impacts on NHP and especially mangroves.	TRA 2.1.1: Immediately activate SOPEP to mitigate the effects of the spill. TRA 2.1.2: Undertake operational review and implement corrective action to prevent future incidents.	THC 2.1: Spill occurs and causes significant negative impacts on BCH and especially mangroves.	TCA 2.1.1: Immediately activate SOPEP to mitigate the effects of the spill. TCA 2.1.2: In consultation with relevant regulatory agencies, implement any required environmental cleanup and restoration measures. TCA 2.1.3: Undertake operational review and implement corrective action to prevent future incidents.	Mon 2.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with IMO regulations, including spill prevention measures and SOPEP.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).
								Mon 2.1.2: Port-State Control inspections and audits of SPV compliance with IMO and AMSA regulations, including spill prevention measures and SOPEP.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator). **PLUS:** Any and all spills that might occur to be reported immediately to all relevant State and Commonwealth authorities (see Sections 8 & 9 below).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
Marine debris from the SPV – impacts on mangroves in the Ramsar wetland: Any marine debris discharged from the SPV could be carried by currents towards the mangroves.	Marine debris will not be discharged into the sea from the SPV. All garbage (e.g from the day-to-day domestic activities of the crew) will be kept on-board and managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	Not required as impact will be fully prevented. See TRAs and TCAs for actions in the highly unlikely event of accidental discharge of marine debris from the SPV.	CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV *(including in the Ramsar wetland).*	TRC 3.1: Marine debris is accidentally discharged into the sea from the SPV but does not enter the NHP.	TRA 3.1.1: Immediately deploy tender vessel to recover the marine debris from the sea if safe to do so. TRA 3.1.2: Undertake operational review and implement corrective action to prevent future incidents.	THC 3.1: Marine debris is accidentally discharged into the sea from the SPV and enters the NHP.	TCA 3.1.1: Immediately deploy tender vessel to recover the marine debris from the NHP if safe to do so. TRA 3.1.2: Undertake operational review and implement corrective action to prevent future incidents.	Mon 3.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard Garbage Management Plan.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).
								Mon 3.1.2: Port-State Control inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard Garbage Management Plan.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
Sewage from the SPV – impacts on mangroves in the Ramsar wetland: Any sewage discharged from the SPV could be carried by currents towards the mangroves, affecting water quality.	Sewage will not be discharged into CG from the SPV. All sewage (e.g. from the day-to-day domestic activities of the crew) will be stored in holding tank and treated and managed in accordance with MARPOL Annex IV.	Not required as impact will be fully prevented.	CEO 4: MEQ - Vessel Sewage: No significant negative impacts from sewage from the SPV *(including in the Ramsar wetland).*	Not required as impact will be fully prevented and it is technically implausible that accidental discharges could occur (sewage will be held on board in closed holding tank when in CG).	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Mon 4.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with MARPOL Annex IV, including Shipboard Sewage Treatment Plant.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).
								Mon 4.1.2: Port-State Control inspections and audits of SPV	Random.	Whenever Port-State Control inspections are carried out (at

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
								compliance with MARPOL Annex IV, including Shipboard Sewage Treatment Plant.		discretion of the regulator).
Turbidity from the SPV – impacts on mangroves in the Ramsar wetland: Any increased turbidity caused by the sand loading operation could be carried by currents towards the mangroves, affecting water quality.	The mangroves in CG are highly adapted to extremely high natural turbidity and ecologically are not affected by increased turbidity. Turbidity generated by the SPV will be negligible in the context of the extremely high natural turbidity in CG, as modelled in Referral Report No. 8 (Section 6). The SPV will only target courser sands, and not fine silts, which are the main cause of turbidity. Each sand loading cycle will only run for 1-2 days, with a two-week break between each cycle, preventing the incremental build-up of turbidity that can occur when operations are continuous. The loaded sand will be exported in the SPV, there will not be any dumping in CG.	While not required, as precautionary measures the following turbidity reduction measures will be applied: - Fitting of 'green valve' in the overflow water discharge intake. - Placing the overflow water discharge outlet at the SPV's keel rather than at the gunwale.	CEO 5: MEQ - Turbidity: No significant negative impacts from changes in turbidity from the SPV *(including in the Ramsar wetland).*	Not required as impact will be fully prevented and it is ecologically implausible that turbidity would affect mangroves.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.	Not required as per TRC.
Marine pests from the SPV –		Potential impacts will be	CEO 6: Marine Pests:	TRC 6.1.1: Compliance	TRA 6.1: Undertake	THC 6.1: CG-SWASP	TCA 6.1.1: Immediately	Mon 6.1.1: Maintenance of	On-board records kept	Reports submitted online

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**

impacts on the Ramsar wetland: Any marine pests introduced via the SPV's ballast water or hull biofouling could be carried by currents towards the mangroves, and depending on the species, establish in and affect the Ramsar wetland.
 	
NOTE: *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. It is therefore essential that cooperative, joint arrangements are agreed between BKA, WA DPIRD-Biosecurity, Cmwlth DAFF-Biosecurity, KPA, CGL and other port users, for the implementation of CG-SWASP,*
	This potential impact will be avoided through the following measures:
	– The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act*.
	– The SPV will implement a biofouling management plan with stringent biofouling prevention, management, mitigation and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*.
	– Biofouling management measures will include:
	  – Maintenance of a high-grade, IMO-compliant anti-fouling system on the SPV.
	  – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas.
		reduced further through an *Cambridge Gulf extension of the WA State-Wide Array Surveillance Program for marine pests* (CG-SWASP), in consultation with relevant stakeholders and consistent with the existing WA SWASP.
		
		Refer Annex 1 for technical details of CG-SWASP.
			No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including in the Ramsar wetland).*	checks find that shipboard ballast water treatment system is not operating in compliance with IMO and Aus requirements.
				
				TRC 6.1.2: Compliance checks find that the SPV's biofouling management plan and procedures do not comply with IMO and Aus requirements.
					operational review and implement corrective action to prevent future non-compliance.	detects potential introduced species in CG.	undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field monitoring if required, and eradication measures if necessary and feasible.
							
							NOTE: *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.*
							
							TCA 6.1.2: Undertake operational review and implement
								IMO-compliant Ballast Water Management Records on the SPV and reporting as required by the Commonwealth *Biosecurity Act*.	updated continuously.	to Australian biosecurity authorities before every arrival to CG (every two weeks) per Biosecurity Act requirements.

								Mon 6.1.2: Maintenance of IMO-compliant Bio-fouling Management Records on the SPV and reporting as required by the Commonwealth *Biosecurity Act* and WA Vessel Check.	"	"
								Mon 6.1.3: Port-State Control inspections by Australian biosecurity authorities.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
								Mon 6.1.4: Implement CG-SWASP (based on monitoring of bio-fouling settlement plates consistent with the existing WA SWASP). Refer Annex 1 for technical details of CG-SWASP.	Biannual (winter & summer) monitoring of bio-fouling settlement plates.	Biannual reports. **PLUS:** Any IMP introductions that might be detected to be reported immediately to all relevant State &Commonwealth authorities (see Sections 8 & 9 below).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
as is applied at other SWASP sites in WA.	– Scheduled maintenance dry docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention. – Required reporting to Australian authorities as per Commonwealth requirements.						corrective action to prevent future incidents.			

TABLE 15: *EMMs for MNES 4: Threatened & Migratory Species (TMS)*

NOTE: Hybrid outcomes- and objectives-based: This EMM's in this table are structured as an outcomes-based EMP as preferred by the WA EPA, based on a modification of the template in EPA (2021). However, given the maritime, vessel-based nature of the proposed operation, and the practical challenges of applying outcome-based indicators to maritime operations, some of the CEOs and in particular the supporting Trigger Criteria and Threshold Criteria are also objective-based / management-based – so this may be considered a hybrid outcomes- and objectives-based EMP.

*Potential Impact: For further details please refer Table 9 - *Combined summary impact & risk assessment* for this MNES, in Section 2.3 above. The proposed action will not lead to a long-term decrease in the size of a population of any of the key TMS in the CG area. However, as assessed in Table 9 in Section 2.3, while there is a nil to low risk of certain impacts on individual animals, as a precautionary measure EMMs are included for these potential impacts, for each key TMS.

**Reporting: All monitoring reports will be submitted to relevant regulatory agencies and the Stakeholder Reference Group (SRG) (refer Section 11.2 below) and made publicly available (on project web site).

Commonwealth MNES: MNES 4 - Threatened & Migratory Species (TMS).
Purpose of the EMMs: To achieve each CEO by preventing, mitigating, monitoring, managing, reporting and responding to potential impacts of the proposed operation on TMS.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
Snubfin and Humpback Dolphins:										
Vessel strikes by the SPV: Causing potential physical injury to dolphins.	Marine fauna observation & avoidance (MFOA): Implementation of best-practice MFOA measures, with TO indigenous rangers, in accordance with relevant guidelines (see Annex 2 for details). In addition, the likelihood of encounters between the SPV and Snubfin and Humpback Dolphins is low for the following reasons: - Very low occurrence of	MFOA measures: The MFOA measures are both an impact prevention and mitigation measure. They are also a monitoring program (see Mon column) and will generate long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. Very low speed: The very low speed of the SPV (<2 knots) when loading sand in CG will improve the	CEO 7: Vessel Strikes: No significant negative impacts are caused to populations of surface-dwelling marine fauna in CG from vessel strikes by the SPV.	TRC 7.1: Surface-dwelling marine fauna is/are observed in the vicinity of the SPV when operating in CG.	TRA 7.1.1: If necessary, implement SPV marine fauna avoidance procedures in accordance with MFOA guidelines and exclusion zones. TRA 7.1.2: Report sighting & avoidance actions in accordance with the MFOA	THC 7.1: Vessel strike on surface-dwelling marine animal occurs when SPV is operating in CG.	TCA 7.1.1: If necessary, to avoid potential additional strikes (if more than one animal in area), implement SPV marine fauna avoidance procedures in accordance with MFOA guidelines and exclusion zones. TCA 7.1.2: If practicable, feasible and safe to do so, rescue struck animal for possible sending to rehabilitation	Mon 7.1.1: MFOA monitoring: In addition to being a mitigation measure, the MFOA measures described to the left, are also a monitoring program, and will record and report the following data: - All marine fauna sightings (location, date, time, species, size, movement,	Continuously whenever the SPV is within CG.	Daily MFOA reports to BKA shore office(s) whenever the SPV is within CG. Can be provided to relevant agencies as required. Monthly consolidated MFOA reports. **PLUS:** Any vessel strikes that might occur to be reported immediately to all relevant

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	these species in the POA: The numbers that utilize CG are low and are part of a larger population that also utilizes the inshore waters of JBG and along the coast outside of CG. Their preferred habitat within CG is foraging areas along the coast, away from the deeper, open waters of the POA (although they may occasionally pass through the POA enroute between foraging areas). - Very low presence of the SPV in CG: The SPV will only be present in CG for 1 to 2 days every 2 weeks. - Naturally elusive species: Snubfins & Humpbacks are naturally shy and elusive, which unlike other dolphin species, avoid vessels. - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in	effectiveness of the MFOA measures.			reporting requirements.		center (closest is at Charles Darwin Univ. in Darwin). TCA 7.1.3: Report strike incident in accordance with the MFOA reporting requirements. TCA 7.1.4: Undertake operational review and implement corrective action to prevent future incidents.	behaviour, sea and weather conditions etc). - Any marine fauna interactions with the SPV. This program will also monitor for signs of pathogens and diseases in marine fauna. All data will be available to WA DBCA and DCCEEW and will further assist protection and conservation of these species both in CG and in other areas.		State and Commonwealth authorities, and to the National Ship Strike Database (see Sections 8 & 9 below). Plus, any evidence of pathogens and diseases in TMS will be reported immediately to relevant authorities.
								Mon 7.1.2: Vessel Tracking: Real-time AIS tracking of the SPV at all times when operating in CG, including recording and reporting vessel speed.	Continuously whenever the SPV is within CG.	Near real-time by electronic transmission to BKA shore office(s) whenever the SPV is within CG. Can be provided to relevant agencies as required. Monthly consolidated

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	CG, allowing fauna to move away.									SPV track reports.
Underwater noise from the SPV: Causing potential auditory injury and behavioural impacts on dolphins.	As presented in EPBC Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate Consultants 2025), modelling and risk assessment of underwater noise emissions from the SPV indicates that auditory injury and behavioural impacts on dolphins will not be caused, in accordance with US NMFS thresholds (as required by WA EPA). Never-the-less, in accordance with the precautionary principle, TRCs, TRAs, THCs, TCAs and monitoring measures are included for this issue, based on initial monitoring of underwater noise, to assess compliance with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and with the NMFS thresholds.	While not required given the findings of Supplementary Report No. 2, the following precautionary mitigation factors and measures also apply: - MFOA measures: As described against 'Vessel Strikes' above, the MFOA measures will also mitigate the potential effects of noise, as sighted animals will be avoided (see Annex 2). - IMO noise reduction measures: The SPV will be a 'purpose-built' vessel and will incorporate relevant best practice noise reduction measures, as per the IMO *Underwater Noise Guidelines* (IMO 2023). - Very low occurrence of these species in the POA (as indicated by	CEO 8: Underwater Noise: No significant negative impacts are caused to populations of Snubfin Dolphins, Humpback Dolphins and marine turtles in CG from underwater noise emissions from the SPV.	TRC 8.1: Initial monitoring on commencement of operations in CG (1st sand loading cycle) indicates that underwater noise emissions from the SPV might not comply with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and might exceed relevant NMFS thresholds.	TRA 8.1: In consultation with regulators, implement follow-up underwater noise monitoring over 12 weeks (6 sand loading cycles), to provide data over a range of environmental and operational conditions.	THC 8.1: Follow-up monitoring indicates that underwater noise emissions from the SPV consistently exceed relevant US NMFS thresholds over the 12 weeks monitoring period.	TCA 8.1.1: Immediately undertake detailed review in consultation with relevant regulatory agencies, and assess need for potential changes to the SPV sound mitigation measures, operational procedures and other potential interventions. TCA 8.1.2: In consultation with regulators implement ongoing underwater noise monitoring to assess effectiveness of TCA 8.1.2, and inform possible further reactive management action if required.	Mon 8.1.1: SPV Underwater Noise Emissions Monitoring: (refer Annex 7 for this). Baseline measurement of natural underwater noise levels in CG before commencement of operations. Initial monitoring and reporting of underwater noise emissions from the SPV on commencement of operations in CG, to assess compliance with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and with relevant US NMFS thresholds (as required by WA EPA).	Baseline measurement of pre-project underwater sound levels in CG before commencement of operations, over full one-month lunar tidal cycle to capture underwater noise conditions under range of tidal current conditions.	Within one-month of baseline assessment. Within one-month of initial assessment. Within one-month of any agreed follow-up monitoring.
								Mon 7.1.1: MFOA monitoring: The data generated by	Continuously whenever the	Daily MFOA reports to BKA shore office(s)

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
		dedicated site surveys). - Very low presence of the SPV (1-2 days every 2 weeks with zero presence in CG for 86% of the time during the project lifespan). - Naturally elusive species: Snubfins & Humpbacks are naturally shy and elusive, which unlike other dolphin species, avoid vessels. - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away; and improving the effectiveness of MFOA measures (see next item). - High SSC: The naturally very high suspended sediment concentrations in CG reduce sound propagation (WODA 2015). - High natural noise in CG:						this monitoring is also relevant to underwater noise as it will record and report on movements of marine fauna, including in spatial relation to the SPV and any vessel interactions.	SPV is within CG.	whenever the SPV is within CG. Can be provided to relevant agencies as required. Monthly consolidated MFOA reports.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
		The naturally high sound levels from high tidal range can mask other sound sources (Marley et al (2017).								
Flatback Turtle nesting beaches & nesting & hatching turtles:										
Accidental oil spill from the SPV – impacts on turtle nesting beaches: A potential accidental oil spill from the SPV could be carried by currents towards the turtle nesting beaches (although this is unlikely given most beaches are outside of CG).	There is nil possibility of an oil spill from refueling operations as the SPV will not refuel in Australian waters. The likelihood of collision with another vessel is very low as there is very little shipping traffic in CG (2.3 transits per week), the SPV will only be present in CG for 1 to 2 days every 2 weeks, and normal maritime safety procedures will be followed. The likelihood of the SPV running aground and breaching a fuel tank to cause an oil spill is very low as the SPV will only navigate in areas of CG with sufficient depth, if it does run aground the seabed is soft and unlikely	Compliance with all relevant maritime laws including MARPOL and the implementing Australian laws as administered by AMSA. The SPV will have a MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill, with a program of regular training and exercises, in cooperation with relevant agencies (see Section 9.3 below).	CEO 2: MEQ - Oil Spills: No significant negative impacts from accidental oil spills from the SPV *(including on the turtle nesting beaches).*	TRC 2.1: Spill occurs but does not impact on turtle nesting beaches.	TRA 2.1.1: Immediately activate SOPEP to mitigate the effects of the spill. TRA 2.1.2: Undertake operational review and implement corrective action to prevent future incidents.	THC 2.1: Spill occurs and impacts on turtle nesting beach(s).	TCA 2.1.1: Immediately activate SOPEP to mitigate the effects of the spill. TCA 2.1.2: In consultation with relevant regulatory agencies, implement any required environmental cleanup and restoration measures. TCA 2.1.3: Undertake operational review and implement corrective action to prevent future incidents.	Mon 2.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with IMO regulations, including spill prevention measures and SOPEP.	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).
								Mon 2.1.2: Port-State Control inspections and audits of SPV compliance with IMO and AMSA regulations, including spill prevention measures and SOPEP.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator). **PLUS:** Any and all spills that might occur to be reported immediately to all relevant State and Commonwealth authorities (see Sections 8 & 9 below)

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	to breach the SPV's hull, and the fuel tanks will be protected as required by the MARPOL Convention.									
Coastal process changes – indirect impacts on turtle nesting beaches: Potential changes to coastal processes from the sourcing of sand from the POA, affecting the supply of sediments to turtle nesting beaches and changing beach morphology and composition.	There is no overlap between the POA and the turtle nesting beaches and there will not be any direct impacts on the beaches. Detailed modelling supported by comprehensive field data shows negligible changes to hydrodynamics, sediment dynamics and beach processes. Confirmed by two independent expert reviews. See Referral Report No. 8 (PCS 2025).	Not required as impacts are avoided. To be confirmed further by monitoring as precautionary measure.	CEO 9: Coastal Processes & Beaches: Removal of sand from the POA does not cause significant changes to coastal processes that result in significant net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics.	TRC 9.1: Measured 2% reduction in any turtle nesting beach in the LAU over two years that cannot be explained by non-project causes (e.g cyclones, changes in natural sediment inputs). See Annex 6 for technical basis of 2 yrs & 2%.	TRA 9.1: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and field monitoring if required.	THC 9.1: Measured 5% reduction in any turtle nesting beach in the LAU over two years that cannot be explained by non-project causes (e.g cyclones, changes in natural sediment inputs). See Annex 6 for technical basis of 2 yrs & 5%.	TCA 9.1.1: Immediately undertake detailed review and root-cause analysis to determine if the measured change is attributable to the operation, in consultation with the Department, and assess any need for changes to the operation, including any need to cease operations. TCA 9.1.2: If TCA 9.1.1 concludes that the measured change is attributable to the operation, implement the actions agreed with the Department, including, if necessary, cease operations. TCA 9.1.3: If deemed	Mon 9.1: Baseline high-resolution aerial drone LiDAR and ortho-photographic surveys of all five turtle nesting beaches in the LAU, before commencement of operations. Biennial (every 2 years) high-resolution aerial drone LiDAR surveys of all five turtle nesting beaches in the LAU, building on pre-commencement baseline and 2024 survey by Sensorem for BKA (see Section 5 below). Assessment of other environmental factors that could cause changes to beaches (e.g cyclones, changes in natural sediment inputs).	Baseline LiDAR and ortho-photographic surveys before commencement of operations. Biennial LiDAR and ortho-photographic surveys (in April after end of cyclone season).	Baseline report within one month of survey. Biennial reports within one-month of survey – by end of May.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
							necessary in consultation with the Department, implement other potential interventions such as beach replenishment. TCA 9.1.4: Engage independent review by relevant subject matter expert(s) of likely causes and effectiveness of mitigation measures, to the satisfaction of the Department. TCA 9.1.5: If operations are ceased, they may only resume once the Department is satisfied that: - the causes have been adequately addressed; and - appropriate mitigation and management measures are in place.			

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
SPV Lighting: Potential impacts on nesting and hatching turtles at the nesting beaches in the CG area, when the SPV is operating in CG at night.	There is no likelihood of this impact as the SPV will be fitted with turtle safe lighting as specified in the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023) and detailed in Annex 3. As presented in EPBC Referral Supplementary Report No. 1 - *Light Assessment* (Nocterra 2025), modelling and risk assessment of light emissions from the SPV (fitted with turtle safe lighting), shows that nesting and hatching turtles at the nesting beaches in the CG area will not be impacted, in accordance with the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023).	While not required given the fitting of turtle safe lighting, and the findings of Supplementary Report No. 1 Nocterra (2025), the following precautionary mitigation factors and measures also apply: - Lowest Impact Vessel Route (West Entrance on Figure 1): The SPV will enter and depart CG via West Entrance (west of Lacrosse Island), which is 16 km away from the most important nesting beach at Cape Domett, and geo-screened by both Cape Domett and Lacrosse Island, geo-screened from Turtle Beach West, and 22 km from the nesting site at Barnett Point. - Limited light presence: Light exposure from the SPV will be limited by the fact that the SPV will only operate in CG for one to two	CEO 10: SPV Lighting: No significant negative impacts are caused to populations of nesting and hatching Flatback Turtles at nesting beaches in the CG area from the SPV's lighting.	TRC 10.1: Initial receptor beach light monitoring at each turtle nesting beach on commencement of operations in CG (1st sand loading cycle), indicates that received light at any one beach might exceed relevant thresholds under DCCEEW (2023).	TRA 10.1: In consultation with regulators, implement follow-up receptor beach light monitoring over 12 weeks (6 sand loading cycles), to provide data over a range of environmental and operational conditions.	THC 10.1: Follow-up monitoring indicates that received light at any one beach consistently exceeds relevant thresholds under DCCEEW (2023) over the 12 weeks monitoring period.	TCA 10.1.1: Immediately undertake detailed review in consultation with relevant regulatory agencies, and assess need for potential changes to the SPV light mitigation measures, operational procedures and other potential interventions. TCA 10.1.2: In consultation with regulators implement ongoing receptor beach light monitoring to assess effectiveness of TCA 10.1.1, and inform possible further reactive management action if required.	Mon 10.1.1: Receptor Beach Light Monitoring: (refer Annex 8 for methods) Baseline measurement of natural light levels at each turtle nesting beach before commencement of operations (refer Section 5 below), followed by initial monitoring and reporting of light received at each turtle nesting beach on commencement of operations in CG, to assess compliance with light report (Nocterra 2025) and relevant thresholds under DCCEEW (2023).	Baseline measurement of pre-project light levels at each turtle nesting beach before commencement of operations, over full one-month lunar cycle to capture range of lunar-light conditions. Carry out baseline assessment in dry-season (Jul-Aug) with least cloud cover and overlap with peak turtle nesting season. Initial one-off assessment on commencement of operations (1- to 2-day sand loading cycle). Follow-up monitoring if deemed necessary after initial assessment (in consultation with regulators).	Within one-month of assessment. Within one-month of any agreed follow-up monitoring.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
		nights every two weeks – there will be zero light source from the SPV in CG for 86% of time during the project lifespan. - Geographical screening: Light exposure from the SPV will also be avoided by the fact that the turtle nesting sites are geographically screened from the POA where the SPV will operate, as described for each nesting site in Nocterra (2025).								
Turtles in the POA *(at or near the sea surface and near the seabed):*										
Vessel strikes by the SPV: Causing potential physical injury to turtles.	Marine fauna observation & avoidance (MFOA): Implementation of best-practice MFOA measures, with TO indigenous rangers, in accordance with relevant guidelines (see Annex 2 for details). In addition, the likelihood of encounters between the SPV and marine turtles is low for the following reasons:	MFOA measures: The MFOA measures are both an impact prevention and mitigation measure. They are also a monitoring program (see Mon column) and will generate long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. Lowest Impact Vessel Route (West Entrance on Figure	CEO 7: Vessel Strikes: No significant negative impacts are caused to populations of surface-dwelling marine fauna in CG from vessel strikes by the SPV.	TRC 7.1: As above – not repeated.	TRA 7.1.1: As above – not repeated. TRA 7.1.2: As above – not repeated.	THC 7.1: As above – not repeated.	TCA 7.1.1: As above – not repeated. TCA 7.1.2: As above – not repeated. TCA 7.1.3: As above – not repeated. TCA 7.1.4: As above – not repeated.	Mon 7.1.1: MFOA monitoring: As above – not repeated.	As per Mon 7.1.1 above – not repeated.	As per Mon 7.1.1 above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	- Very low occurrence of these species in the POA: The numbers of turtles that pass through the POA are very low as indicated by site surveys and given the extreme environmental conditions in the POA. - Very low presence of the SPV in CG: The SPV will only be present in CG for 1 to 2 days every 2 weeks. - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.	1): The SPV will enter and depart CG via West Entrance (west of Lacrosse Island), which is 16 km away from the most important nesting beach at Cape Domett, Very low speed: The very low speed of the SPV (<2 knots) when loading sand in CG will improve the effectiveness of the MFOA measures.								
Underwater noise from the SPV: Causing potential auditory injury and behavioural impacts on marine turtles.	As presented in EPBC Referral Supplementary Report No. 2 - *Noise Assessment* (Resonate Consultants 2025), modelling and risk assessment of underwater noise emissions from the SPV indicates that auditory injury and behavioural impacts on marine turtles	While not required given the findings of Supplementary Report No. 2, the following precautionary mitigation factors and measures also apply: - MFOA measures: As described against 'Vessel Strikes' above, the MFOA	CEO 8: Underwater Noise: No significant negative impacts are caused to populations of Snubfin Dolphins, Humpback Dolphins and marine turtles in CG from	TRC 8.1: As above – not repeated.	TRA 8.1: As above – not repeated.	THC 8.1: As above – not repeated.	TCA 8.1.1: As above – not repeated. TCA 8.1.2: As above – not repeated.	Mon 8.1.1: Noise Emissions Monitoring: As above – not repeated.	As per 8.1.1 above – not repeated.	As per 8.1.1 above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	will not be caused, in accordance with US NMFS thresholds (as required by WA EPA). Never-the-less, in accordance with the precautionary principle, TRCs, TRAs, THCs, TCAs and monitoring measures are included for this issue, based on initial monitoring of underwater noise, to assess compliance with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and with the NMFS thresholds.	measures will also mitigate the potential effects of noise, as sighted animals will be avoided (see Annex 2). - IMO noise reduction measures: The SPV will be a 'purpose-built' vessel and will incorporate relevant best practice noise reduction measures, as per the IMO *Underwater Noise Guidelines* (IMO 2023). - Very low occurrence of these species in the POA (as indicated by dedicated site surveys). - Very low presence of the SPV (1-2 days every 2 weeks with zero presence in CG for 86% of the time during the project lifespan). - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in	underwater noise emissions from the SPV.							

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
		CG, allowing fauna to move away; and improving the effectiveness of MFOA measures (see next item). - High SSC: The naturally very high suspended sediment concentrations in CG reduce sound propagation (WODA 2015). - High natural noise in CG: The naturally high sound levels from high tidal range can mask other sound sources (Marley et al (2017).								
Drag-head entrainment: Potential entrainment of a turtle when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	The likelihood of encounters between the drag-head and marine turtles on the seabed in the POA is very low for the following reasons: - Very low occurrence of these species in the POA: The numbers of turtles that pass through the POA are very low as	This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at low	CEO 11: Drag-head Entrainment: No significant negative impacts are caused to populations of large epibenthic animals in CG from entrainment in the SPV's drag-head (including	TRC 11.1: One reported entrainment of animal in drag-head in any loading cycle.	TRA11.1.1: Immediately report incident to authorities. TRA 11.1.2: Undertake operational review, including checking correct fitting and function of the tickler chains, and correct application of	THC 11.1: Six repeated entrainments of animals in drag-head over 12 weeks (6 sand loading cycles). **NOTE:** Normally, the THC represents the limit of acceptable impact	TCA 11.1.1: Immediately report incident to authorities. TCA 11.1.2: Immediately undertake detailed root cause analysis, including the same checks as per TRA 11.1.2, in consultation with the Department, and assess need for	Mon 11.1.1: Drag-head Inspections: Inspect drag-head at the end of each sand loading cycle in CG for signs of animal entrainment.	At the end of every sand loading cycle in CG.	At the end of every sand loading cycle in CG.
								Mon 11.1.2: Vessel Compliance Checks: Port-State Control inspections of the SPV to check	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	indicated by site surveys, and they do so on or near the surface (away from the drag-head), as the extreme tidal currents, highly dynamic sand waves and permanent aphotic zone at the seabed in the POA make it implausible that they would remain on or near the seabed in this area. - Very low presence of the SPV (1-2 days every 2 weeks with zero presence in CG for 86% of the time during the project lifespan). - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.	pump revolutions, providing opportunity for any marine fauna on the seabed to move away. This is a recognized mitigation measure in the Marine Turtle Recovery Plan (DCCEEW 2017) and has been accepted as best practice in dredging projects across marine turtle areas of Australia for over ten years. – Marine fauna deflector ('tickler chains): Fitted to the drag-head as per Annex 4. This is a recognized mitigation measure in the Marine Turtle Recovery Plan (DCCEEW 2017) and has been accepted as best practice in dredging projects across marine turtle areas of Australia for over ten years.	marine turtles, and sawfish).		the 'soft-start' procedure. Implement any required corrective action to prevent future incidents.	beyond which there is likely to be a significant impact on the MNES. For TMS, significant impact is defined under the EPBC Act criteria as impacts at the population level. This THC does not even begin to approach this threshold. Even if there were to be an entrainment during each and every sand-loading cycle, the number of individuals affected would not meet this criterion, as the population of Flatback Turtles in the area offshore from CG is in the order of thousands and possibly tens of thousands (White al 2009). This THS is therefore	potential changes to the tickler chains, operational procedures and other potential interventions. TCA 11.1.3: If TCA 11.1.2 cannot identify the root cause, and if repeated entrainments continue, BK to commission targeted research and monitoring, to further assess the presence of relevant fauna on the seabed in the POA. TCA 11.1.4: If TCA 11.1.3 finds that turtle sightings in the POA exceed 30 per day over a ten-day continuous survey period, in consultation with the Department, implement other potential interventions, including, if necessary, modification or cessation of operations. TCA 11.1.5: Engage independent	fitting and operation of marine-fauna deflection / excluder device.		

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
						extremely precautious and conservative, and the associated TCAs are tempered accordingly.	review by relevant subject matter expert(s) of likely causes and effectiveness of mitigation measures, to the satisfaction of the Department. TCA 11.1.6: If operations are ceased, they may only resume once the Department is satisfied that: - the causes have been adequately addressed; and - appropriate mitigation and management measures are in place.			
Peak Flatback Turtle nesting season considerations (Aug-Sept):										
The likelihood of vessel strikes and drag-head entrainment described above could potentially	The impact prevention and mitigation measures for vessel strikes and drag-head entrainment listed above will apply equally during peak nesting season.	As per enhanced prevention measures, which are also mitigation measures.	CEO 12: Peak Turtle Nesting Season Enhanced Measures: No significant negative	As per TRC 7 (with doubled MFOA effort) and TRC 11 above – not repeated. TRC 12.1: SPV tracking shows SPV is within 10	As per TRA 7 and TRA 11 above – not repeated. TRA 12.1: Maneuver SPV to avoid entering the Restricted	As per THC 7 and THC 11 above – not repeated. THC 12.1: SPV tracking shows SPV enters the Restricted	As per TCA 7 and TCA 11 above – not repeated. TCA 12.1: Immediately raise drag-head and maneuver	As per Mon 7 and Mon 11 above – not repeated. Mon 12.1: Real-time AIS tracking of the SPV at all times when operating in CG, including	As per Mon 7 and Mon 11 above – not repeated. Mon 12.1: Continuously whenever the	As per Mon 7 and Mon 11 above – not repeated. Mon 12.1: Near real-time by electronic transmission to BKA shore

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
increase during peak turtle nesting season (Aug-Sept), when larger numbers of Flatback Turtles are present at and near the nesting beaches in the area (although these are distant from the POA).	While the above measures are assessed as being more than adequate for preventing and mitigating the potential for significant impacts on marine turtles in all seasons, as an additional precaution, enhanced measures will be applied during the peak Flatback Turtle nesting season, as follows: – Very low SPV presence: The SPV will only be present in the POA for 4 loading cycles of up to 2 days each = max of 8 days presence during the two-month season. – Spatial restriction: Sand-sourcing operations will be restricted to the western half of the POA (furthest from the main nesting beach at Cape Domett) during the season (refer Restricted Area map at Figure 1a). – Doubling MFOA effort: The MFOA		impacts are caused to populations of inter-nesting Flatback Turtles in the CG area during peak nesting season (August-September).	m of Restricted Area boundary (refer Figure 1a) while drag-head is still deployed and operating. (NOTE: SPV may navigate outside the Approved Area with the drag-head raised and not operating for turning and maneuvering purposes).	Area and/or raise drag head before entering the Restricted Area.	Area while drag-head is still deployed and operating.	SPV to return to Approved Area. TCA 12.2: Undertake operational review and implement corrective action to prevent future incidents.	recording and reporting when drag-head is lowered and operating and is not lowered and not operating	SPV is within CG.	office(s) whenever the SPV is within CG. Can be provided to relevant agencies as required. Monthly consolidated SPV track reports.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	program will be doubled from two active observers and one aerial drone to four active observers and two aerial drones) during the season.									
River Sharks										
Vessel strikes by the SPV: Causing potential physical injury to River Sharks.	Marine fauna observation & avoidance (MFOA): Implementation of best-practice MFOA measures, with TO indigenous rangers, in accordance with relevant guidelines (see Annex 2 for details). In addition, the likelihood of encounters between the SPV and marine turtles is low for the following reasons: - Unlikely presence in POA: The primary habitat for River Sharks in the CG area is in the Lower Ord River ~35 km upstream from the POA and in the Durack and Pentecost Rivers >80 km upstream from CG. There have been no observations or	MFOA measures: The MFOA measures are both an impact prevention and mitigation measure. They are also a monitoring program (see Mon column) and will generate long-term monitoring data that will further assist protection and conservation of these species, both in CG and in other areas. important nesting beach at Cape Domett, Very low speed: The very low speed of the SPV (<2 knots) when loading sand in CG will improve the effectiveness of the MFOA measures.	CEO 7: Vessel Strikes: No significant negative impacts are caused to populations of surface-dwelling marine fauna in CG from vessel strikes by the SPV.	TRC 7.1: As above – not repeated.	TRA 7.1.1: As above – not repeated. TRA 7.1.2: As above – not repeated.	THC 7.1: As above – not repeated.	TCA 7.1.1: As above – not repeated. TCA 7.1.2: As above – not repeated. TCA 7.1.3: As above – not repeated. TCA 7.1.4: As above – not repeated.	Mon 7.1.1: MFOA monitoring: As above – not repeated.	As per Mon 7.1.1 above – not repeated.	As per Mon 7.1.1 above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	records of River Sharks in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - Swimming depth: The adults of these two species typically swim in mid waters below the sea surface, which reduces the likelihood of vessel strike. - Very low SPV presence: The SPV will only be present in CG for 1 to 2 days every 2 weeks. - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.									

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
Drag-head entrainment: Potential entrainment of a shark when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	The likelihood of encounters between the drag-head and River Sharks on the seabed in the POA is very low for the following reasons: - Unlikely presence in POA: The primary habitat for River Sharks in the CG area is in the Lower Ord River ~35 km upstream from the POA and in the Durack and Pentecost Rivers >80 km upstream from CG. There have been no observations or records of River Sharks in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - Swimming depth: The adults of these two	This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at low pump revolutions, providing opportunity for any marine fauna on the seabed to move away. This is a recognized mitigation measure and has been accepted as best practice in dredging projects across Australia for over ten years. – Marine fauna deflector ('tickler chains): Fitted to the drag-head as per Annex 4. This is a recognized mitigation measure and has been accepted as best practice in dredging projects across Australia for over ten years.	CEO 11: Drag-head Entrainment: No significant negative impacts are caused to populations of large epibenthic animals in CG from entrainment in the SPV's drag-head (including marine turtles, sharks and sawfish).	TRC 11.1: As above – not repeated.	TRA 11.1.1: As above – not repeated. TRA 11.1.2: As above – not repeated.	THC 11.1: As above – not repeated.	TCA 11.1.1: As above – not repeated. TCA 11.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 1.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 1.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 1.1.2: As above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	species typically swim in mid waters above the seabed, which reduces the likelihood of encountering the drag-head. - Very low SPV presence: The SPV will only be present in CG for 1 to 2 days every 2 weeks. Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.									
Sawfish										
Drag-head entrainment: Potential entrainment of a sawfish when it is on or near the seabed in the SPV's drag-head (which operates on the seabed).	The likelihood of encounters between the drag-head and River Sharks on the seabed in the POA is very low for the following reasons: - Unlikely presence in POA: The primary habitat for Sawfish in the CG area is in the upstream rivers, creaks and tidal inlets located well upstream from the POA. There have been no observations or records of	This potential impact will be mitigated through the following measures: – Only one drag-head: The SPV will only have one drag-head (similar vessels normally have two). – Soft start procedure: This involves slowly lowering the drag-head to the seabed and starting at low pump revolutions, providing opportunity for any marine fauna on the seabed to	CEO 11: Drag-head Entrainment: No significant negative impacts are caused to populations of large epibenthic animals in CG from entrainment in the SPV's drag-head (including marine turtles, sharks and sawfish).	TRC 11.1: As above – not repeated.	TRA 11.1.1: As above – not repeated. TRA 11.1.2: As above – not repeated.	THC 11.1: As above – not repeated.	TCA 11.1.1: As above – not repeated. TCA 11.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 11.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 11.1.2: As above – not repeated.	Mon 1.1.1: As above – not repeated. Mon 11.1.2: As above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	Sawfish in the POA, including from eDNA sampling conducted in 2024 (Annex 13 of Referral Report No. 2). However, for the purposes of this EMP, it is precautiously assumed that the occasional adult may pass through the POA during inshore-offshore movements. - Very low SPV presence: The SPV will only be present in CG for 1 to 2 days every 2 weeks. - Very low vessel speed: The SPV will operate at very low speeds (<2 knots) when loading sand in CG, allowing fauna to move away.	move away. This is a recognized mitigation measure and has been accepted as best practice in dredging projects across Australia for over ten years. – Marine fauna deflector ('tickler chains): Fitted to the drag-head as per Annex 4. This is a recognized mitigation measure and has been accepted as best practice in dredging projects across Australia for over ten years.								
All TMS										
Marine debris from the SPV – impacts on TMS: Any marine debris discharged from the SPV could	Marine debris will not be discharged into the sea from the SPV. All garbage (e.g from the day-to-day domestic activities of the crew) will be kept on-board and	Not required as impact will be fully prevented. See TRAs and TCAs for actions in the highly unlikely event of accidental	CEO 3: MEQ - Marine Debris: No significant negative impacts from marine debris from the SPV	TRC 3.1: Marine debris is accidentally discharged into the sea from the SPV but does not impact on TMS.	TRA 3.1.1: Immediately deploy tender vessel to recover the marine debris from the sea if safe to do so.	THC 3.1: Marine debris is accidentally discharged into the sea from the SPV and impacts on TMS.	TCA 3.1.1: Immediately deploy tender vessel to disentangle the TMS and recover the marine debris if feasible	Mon 3.1.1: Flag-State and Classification Society surveys, inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard	Before commencement of project and thence every five years (as per IMO ship survey requirements).	Before commencement of project and thence every five years (as per IMO ship survey requirements).

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
potentially impact on TMS.	managed in accordance with a MARPOL Annex V-compliant Shipboard Garbage Management Plan, and discharged to MARPOL-compliant port waste reception facilities in Asian port, for recycling and disposal, as relevant.	discharge of marine debris from the SPV.	*(including on TMS).*		TRA 3.1.2: Undertake operational review and implement corrective action to prevent future incidents.		and safe to do so. TRA 3.1.2: Undertake operational review and implement corrective action to prevent future incidents.	Garbage Management Plan.		
								Mon 3.1.2: Port-State Control inspections and audits of SPV compliance with MARPOL Annex V, including Shipboard Garbage Management Plan.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
								Mon 4.1.2: Port-State Control inspections and audits of SPV compliance with MARPOL Annex IV, including Shipboard Sewage Treatment Plant.	Random.	Whenever Port-State Control inspections are carried out (at discretion of the regulator).
Marine pests from the SPV – impacts on TMS: Any marine pests introduced via the SPV's ballast water or hull biofouling that could potentially harm TMS. **NOTE:** As per tables above for	This potential impact will be avoided through the following measures: – The SPV will be equipped with an IMO-compliant ballast water treatment system as required by the Commonwealth *Biosecurity Act.* – The SPV will implement a biofouling management plan with	Potential impacts will be reduced further through a *Cambridge Gulf extension of the WA State-Wide Array Surveillance Program for marine pests* (CG-SWASP), in consultation with relevant stakeholders and consistent with the existing WA SWASP. Refer Annex 1 for technical details of CG-SWASP.	CEO 6: Marine Pests: No marine pest species are introduced via the SPV's ballast water discharges or hull bio-fouling *(including potential impacts on TMS).*	TRC 6.1.1: As above – not repeated. TRC 6.1.2: As above – not repeated.	TRA 6.1: As above – not repeated.	THC 6.1: As above – not repeated.	TCA 6.1.1: As above – not repeated. TCA 6.1.2: As above – not repeated.	Mon 6.1.1: As above – not repeated.	As above – not repeated.	As above – not repeated.
								Mon 6.1.2: As above – not repeated.	As above – not repeated.	As above – not repeated.
								Mon 6.1.3: As above – not repeated.	As above – not repeated.	As above – not repeated.
								Mon 6.1.4: As above – not repeated.	As above – not repeated.	As above – not repeated.

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
marine pests.	stringent biofouling prevention, management, mitigation and monitoring measures, consistent with the IMO biofouling guidelines (IMO 2023) and as required by the Commonwealth *Biosecurity Act*. – Biofouling management measures will include: – Maintenance of a high-grade, IMO-compliant anti-fouling system on the SPV. – Regular in-water inspections and when necessary, cleaning in Asian port – with a priority focus on niche areas. – Scheduled maintenance dry docking, out-of-water hull cleaning and refresh of anti-fouling system, per AFS Convention.									

Potential Impact*	Impact Prevention	Impact Mitigation	Commonwealth Environmental Outcome (CEO)	Trigger Criteria (TRC)	Trigger Response Action (TRA)	Threshold Criteria (THC)	Threshold Contingency Action (TCA)	Monitoring (Mon)	Timing of Monitoring	Reporting**
	– Required reporting to Australian authorities									

5. REQUIRED BASELINE SURVEYS

1. Some of the monitoring programs outlined in EMM Tables 13 to 15 above require baseline surveys to be undertaken before proposed sand sourcing operations commence in CG. Some baseline surveys were commissioned by BKA in 2023 and 2024 as part the environmental assessment studies as reported in EPBC Referral Report No 2 - *Setting & Existing Environment* (BKA 2024b) and its supporting Annexes (e.g. aerial drone high-resolution LiDAR and ortho-photographic surveys of beaches, assessment of mangrove cover from Global Mangrove Watch, etc).

2. Given the passage of time between these surveys and the likely commencement of proposed sand loading operations (approximately 2 to 3 years), it is necessary undertake fresh baseline surveys as close as possible time-wise to the commencement of proposed operations. This will provide up-to-date baseline data against which to measure potential changes that might be caused by the proposed operation, and allow monitoring and adaptive responses in relation to each relevant CEO in EMM Tables 13 to 17.

3. Table 19 lists the baseline surveys that are required against each relevant CEO. Technical details are provided in the Annexes listed against each baseline survey in Table 16.

TABLE 16: *Required baseline surveys*

- Only lists CEOs for which baseline surveys are relevant / required.
- Each baseline survey should be undertaken as close as possible time-wise to the commencement of proposed sand sourcing operations, so as to provide up-to-date baseline data.
- Each baseline survey would be conducted by consultants or institutions with relevant expertise and experience on contract to BKA.
- *All reports will be submitted to relevant regulatory agencies and the Stakeholder Reference Group (SRG) and made publicly available (on project web site).

CEO	Required Baseline Survey	Purpose	Report *	Annex with Technical Details
CEO 1: Coastal Processes & Mangroves:	Mangrove Baseline Survey: Baseline GIS mapping of mangrove cover in the LAU using remote sensing from open-source satellite imagery, before commencement of operations.	Allow assessment of potential changes over time relative to pre-project baseline and assist differentiation of likely causes of any measured changes, including possible natural causes.	Baseline Mangrove Report; including GIS maps and data layers within one month of completion of mapping.	Annex 5 - Mangrove Mapping Methods.
CEO 8: Underwater Noise:	Underwater Sound Baseline Survey: Baseline measurement of pre-project underwater sound levels in CG before commencement of operations, over full one-month lunar tidal cycle to capture underwater sound conditions under range of tidal current conditions.	Establish pre-project sound levels in CG against which to assess potential additional underwater noise caused by the SPV, in the context of the NMFS thresholds for dolphins and marine turtles.	Baseline Underwater Sound Report; including characterization of pre-project underwater sound levels in CG and supporting noise data within one month of completion of assessment.	Annex 8 - Underwater Sound Assessment Methods.
CEO 9: Coastal Processes & Beaches:	Beach Baseline Survey: Baseline high-resolution aerial drone LiDAR and ortho-photographic surveys of all five turtle nesting beaches in the LAU, before commencement of operations. Must be consistent with 2024 baseline and methods in Sensorem (2024).	Allow assessment of potential changes over time relative to pre-project baseline and assist differentiation of likely causes of any measured changes, including possible natural causes.	Baseline Beach Report; including LiDAR data and generated Digital Terrain Model, Digital Elevation Model and ortho-photographic map of each beach within one month of completion of survey.	Annex 6 - Beach Monitoring Methods.
CEO 10: SPV Lighting:	Light Baseline Survey: Baseline measurement of pre-project light levels at each turtle nesting beach before commencement of operations, over full one-month lunar cycle to capture range of lunar-light conditions. Carry out in dry-season (Jul-Aug) with least cloud cover and overlap with peak turtle nesting season.	Establish pre-project light levels at the nesting beaches against which to assess potential additional light caused by the SPV, in the context of turtle-safe light criteria in the *National Light Pollution Guidelines for Wildlife* (DCCEEW 2023).	Baseline Light Report; including characterization of pre-project light levels at the turtle nesting beaches and supporting light data within one month of completion of assessment.	Annex 9 - Light Assessment Methods.

6. ROLES & RESPONSIBILITIES

1. Table 17 lists roles and responsibilities of various personal under this C-EMP. Overall responsibility for the implementation of this C-EMP rests with BKA, who will designate a responsible staff officer with sufficient resources and authority to ensure its implementation, including all impact prevention, mitigation and monitoring measures, and all reporting requirements.

2. The Master of the Sand Production Vessel (SPV) has full responsibility for ensuring the implementation of all C-EMP requirements that relate to and affect the day-to-day operation of the SPV.

3. The environmental monitoring requirements of the C-EMP may be implemented by consultants on contract to BKA, including, subject to negotiations, the TO groups in the GC area and their indigenous rangers, with necessary funding, training and equipment provided by BKA.

4. BKA may base a small research and survey vessel in Wyndham for the duration of the project to undertake environmental monitoring and other support tasks.

5. As outlined in Section 7.2 below, BKA will seek to establish a Stakeholder Reference Group (SRG) to meet quarterly for the duration of the project, to provide a forum to communicate progress of the project, including progress with implementation of the C-EMP, to the local community and other key stakeholders. The SRG will also provide a forum for stakeholders to make inputs to the project and raise any concerns and complaints.

TABLE 17: *Roles and responsibilities of various personal under this C-EMP*

Party	Role & Responsibility
BK Head Office (Netherlands):	– Overall corporate responsibility for compliance with the C-EMP requirements, including any internal reporting to management and board.
BKA Office (Perth, Australia):	– Operational responsibility for ensuring that all C-EMP requirements are implemented and reported, and regular review and update of the C-EMP is undertaken as per Section 10 below. – Manage the establishment and operation of the Stakeholder Reference Group (SRG). – Engage and manage environmental consultants who undertake environmental monitoring and reporting. – Undertake all liaison and communication with and reporting to State and Commonwealth regulatory agencies.
SPV Management:	– Ensure that all required vessel surveys, inspections, audits and checks are carried and reported, and that any necessary corrective actions relating to the vessel are implemented.
SPV Master & Crew:	– Full responsibility for ensuring the implementation of all C-EMP requirements that relate to and affect the day-to-day operation of the SPV.
BKA environmental consultants:	– May include local TO groups as Marine Fauna Observers (MFOs). – Undertake relevant environmental monitoring and reporting on contract to BKA.
Stakeholder Reference Group (SRG): (refer Section 11.2 below)	– Meet quarterly for the duration of the project, to provide a forum to communicate progress of the project, including progress with implementation of the C-EMP, to the local community and other key stakeholders. – Provide a forum for stakeholders to make inputs to the project and raise any concerns and complaints.

7. ENVIRONMENTAL INDUCTIONS & TRAINING

1. The effective implementation of any EMP requires environmental inductions and training of all relevant personnel that have roles and responsibilities under the EMP, and who are involved in the operation in any other capacity.

2. Environmental inductions and training are taken very seriously by BKA as part of the overall Boskalis 'Way of Working', the Boskalis Environment and Social Policy, the Boskalis Code of Conduct, the Boskalis Supplier Code of Conduct, and the Boskalis Safety, Health, Environment & Quality (SHE-Q) policy and procedures, based on 'No Injuries - No Accidents' (NINA). All of these are mandatory for all staff and contractors involved in any Boskalis project, operation or activity.

3. Table 18 lists the mandatory environmental inductions and training required for all respective parties involved in the CG marine sand project. It should be noted that this is in addition to the mandatory health and safety inductions and training that will be required in accordance with the Boskalis SHE-Q policy and procedures, and the relevant regulatory requirements under both WA and Commonwealth work health and safety legislation. It is also in addition to the shipboard safety inductions and training required under the SPV's Safety Management System (SMS) per the *International Convention for the Safety of Life at Sea* (SOLAS), and the Commonwealth *Navigation Act* and supporting Marine Orders administered by AMSA.

4. The safety training requirements are not included here as they are not the subject of this C-EMP. However, delivery of some safety and environmental inductions and training might be integrated for efficiency, especially for non-SPV personal who occasionally join the SPV such as the Marine Fauna Observers (MFOs).

TABLE 18: *Inductions and training required for the implementation of this C-EMP*

Party	Mandatory Inductions & Training Required	Training Provider

Any and all persons involved with the project:
Includes but not limited to:
– all relevant BK and BKA staff,
– SPV management,
– SPV crew,
– contractors and consultants,
– all members of the SRG; and
– any person who joins the SPV when in CG, including MFOs, government officers and other external parties.
	1. CG Marine Sand Project - General Environmental Awareness Induction:
	Includes:
	– Welcome to country and indigenous awareness induction of CG area by local TOs (paid by BKA).
	– Overview of:
	  – BKA as a company and applicable company policies and procedures.
	  – The sand loading operation and the SPV specifications.
	  – The environmental resources, values and sensitivities of CG, including relevant MNES.
	  – State and Commonwealth environmental legislation, regulations and project regulatory conditions.
	  – The C-EMP and its main provisions and requirements.
	  – Responsibilities, obligations and expectations of all parties with respect to environmental protection, sustainability and compliance.
		– TOs.
		– BKA SHE-Q staff.
		– BKA environmental consultant(s).

BK Head Office staff (Netherlands):	In addition to 1. above. 2. CG Marine Sand Project - C-EMP Training (tailored to their role): Includes covering their roles and responsibilities under the C-EMP, including overall corporate responsibility for compliance with the C-EMP and internal reporting to management and board.	– BKA SHE-Q staff. – BKA environmental consultant(s).
BKA Office staff (Perth, Australia):	In addition to 1. above. 2. CG Marine Sand Project - C-EMP Training (tailored to their role): Includes covering their roles and responsibilities under the C-EMP, including: – Operational responsibility for ensuring that all C-EMP requirements are implemented and reported, and regular review and update of the C-EMP is undertaken as per Section 10 below. – Managing the establishment and operation of the Stakeholder Reference Group (SRG). – Engaging and managing environmental consultants who undertake environmental monitoring and reporting. – Undertaking all liaison and communication with and reporting to State and Commonwealth regulatory agencies.	– BKA SHE-Q staff. – BKA environmental consultant(s).

Party	Mandatory Inductions & Training Required	Training Provider
SPV Management staff:	In addition to 1. above. 2. CG Marine Sand Project - C-EMP Training (tailored to their role): Includes covering their roles and responsibilities under the C-EMP, including ensuring that all required vessel surveys, inspections, audits and checks are carried and reported, and that any necessary corrective actions relating to the vessel are implemented.	– BKA SHE-Q staff. – BKA environmental consultant(s).
SPV Master & Crew:	In addition to 1. above. 2. CG Marine Sand Project - C-EMP Training (tailored to their role): Includes covering their roles and responsibilities under the C-EMP, including full responsibility for ensuring the implementation of all C-EMP requirements that relate to and affect the day-to-day operation of the SPV.	– BKA SHE-Q staff. – BKA environmental consultant(s).
Marine Fauna Observers (MFOs) (TO Indigenous Rangers - subject to contract arrangements) Refer Annex 2 for MFOA methods. Refer Annex 1 for IMP-RMP methods.	In addition to 1. above. 3. Marine Fauna Observer (MFO) Training: Includes training the contracted TO Indigenous Rangers in best practice MFOA methods and procedures as will be applied on the SPV, as described in Annex 2 - *MFOA methods and procedures*, including but not limited to: – Biology, ecology, behavior and identification of key marine megafauna in CG. – Specified fauna proximity exclusion and avoidance zones and SPV response and avoidance requirements. – Effective use of binoculars, cameras and aerial drones. – Identification and reporting of pathogens and diseases in marine fauna. – Data recording, analysis and reporting. – Fauna rescue response measures in the event of a vessel strike / observation of severe disease. Will include both pre-project training before commencement of the project (both theory and practical on-water training), followed by on-the-job training, verification and certification during the initial sand loading cycles. The MFOs will be accompanied by the BKA MFO consultants / trainers, until the MFOs are verified and certified to assume full responsibility for the MFOA program.	– BKA MFO consultants / trainers.
	4. Introduced Marine Pests - Monitoring & Response Program (CG-SWASP) training: In addition to conducting the MFOA program on the SPV, the MFOs will separately carry out the field sampling aspects of the CG-SWASP, as described in Annex 1 —*CG-SWASP Methods*, consistent with the existing WA SWASP for IMPs in WA ports. They will be trained in checking of IMP settling plates placed at strategic sites throughout CG (working from a BKA-provided small environmental survey vessel), assessing for suspected IMPs as per the WA DPIRD Biosecurity target species list, photographic records, sampling any suspected IMPs from the settling plates for transmittal to taxanomic ID lab, and preparing field reports in accordance with standard template. Will include both theory and practical on-water training.	BKA IMP consultants / trainers.
BKA environmental consultants:	In addition to 1. above. Apart from the MFOs, who will be trained as outlined above, all other environmental consultants engaged by BKA will be qualified and experienced experts in their respective fields, and will not require any additional training, other than 1. above.	N/a
Stakeholder Reference Group (SRG): (refer Section 11.2 below)	In addition to 1. above. 5. SRG Procedures Briefing: Initial briefing of all SRG members on the role of the SRG and Rules of Procedure for SRG meetings, to ensure effective functioning of the SRG and orderly SRF meetings.	BKA staff.

8. ENVIRONMENTAL REPORTING

1. An EMP requires reporting arrangements for three primary purposes:

    a) Internal reporting within the company on EMP implementation, compliance and monitoring results.

    b) External reporting to regulatory agencies, key stakeholders, and in some cases (including this project), the public, on EMP implementation, compliance and monitoring results.

    c) Incident reporting to regulatory agencies and other required parties, if/when environmental incidents and/or regulatory non-compliances occur (including in relation to any applicable statutory reporting requirements specified in relevant environmental legislation and/or permit conditions).

2. Table 19 lists the main environmental reports under this C-EMP.

TABLE 19: *Main environmental reports under this C-EMP*

Environmental Report	Subject	Prepared By (submitted via BKA)	Submitted by BKA To	Submission Mode	Timing
1. Internal C-EMP Quarterly Progress Report.	General progress report on EMP implementation, compliance and overall monitoring results. Any internal company reporting requirements.	BKA Environmental Lead for the project (staff member or consultant).	All relevant BKA staff.	PDF via email.	Quarterly.
2. External C-EMP Quarterly Progress Report.	General progress report on EMP implementation, compliance and overall monitoring results. Any regulatory agency reporting requirements.	BKA Environmental Lead for the project (staff member or consultant).	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at quarterly SRG meetings.	Quarterly.
3. Baseline Mangrove Report:	GIS maps of mangrove cover in the LAU pre-project.	BKA's mangrove mapping consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at quarterly SRG meetings.	One-off as close as possible (time-wise) before initial commencement of sand-sourcing operations in CG.
4. Biennial Mangrove Reports.	GIS maps of mangrove cover in the LAU every two years. Analysis of mangrove changes since baseline and any previous biennial report(s). Analysis of natural environmental factors affecting mangroves in preceding period.	BKA's mangrove mapping consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at quarterly SRG meetings.	Biennial by end of May (after cyclone season) every two years after commencement of sand-sourcing operations in CG.
5. Baseline Underwater Sound Report.	Baseline measurement of pre-project underwater sound levels in CG before commencement of operations, over full one-month lunar tidal cycle to capture underwater	BKA's underwater sound consultant.	Relevant regulatory agency contacts. SRG members.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts	One-off as close as possible (time-wise) before initial commencement of

Environmental Report	Subject	Prepared By (submitted via BKA)	Submitted by BKA To	Submission Mode	Timing
	sound conditions under range of tidal current conditions.		Publicly available on project web site.	and SRG members. Discussed at quarterly SRG meetings.	sand-sourcing operations in CG.
6. Project Commencement Underwater Sound Report.	Initial monitoring and reporting of underwater noise emissions from the SPV on commencement of operations in CG, to assess compliance with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and with relevant US NMFS thresholds (as required by WA EPA).	BKA's underwater sound consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	One-off within a month of completion of the field measurements.
Only if required after Report 6. 7. Follow Up Underwater Sound Report (s).	Follow-up monitoring if deemed necessary after 6. Project Commencement Report (in consultation with regulators).	BKA's underwater sound consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	One-off within a month of completion of the field measurements.
8. Baseline Beach Report.	Baseline high-resolution aerial drone LiDAR and ortho-photographic surveys of all five turtle nesting beaches in the LAU, before commencement of operations.	BKA's beach survey consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	One-off as close as possible (time-wise) before initial commencement of sand-sourcing operations in CG.
9. Biennial Beach Reports.	High-resolution aerial drone LiDAR and ortho-photographic surveys of all five turtle nesting beaches in the LAU every two years. Analysis of beach changes since baseline and any previous biennial report(s). Analysis of natural environmental factors affecting beaches in preceding period.	BKA's mangrove mapping consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at quarterly SRG meetings.	Biennial by end of May (after cyclone season) every two years after commencement of sand-sourcing operations in CG.
10. Light Baseline Report.	Baseline measurement of pre-project light levels at each turtle nesting beach before commencement of operations, over full one-month lunar cycle to capture range of lunar-light conditions.	BKA's light consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	One-off as close as possible (time-wise) before initial commencement of sand-sourcing operations in CG.
11. Project Commencement Light Report.	Initial monitoring and reporting of light received at each turtle nesting beach on commencement of operations	BKA's light consultant.	Relevant regulatory agency contacts.	Down-loadable PDF on project web site, with email alert to	One-off within a month of completion

Environmental Report	Subject	Prepared By (submitted via BKA)	Submitted by BKA To	Submission Mode	Timing
	in CG, to assess compliance with light report (Nocterra 2025) and relevant thresholds under DCCEEW (2023).		SRG members. Publicly available on project web site.	regulatory agency contacts and SRG members. Discussed at next SRG meeting.	of the field measurements.
Only if required after Report 11. 12. Follow Up Light Report(s).	Follow-up monitoring if deemed necessary after 12. Project Commencement Report (in consultation with regulators).	BKA's light consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	One-off within a month of completion of the field measurements.
13. Daily Marine Fauna Observation & Avoidance (MFOA) Reports. (whenever SPV is operating in CG)	MFOs record and report the following data (per standard template): - All marine fauna sightings (location, date, time, species, size, movement, behaviour, sea and weather conditions etc). - Any marine fauna interactions with the SPV - see 13b.	MFOs & BKA Environmental Lead for the project (staff member or consultant).	Immediate reports: – WA DBCA District Office Kununurra. – WA DWER. – DCCEEW. Plus, in due course other recipients by inclusion in C-EMP Quarterly Progress Report.	Immediate reports – via email. Others – as per C-EMP Quarterly Progress Report.	Immediate reports - at the end of each 1- to 2-day sand loading cycle. Others – as per 2. C-EMP Quarterly Progress Report.
13a. MFOA Vessel Strike Incident Report. (see Section 9 below for Emergency Contacts).	Details of any vessel strike that might occur, and any response undertaken (e.g rescue of the animal and sending to rehab centre in Darwin). (Report per standard template).	MFOs & BKA Environmental Lead for the project (staff member or consultant).	Immediately to: – BKA internal network. – WA DBCA District Office Kununurra. – WA DWER. – DCCEEW. Within 1 week of incident: – National Ship Strike Database. Plus, in due course other recipients by inclusion in C-EMP Quarterly Progress Report.	Immediate reports – via email. National Ship Strike Database – online data entry. Others – as per C-EMP Quarterly Progress Report.	Immediate reports - As soon as practicable after the incident occurs. Others in due course in C-EMP Quarterly Progress Report.
13b. Marine Fauna Disease Report. (see Section 9 below for Emergency Contacts).	Details of any diseases that might be observed in marine fauna, and any response undertaken (e.g rescue of the animal and sending to rehab centre in Darwin). (Report per standard template).	MFOs & BKA Environmental Lead for the project (staff member or consultant).	Immediately to: – BKA internal network. – WA DBCA Wildlife Duty Officer. – DCCEEW. Within 1 week of incident: – National Ship Strike Database.	Immediate reports – via email. – WA DBCA Wildlife Duty Officer - via email Others – as per C-EMP Quarterly Progress Report.	Immediate reports - As soon as practicable after the incident occurs. Others in due course in C-EMP Quarterly Progress Report.

Environmental Report	Subject	Prepared By (submitted via BKA)	Submitted by BKA To	Submission Mode	Timing
			Plus, in due course other recipients by inclusion in C-EMP Quarterly Progress Report.		
14. Drag-head Inspection Reports.	Inspections of SPV drag-head at the end of each sand loading cycle in CG for signs of animal entrainment.	MFOs before departing the SPV at end of sand loading cycle.	Immediately to: – BKA internal network. – WA DBCA District Office Kununurra. – WA DWER. – DCCEEW. Plus, in due course other recipients by inclusion C-EMP Quarterly Progress Report.	Immediate reports – via email. Others – as per C-EMP Quarterly Progress Report.	Immediate reports - As soon as practicable after the inspection occurs. Others in due course in C-EMP Quarterly Progress Report.
15. CG-SWASP Reports. *Cambridge Gulf extension of the WA State-Wide Array Surveillance Program for marine pests*	Biannual (winter & summer) results of the IMP monitoring (inspection of settling plates at strategic sites in CG) Any IMP detections - see 15b.	MFOs & BKA IMP consultant.	Relevant regulatory agency contacts. SRG members. Publicly available on project web site.	Down-loadable PDF on project web site, with email alert to regulatory agency contacts and SRG members. Discussed at next SRG meeting.	Biannual (winter & summer) within a month of each monthly IMP settling plate inspection. Any IMP detections – immediate as per 15b.
15b. IMP Incident Report. (see Section 9 below for Emergency Contacts).	IMP detections on IMP-RMP settling plates as per the WA DPIRD Biosecurity target species list.	BKA Environmental Lead for the project (staff member or consultant).	Immediately to: – BKA internal network. – WA DPIRD Biosecurity. – WA DPIRD Fisheries. – WA DBCA District Office Kununurra. – Cmwlth DAFF Biosecurity. (see Section 9 below for Emergency Contacts). Copy for info to: – WA DWER. – DCCEEW. Plus, in due course other recipients by inclusion in C-EMP Quarterly Progress Report.	Immediate reports – via email. Others – as per C-EMP Quarterly Progress Report.	Immediate reports - As soon as practicable after the incident is detected. Others in due course in C-EMP Quarterly Progress Report.
16. Oil Spill Incident Report. (see Section 9 below for Emergency Contacts).	Full details of the oil spill incident as required by the POLREP Template of WA DoT - Maritime & AMSA.	BKA Environmental Lead for the project (staff member or consultant).	Immediately to: – BKA internal network. – WA DoT - Maritime. – Kimberley Ports Authority. – Cambridge Gulf Ltd.	Immediate reports – via email. Others – as per C-EMP Quarterly Progress Report.	Immediate reports - As soon as practicable after the incident occurs. Others in due course in C-EMP Quarterly Progress Report.

Environmental Report	**Subject**	**Prepared By** (submitted via BKA)	**Submitted by BKA To**	**Submission Mode**	**Timing**
			– WA DBCA District Office Kununurra. – AMSA-Response. Copy for info to: – WA DWER. – DCCEEW. Plus, in due course other recipients by inclusion in C-EMP Quarterly Progress Report.		

9. EMERGENCY PROCEDURES & CONTACTS

9.1 Potential Types of Emergencies & Incidents

1. The DCCEEW *Environmental Management Plan Guidelines* (DCCEEW 2024) state that an EMP should identify the key emergency contacts responsible for managing environmental emergencies associated with the project and their contact details. These personnel should have the power to stop and direct works so that they can manage emergencies effectively. The EMP should also establish procedures for managing environmental emergencies and ensure that those procedures are implemented and maintained.

2. The term 'emergency' implies a serious, unexpected and dangerous situation, usually with respect to human life and safety, requiring immediate action (Oxford Dictionary).

3. Because this is a vessel-based marine operation, the main potential emergencies relate to maritime safety and vessel operations, which are covered by international maritime law as administered by IMO and implemented by the vessels' Flag-state, and, within Australian waters, by Australian maritime law as administered by AMSA.

4. Maritime safety issues are beyond the scope of this C-EMP, which is designed to focus on potential environmental impacts on MNES, as defined under the EPBC Act. Maritime safety issues will be addressed in accordance with the vessel-specific *Safety Management System* (SMS) that is required under the *International Convention for the Safety of Life at Sea* (SOLAS), and where relevant in Australian waters, by the Commonwealth *Navigation Act* and supporting Marine Orders administered by AMSA.

5. Because this is a vessel-based marine operation, in accordance with both international and Australian maritime law, the Master (Captain) of the SPV has ultimate responsibility and authority to direct, amend and if necessary, stop all operations of the SPV in response to potential or actual emergencies, with highest priority being given to the safety of the crew and the vessel.

6. As this version of the C-EMP (September 2025) is prepared at least a year and perhaps longer before SPV operations, the SPV has not yet been built. All vessels are required to have vessel-specific emergency response plans for a wide-range of maritime emergencies, in accordance with the vessel-specific SMS, which can only be developed after the vessel has been built and commissioned. It is therefore not possible to include details of these, including vessel and Master emergency contact details, in this C-EMP. The vessel-specific SMS including all relevant emergency contact details can be made available after the SPV is commissioned and before it commences operations in CG. In the meantime, see Table 23 below.

7. The only real potential environmental 'emergency' associated with the SPV when operating in CG is the very low risk of a potential small oil spill. This is addressed in Section 9.3 below. Other unexpected or unintended environmental events associated with the operation are more accurately described as environmental 'incidents' rather than 'emergencies.' These are addressed in Section 9.4 below.

9.2 General Maritime Emergency Contacts

1. Table 23 presents general maritime emergency contacts for the CG area, including some listed in the Wyndham Port Handbook, published from time-to-time by the Kimberley Ports Authority. These should be checked and if necessary updated before commencement of SPV operations in CG.

TABLE 20: *General maritime emergency contacts for the CG area, including some listed in the Wyndham Port Handbook*

Organization	Contacts
WA Department of Transport (DoT) - Maritime: – Based in Perth. – Has maritime jurisdiction over CG which is outside the Wyndham port limits. – Lead State agency for responding to marine environmental emergencies in State waters, including in CG.	State marine environmental emergencies hotline: **08 9480 9924.** marine.pollution@transport.wa.gov.au https://www.transport.wa.gov.au/marine/maritime-environmental-emergencies/reporting#anchor-link-2 https://www.transport.wa.gov.au/marine
Australian Maritime Safety Authority (AMSA): – National shipping regulator. – National maritime Search & Rescue coordinator. – Lead Commonwealth agency for responding to maritime safety and marine environmental emergencies in Australian waters. – Should also be contacted for any incidents in CG.	**Maritime Search & Rescue (SAR) Hotline:** Within Australia: 1800 641 792 Outside Australia: +61 2 6230 6811 **Marine Pollution Report (POLREP):** https://amsa-forms.nogginoca.com/public/polrep.html By phone to SAR hotline above. **Other Maritime Incidents:** reports@amsa.gov.au https://www.amsa.gov.au/forms/incident-alert-form-18 https://www.amsa.gov.au/forms/incident-report-form-19 www.amsa.gov.au
Harbour Master, Kimberley Ports Authority: – Based in Broome. – Has jurisdiction in Wyndham Port but not the main body of CG, which is outside the Wyndham port limits. – Should be kept informed of incidents in CG.	Mobile: **0408 253 193** Emergency After Hours No.: **0419 044 765** harbourmaster@kimberleyports.wa.gov.au www.kimberleyports.wa.gov.au
East Kimberley Volunteer Marine Rescue (VMR): - Has rescue boat based in Wyndham that can deploy to CG.	Mobile (24 hours): **0466 092 747** secretary@eastkimberleyvmr.com www.vmrwa.org.au
Cambridge Gulf Ltd: – Operates Wyndham Port and provides port pilotage. – Has pilot boat based in Wyndham that can deploy to CG.	Wyndham Port Manager: 0409 373 920 / gill@cgltd.com.au Wyndham Port Safety Officer: 488 300 788 / terry@cgltd.com.au www.cgltd.com.au
Police, Fire, Ambulance Emergency:	Call 000.
Wyndham Hospital:	(08) 9161 0222
Kununurra Hospital:	(08) 9194 2640
Royal Flying Doctor Service (RFDS): - Can provide aerial emergency medivac out of Wyndham Aerodrome or Kununurra Airport.	24 hour medical & emergency: **1800 625 800** From satellite phone: **08 9417 6389** www.flyingdoctor.org.au
Helicopter Services (based at Kununurra Airport):	https://helispirit.com.au/ https://frontierhelicopters.com.au/ https://ordvalleyhelicopters.com.au/

9.3 Oil Spill Procedures & Contacts

1. As outlined in Annex 2 - *Shipping & Oil Spill Risk Assessment* of EBPC Referral Report No. 4 - *Impact Assessments* (BKA 2024h), and summarized in the risk assessment in Table 7 in Section 2.3 above, the risk of an oil spill from the SPV is low due to a range of factors and the prioritization of spill prevention through best practice measures. These include a prohibition on vessel refuelling in CG, and protection of the SPV's fuel tanks as required under MARPOL Annex I and the Commonwealth *Protection of the Sea (Prevention of Pollution from Ships) Act* (PS(PPS) Act). Never-the-less, it is still necessary for the SPV to have an oil spill plan to prevent and mitigate environmental impacts in the unlikely event that an accidental spill does occur.

2. As outlined in Table 7 in Section 2.3 above, and against CEO 2: MEQ - Oil Spills in Table 13 and the following tables above, the SPV will have a *Shipboard Oil Pollution Emergency Plan* (SOPEP) as required under MARPOL Annex I, the PS(PPS) Act and AMSA Marine Order 91 - *Marine Pollution Prevention - Oil*.

3. The SOPEP will outline oil spill response, containment and clean-up priorities, procedures and actions, and include equipment on-board the SPV for containing and recovering oil in the highly unlikely event of a spill. The SOPEP will outline links to:

    a) the local *Wyndham Port Marine Oil Spill Contingency Plan*, led by Kimberley Ports Authority,

    b) the *State Hazard Plan for Maritime Environmental Emergencies* led by WA DoT Maritime; and

    c) the *National Plan for Maritime Environmental Emergencies* led by AMSA.

4. Each of these plans can be activated in an escalatory, tiered approach, if necessary, depending on the scope of the spill. However, the spill risk profile associated with the SPV is such it is highly unlikely that a spill would occur, and if it does, it is unlikely to require activation of a response beyond the vessel's SOPEP or the local port plan.

5. There will be a program of regular SOPEP training and exercises for the SPV's crew, in cooperation with relevant agencies (WA DoT-Maritime, Kimberley Ports Authority, Cambridge Gulf Ltd, DBCA East Kimberley District Office in Kununurra, and the two TO indigenous ranger groups in the GC area - Balanggarra and Miriurung-Gajerrong, and if required, AMSA, DCCEEW and WA DWER).

6. Similar to the SMS referenced in Section 9.1 above, a SOPEP is a vessel-specific plan that is developed for a vessel once it is built and commissioned, reflecting the specifications, parameters and characteristics of the vessel. As this version of the C-EMP (September 2025) is prepared at least a year and perhaps longer before SPV operations, the SPV has not yet been built. It is therefore not possible to include full details of the SOPEP in this C-EMP.

7. The SOPEP, including detailed oil spill response, containment and clean-up priorities, procedures and actions, and full list of all relevant emergency contact details, will be made available after the SPV is commissioned and before it commences operations in CG. The SOPEP will be developed in consultation with relevant regulatory agencies, as listed above. In the meantime, the contacts for DoT Maritime, AMSA and Kimberley Ports Authority listed in Table 20 above are relevant.

8. The detailed oil spill response, containment and clean-up priorities, procedures and actions will follow relevant SOPEP guidelines from IMO and AMSA under MARPOL Annex I and Marine Order 91. Figure 9 shows a simplified flow chart of oil spill response actions, in descending order of priority. These will be developed in more detail when the SOPEP is developed, in consultation with relevant agencies.

9. The types and amounts of oil spill response equipment carried on board the SPV will be specified in the SOPEP and will include adequate types and numbers of the following:

    a) Absorbent pads.
    b) Absorbent sausages and small booms.
    c) On-water oil containment booms.
    d) On-water oil recovery skimmers.
    e) Regulatory-approved, third generation, low toxicity oil spill dispersant, for application to oil in open waters only (to prevent oil reaching the coast).
    f) Recovered oil storage containers.
    g) Aerial drone with cameras for monitoring spill dispersal (also as used by the MFOs as described in Annex 2).

10. The SPV's on-board rescue boat and small work tenders will be used for on-water equipment deployment and oil spill containment and recovery work.

11. The Master of the SPV will have ultimate responsibility for ensuring that the SOPEP is developed, maintained and kept up to date, that all on-board oil spill response equipment is maintained and kept fully operational, that the SOPEP is regularly exercised and crew receive regular training, and that the SOPEP is activated and implemented when necessary. The Master of the SPV will be supported in achieving these responsibilities by the SPV management and BKA fleet technical support.

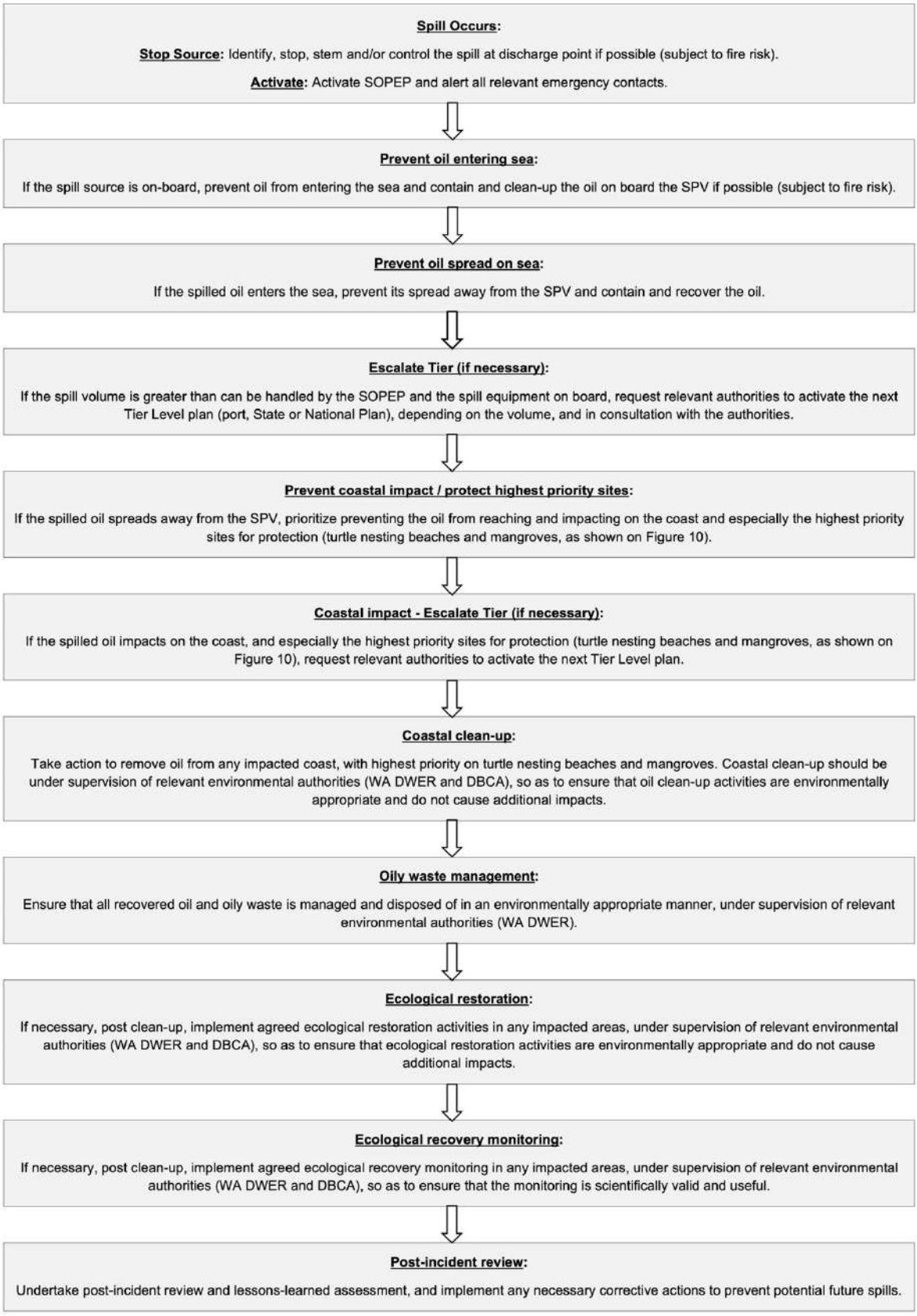

FIGURE 9: *Simplified flow chart of oil spill response actions, in descending order of priority. These will be developed in more detail when the SOPEP is developed, in consultation with relevant agencies.*

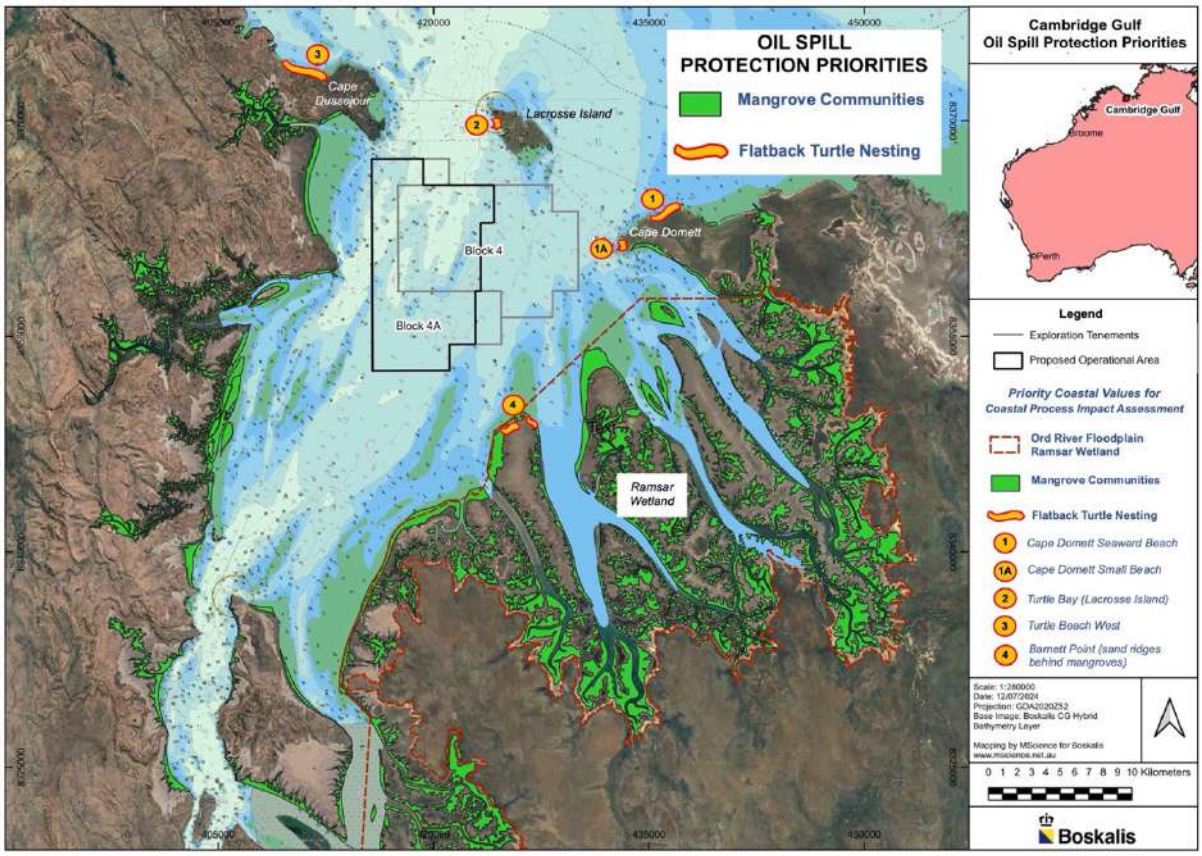

FIGURE 10: *Oil spill protection priorities in the CG area – mangrove communities and Flatback Turtle nesting beaches.*

9.4 Other Environmental Incident Procedures & Contacts

1. As outlined in Section 2 - *Potential Environmental Impacts & Risks*, apart from a potential accidental oil spill, there are three other types of environmental incidents that could potentially occur when the SPV is operating in CG, as follows:

    a) Vessel strike incident - should the SPV physically strike a large marine animal that is swimming at or near the sea surface, such as a dolphin, marine turtle, crocodile, shark or similar. Vessel strikes can cause minor to serious injury and possibly mortality in the struck animal. It should be noted that vessel strikes are highly unlikely, for the reasons listed in Table 9 above, including *inter-alia* the very slow speed of the SPV when operating in the POA (~2 knots), and the implementation of MFOA measures, as described in Annex 2.

    b) Drag-head entrainment – should a large marine animal that is located at or near the seabed, such as a marine turtle or sawfish, be sucked into the SPVs drag-head when it is operating to source sand at the seabed. Drag-head entrainment would likely cause serious injury or mortality in the affected animal. It should be noted that drag-head entrainment is highly unlikely, for the reasons listed in Table 9 above, including *inter-alia* the very slow speed of the SPV when operating in the POA (~2 knots), use of the 'soft start' procedure, providing opportunity for any marine fauna on the seabed to move away, and fitting of fauna deflector / excluder device (tickler chains) in front of the drag-head, to prevent fauna being sucked into the drag-head, as described in Annex 4.

    c) IMP detection - should the Cambridge Gulf extension of the WA *State-Wide Array Surveillance Program* for marine pests (CG-SWASP) (as described in Annex 1) detect a potential IMP species, that might have been introduced via the SPV. It should be noted that an IMP introduction is highly unlikely, for the reasons listed in Table 7 above, including *inter-alia* the implementation of best-practice ballast water treatment and biofouling management measures, in accordance with the requirements of IMO and the Commonwealth *Biosecurity Act*, and the inhospitable environmental conditions in CG.

2. The incident response procedures and relevant emergency contacts for each of these three potential incidents are presented in Table 21. Although potential signs of disease in marine fauna are not a project-related 'incident', recording and reporting these is included in Table 21 as observing for wildlife diseases is included in the MFO's duties.

TABLE 21: *Incident response procedures and contacts for vessel strikes, drag-head entrainment and IMP detection*

*Response procedures are the measures applied when and after an incident occurs. The prevention and mitigation measures that are designed to avoid and reduce the incident occurring are outlined in Table 9.

Environmental Incident	Response Procedure*	Contacts
1. Vessel strike on large marine fauna at/near sea surface (e.g. dolphin, turtle, shark, crocodile or similar):		
- ***1a. Near miss incident:*** As per TRC 7.1 in Table 15: Surface-dwelling marine fauna is/are observed in the vicinity of the SPV when operating in CG.	As per TRA 7.1.1 in Table 15: If necessary, implement SPV marine fauna avoidance procedures in accordance with MFOA guidelines and exclusion zones (refer Annex 2). As per TRA 7.1.2 in Table 15: Report sighting & avoidance actions in accordance with the MFOA reporting requirements (see Report 13b in Table 19).	DBCA East Kimberley District Office (Kununurra): **08 9168 4200** kununurra@dbca.wa.gov.au DBCA Wildcare Helpline: **08 9474 9055.** Charles Darwin University / AusTurtle Rehabilitation Centre (Darwin): Mobile: **0438 192 507** austurtle@austurtle.org www.austurtle.org DCCEEW: Australian Marine Mammal Centre: https://data.marinemammals.gov.au/ National Ship Strike Database
- ***1b. Actual strike incident:*** As per THC 7.1 in Table 15: Vessel strike on surface-dwelling marine animal occurs when SPV is operating in CG.	As per TCA 7.1.1 in Table 15: If necessary, to avoid potential additional strikes (if more than one animal in area), implement SPV marine fauna avoidance procedures in accordance with MFOA guidelines and exclusion zones. As per TCA 7.1.2 in Table 15: If practicable, feasible and safe to do so, rescue struck animal for possible sending to rehabilitation center (closest is at Charles Darwin Univ. in Darwin). As per TCA 7.1.3 in Table 15: Report strike incident in accordance with the MFOA reporting requirements (see Report 13b in Table 19). As per TCA 7.1.4 in Table 15: Undertake operational review and implement corrective action to prevent future incidents.	
- *1c. Marine Fauna Disease Report.*	Should the MFOs observe any signs of disease in marine fauna, this will be recorded on a standard Disease Report Template and submitted to the WA DBCA Duty Wildlife Officer, which is the State coordinator for Wildlife Health Australia. If practicable, feasible and safe to do so, rescue the diseased animal for possible sending to rehabilitation center (closest is at Charles Darwin Univ. in Darwin).	WA DBCA Duty Wildlife Officer (State coordinator for Wildlife Health Australia). wildlife.protection@dbca.wa.gov.au **08 9474 9055** Charles Darwin University / AusTurtle Rehabilitation Centre (Darwin): Mobile: **0438 192 507** austurtle@austurtle.org www.austurtle.org
2. Drag-head entrainment of large marine fauna on or near seabed (e.g. marine turtle, sawfish): As per Mon 11.1.1 in Table 15: Inspection of drag-head at end of sand-loading cycle indicates evidence of animal entrainment.	As per TRA11.1.1 in Table 15: Immediately report incident to authorities. As per TRA 11.1.2 in Table 15: Undertake operational review and implement corrective action to prevent future incidents. If repeat entrainments occur: As per TCA 11.1.2 in Table 15: Immediately undertake detailed review in consultation with relevant regulatory agencies, and assess need for potential changes to the drag-head marine-fauna deflection / excluder device, operational procedures and other potential interventions.	DBCA East Kimberley District Office (Kununurra): **08 9168 4200** kununurra@dbca.wa.gov.au DCCEEW: [DCCEEW pls advise contact details for reports]
3. IMP detection: As per THC 6.1 in Table 15: Potential IMP detected on CG-SWASP settling plates in CG (refer Annex 1).	Immediately report to relevant regulatory agencies as per Report 15b in Table 19. TCA 6.1.1: Immediately undertake detailed review in consultation with relevant regulatory agencies and implement more detailed investigation, including relevant site studies and	WA DPIRD - Aquatic Pest Biosecurity: aquatic.biosecurity@dpird.wa.gov.au vessel.management@dpird.wa.gov.au Cmwlth DAFF - Marine Pests: Report a pest:

	field monitoring if required, and eradication measures if necessary and feasible. TCA 6.1.2: Undertake operational review and implement corrective action to prevent future incidents. **NOTE:** *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.*	ccimpe@aff.gov.au www.marinepests.gov.au/report www.marinepests.gov.au

10. REACTIVE & ADAPTIVE MANAGEMENT & C-EMP AUDIT & REVIEW

1. The EMM tables in Section 4 are designed to provide for relatively rapid reactive management of the operation itself, in direct response to any environmental issue that might arise, by including the following as key EMM elements:

   - Trigger Criteria (TRC), which are designed to forewarn of the approach of the Threshold Criteria and prompt trigger response actions.
   - Trigger Response Actions (TRAs), which are designed to implement reactive management and avoid reaching the Threshold Criteria.
   - Threshold Criteria (THC), which represent the limit of acceptable impact beyond which the EO is not being met and there is likely to be a significant impact on the environment.
   - Threshold Contingency Actions (TCAs) which are the specific activities and timing that proponents will implement to ensure that impacts return and remain below the Trigger or Threshold Criteria.

2. In addition to adaptive management of the operation itself, it is important to also evaluate the performance and effectiveness of the C-EMP, as shown in Figure 11 (from EPA 2024). This will be achieved through reporting to quarterly meetings of the SRF, which will also discuss any potential need for updating the C-EMP, and whenever a TRC or THC is exceeded, which will prompt a review for the C-EMP.

3. Any review and update of the C-EMP will be undertaken in consultation with relevant regulatory agencies (DCCEEW, WA DWER and others as may be relevant / required).

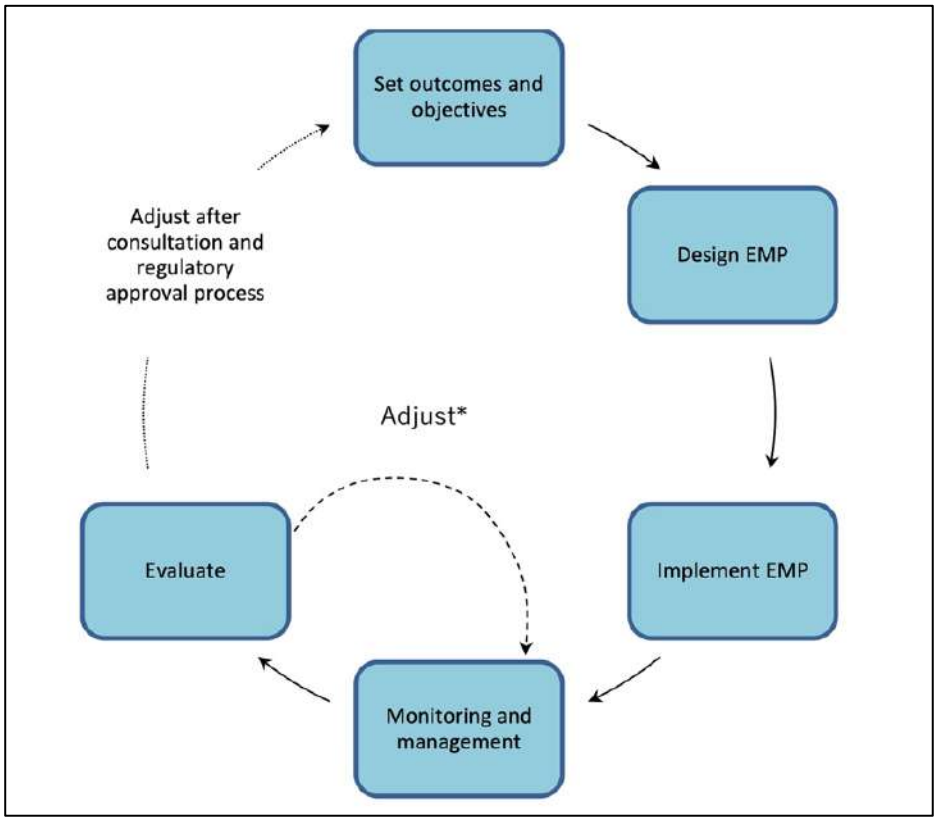

FIGURE 11: *Adaptive management cycle for EMPS (from WA EPA 2024).*

11. STAKEHOLDER CONSULTATION

11.1 Consultation undertaken to support assessment phase

1. BKA recognises that social licence is as important as regulatory licence for development proposals, and in order to ensure that the views, perspectives and positions of relevant key stakeholders are identified and addressed, since mid-2022 BKA has undertaken a Stakeholder Analysis, which identified 26 key stakeholder organizations and eight key individuals (regional marine users), and implemented direct, in-person consultations with these stakeholders.

2. Many of the issues addressed in the C-EMP and the measures proposed to address them have been developed based on the inputs of stakeholders from the consultation process.

3. Referral Report No. 6 (BKA 2024i) presents details and outcomes of BKA's consultation program and outcomes to August 2024, noting that consultation is also ongoing.

11.2 Consultation during implementation phase

1. As outlined above, BKA will seek to establish a Stakeholder Reference Group (SRG) to meet up to quarterly (as required) for the duration of the project, to provide a forum to communicate progress of the project, including progress with implementation of the C-EMP, to the local community and other key stakeholders. The SRG would also be a forum for stakeholders to make inputs to the project and raise any concerns and complaints.

2. Membership of the SRG could include:

   - BKA.
   - TOs (both Balanggarra and Miriuwung-Gejerrong).
   - Relevant State and Commonwealth agencies.
   - Local Council (Shire of Wyndham and East Kimberley).
   - Kimberley Ports Authority (authority for the port of Wyndham).
   - Cambridge Gulf Ltd (operator of the Port of Wyndham).
   - Wyndham Volunteer Marine Rescue.
   - Commercial and recreational fishing representatives.

3. Meetings would be held either in-person in Wyndham or Kununurra, or remotely on-line, depending on the requirements of each meeting agenda. The venue for in-person meetings in Wyndham or Kununurra would be arranged by BKA, and either hired by BKA or provided gratis by a member organization that has suitable meeting facilities.

4. The secretariat function would be provided by BKA, including organizing the meetings, securing the meeting venue, circulating meeting agendas and documents (including project updates and environmental reports from the previous quarter), providing progress briefings during the meetings, taking minutes during meetings and circulating these after meetings, and actioning meeting decisions.

5. The SRG would be chaired by a Chair-person nominated by the SRG from within the SRG membership, subject to the nominee's agreement. To retain independence, the Chair-person must not be a BKA representative.

REFERENCES

BKA (2024a), EPBC Referral Report No. 1 - Boskalis Cambridge Gulf - *Description of Proposed Action & Regulatory Framework.*

BKA (2024b), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment.*

BKA (2024c), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - *Setting & Existing Environment.*

BKA (2024d), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Marine Mega-fauna Surveys Report.*

BKA (2024e), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Appendix 4 - Species Obs Data - Dry Season*

BKA (2024f), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - *Appendix 5 - Species Obs Data - Wet Season*

BKA (2024g), EPBC Referral Report No. 3 - Boskalis Cambridge Gulf - *Traditional Owner Matters.*

BKA (2024h), EPBC Referral Report No. 4 - Boskalis Cambridge Gulf - *Impact Assessments.*

BKA (2024i), EPBC Referral Report No. 6 - Boskalis Cambridge Gulf - *Consultation*

BKA (2024j), EPBC Referral Report No. 7 - Boskalis Cambridge Gulf - *Commonwealth Matters.*

BKA (2025a), EPBC Referral Supplementary Report No. 3 - Boskalis Cambridge Gulf - *Commonwealth Environmental Management Plan (C-EMP).*

BKA (2025b), EPBC Referral Supplementary Report No. 4 - Boskalis Cambridge Gulf - *Additional Information.*

BKA (2025c), EPBC Referral Supplementary Report No. 5 - Boskalis Cambridge Gulf - *Response to Request for Further Information.*

Bunting, P., A. Rosenqvist, L. Hilarides, R.M. Lucas, N. Thomas, T. Tadono, T.A. Worthington, M. Spalding, N.J. Murray, and L.-M. Rebelo, 2022. Global Mangrove Extent Change 1996–2020: Global Mangrove Watch Version 3.0. *Remote Sensing 2022, 14, 3657. https://doi.org/10.3390/rs14153657*

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MScience (2024), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 2 - *MScience BCH Methods.*

Nocterra (2025), EPBC Referral Supplementary Report No. 1 - Boskalis Cambridge Gulf - *Light Assessment.*

PCS (2024a), EPBC Referral Report No. 5 - Boskalis Cambridge Gulf - *Metocean & Sed Dynamics Initial Report.*

PCS (2024b), EPBC Referral Report No. 5 - Boskalis Cambridge Gulf - Annex 2 - *Factual Data Report.*

PCS (2025a), EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Metocean & Sed Dynamics Full Modelling Report.*

PCS (2025b), EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Appendices.*

PCS (2025c), EPBC Referral Report No. 8 - Boskalis Cambridge Gulf - *Annexes.*

Price & Raaymakers (2024), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 12 - *Cape Domett Turtle Data Report.*

Resonate (2025), EPBC Referral Supplementary Report No. 2 - Boskalis Cambridge Gulf - *Noise Assessment.*

Sensorem (2024), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 10 - *Aerial Drone Lidar Report.*

Sun, C., Branson, P., and Mills, D., 2020. Guideline on dredge plume modelling for environmental impact assessment. Prepared for the Dredging Science Node, Western Australian Marine Science Institution, Perth, Western Australia. 73pp.

Univ. Canberra (2024), EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 13 - *Marine eDNA Report.*

WA EPA (2024), *Instructions: How to prepare Environmental Protection Act 1986 Part IV environmental management plans.*

WA EPA (2023), *Interim Technical Guidance, EIA of Social Surroundings - Aboriginal cultural heritage.*

WA EPA (2021a), *Interim Guidance - Environmental outcomes and outcomes-based conditions*.

WA EPA (2021b), *Templates - Environmental Management Plans.*

WA EPA (2021c), *Technical Guidance - Environmental Impact Assessment of Marine Dredging Proposals.*

WA EPA (2020), *Environmental Factor Guideline - Air Quality.*

WA EPA (2016a), *Environmental Factor Guideline - Benthic Communities & Habitats.*

WA EPA (2016b), *Technical Guidance - Protection of Benthic Communities & Habitats.*

WA EPA (2016c), *Environmental Factor Guideline - Coastal Processes.*

WA EPA (2016d), *Environmental Factor Guideline – Marine Environmental Quality.*

WA EPA (2016e), *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment.*

WA EPA (2016f), *Environmental Factor Guideline - Marine Fauna.*

WA EPA (2016g), *Environmental Factor Guideline - Social Surroundings.*

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Wolanski, E., S. Spagnol and D. Williams, 2004. The impact of damming the Ord River on the fine sediment budget in Cambridge Gulf, Northwestern Australia. *Journal of Coastal Research 20(3): 801-807.*

ANNEX 1: MARINE PESTS - CG-SWASP METHODS

NOTE: *Because there is existing and increasing shipping through CG, transiting to and from Wyndham Port, it is possible that any potential IMP introduction that might be detected, could be caused by one or more of these ships, and not by BKA's SPV. BKA will therefore only be responsible for responding to any IMP introduction that might be detected, that can be attributed without scientific or legal doubt to the SPV.*

Given the use of CG by other ships, other parties including WA DPIRD-Biosecurity, Cmwlth DAFF-Biosecurity, Kimberley Ports Authority (KPA), Cambridge Gulf Ltd (CGL) and other port users, should contribute to the costs of CG-SWASP, and to the cost of undertaking coordinated, joint response in the event of an IMP detection, under a cooperative partnership, as is applied at other SWASP locations in WA.

1. As outlined in Tables 13 to 15, CEO 6 - Marine Pests, aims to ensure that marine pest species are not introduced via the SPV's ballast water discharges or hull bio-fouling, including into intertidal parts of the NHP, into the Ramsar wetland, into the CMA and causing impacts on TMS. The mitigation and monitoring measures to achieve CEO 6 include introduced marine pests (IMO) monitoring and response arrangements, in the form of a Cambridge Gulf (CG) extension of the existing *State-wide Array Surveillance Program* (SWASP) for marine pests, referred to as CG-SWASP.

2. The purpose of the CG-SWASP is the same as the existing State-wide SWASP, to enable early detection of a potential IMP introduction and assist a rapid response to contain and eradicate any such introduction.

3. While the CG-SWASP will be commissioned by BKA, it will link with the existing SWASP, which is implemented by the WA Department of Primary Industries & Regional Development (DPIRD) - Aquatic Pests Biosecurity branch, in cooperation with all regional port authorities in WA. The existing SWASP is currently active in the following WA ports, from south to north; Esperance, Albany, Garden Island navy base, Fremantle, Geraldton, Cape Preston, Cape Lambert, Dampier, Port Hedland and Broome, as shown on Figure A1.1. There is currently no SWASP monitoring in CG or Wyndham Port, so implementation of the CG-SWASP by BKA will fill an important gap in the SWASP network, as shown on Figure A1.1.

4. The existing SWASP monitoring methods are based primarily on settlement plate arrays, which are metal frames with change-able PVC plates, deployed underwater at key sites in each port, twice a year (summer and winter) for a two-month period in each season (Figures A.1.2 & A.1.3). When the plates are retrieved at the end of each deployment, they are assessed for potential IMPs, including visual assessment, photographic records and scraping the biota and sending to laboratory for taxanomic identification, including DNA extraction and matching against DPIRD's IMP taxanomic reference database.

5. The CG-SWASP will use the same methods, so as to be fully consistent with the existing SWASP and will create a long-term dataset for CG, to feed directly into the SWASP database.

6. A modified, more robust frame and fixed deployment mode may be required for CG given the extreme tidal currents there.

7. In addition to undertaking MFO functions on the SPV, a sub-set of the MFOs (a team of two plus a boat driver) will do the IMP settlement plate checks at the end of each deployment. They will work from a small environmental survey vessel that will be provided by BKA and based in Wyndham. The MFOs will be trained in the SWASP methods as outlined in Table 18 in Section 7.

8. Figure A.1.4 shows six indicative positions for the settlement arrays in CG, based on sites with conditions likely to be conducive to species settlement. These locations will be finalized before commencement of monitoring in consultation with the DPIRD SWASP team, and may be changed from what is shown in Figure A.1.3.

9. The existing SWASP surveys in WA ports also utilize shoreline surveillance at key locations in each port. This will not be undertaken as part of the CG-SWASP due to the extreme tidal range of up to 8 m, which makes the coastline in-accessible at high tide, the thick impenetrable mangroves along much of the coast, and the extreme risk of crocodile attack in CG.

10. In the event that the CG-SWASP detects a potential IMP introduction, the response will be as outlined in Table 21 in Section 9.4.

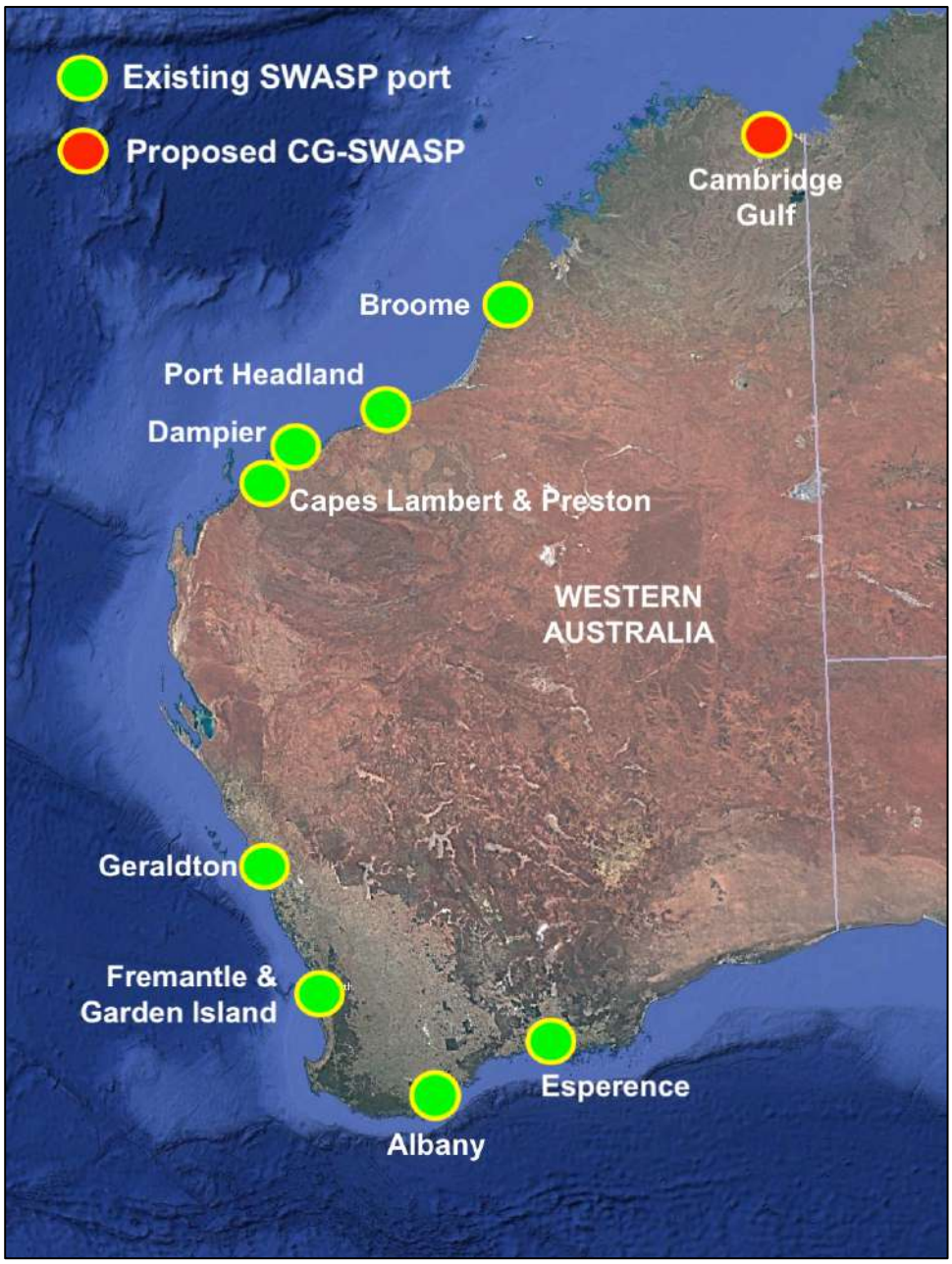

FIGURE A1.1*: Cambridge Gulf in relation to the existing ports where SWASP is active. Implementation of CG-SWASP will fill an important gap in the SWASP network. Given the use of CG by other ships, BKA will invite Kimberley Ports Authority, Cambridge Gulf Ltd (which operates Wyndham Port), port users and DPIRD to contribute to the costs of CG-SWASP in a cooperative partnership.*

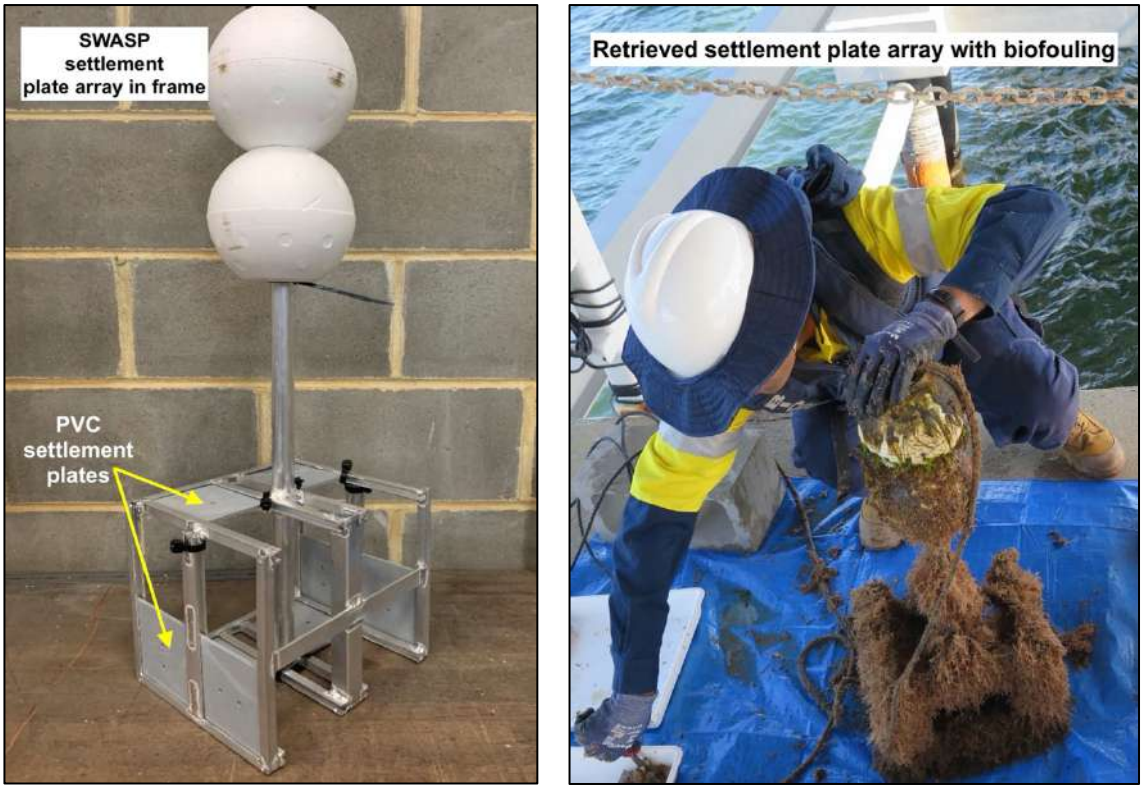

FIGURE A1.2: *SWASP settlement arrays with PVC plates before and after deployment. A modified, more robust frame and fixed deployment mode may be required for CG given the extreme tidal currents there (source: DPIRD)*

FIGURE A1.3*: SWASP settlement plate after deployment, ready for analysis (source: DPIRD)*

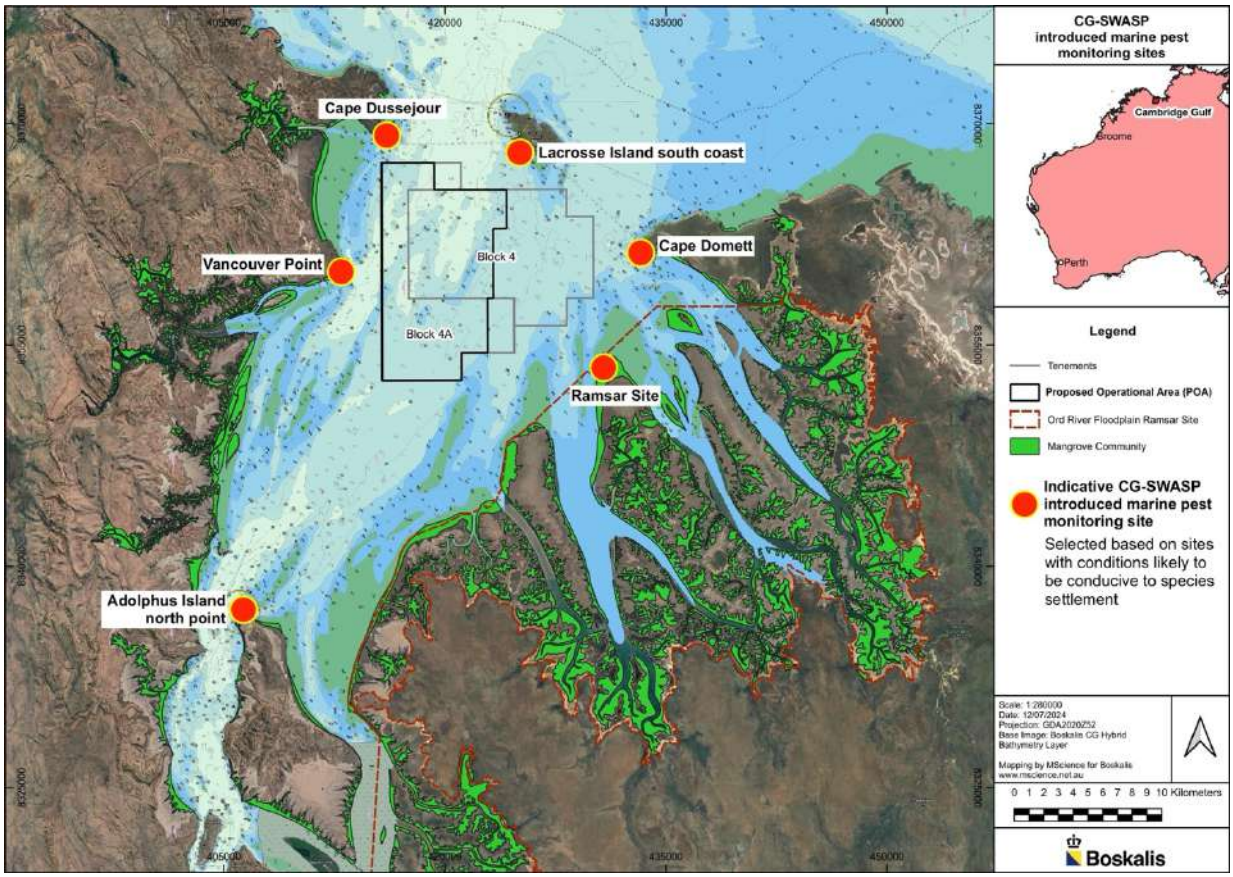

FIGURE A1.4*: Six indicative CG-SWASP introduced marine pest monitoring sites, based on sites with conditions likely to be conducive to species settlement. These locations will be finalized before commencement of monitoring in consultation with the DPIRD SWASP team, and may be changed from what is shown.*

ANNEX 2: MARINE FAUNA OBSERVATION & AVOIDANCE MEASURES

NOTE: *The Marine Fauna Observation & Avoidance (MFOA) measures described below are indicative, based on best practices as outlined in relevant guidelines, as listed below. Implementation, including numbers, make-up and positions of MFOs, should remain flexible and should be optimized in consultation with regulatory agencies and MFO experts prior to commencement of operations. They should also be refined and optimized in response to lessons-learned on-site during operations, through quarterly reviews.*

1. As outlined in Tables 1, 12 and 15, CEO 7: Vessel Strikes aims to prevent significant negative impacts on populations of surface-dwelling marine fauna in Cambridge Gulf (CG), such as dolphins, marine turtles and crocodiles, from vessel strikes by the Sand Production Vessel (SPV).

2. The mitigation and monitoring measures to achieve CEO 7 include implementation of best-practice MFOA measures, with Traditional Owner (TO) indigenous rangers to be trained, equipped and contracted as Marine Fauna Observers (MFOs), in accordance with relevant guidelines (subject to contracting arrangements), supported initially by contracted expert MFOs, and by BKA SPV crew who are also trained as MFOs.

3. This Annex describes the purpose, relevant guidelines and standards, methods, procedures, training and equipment for the MFOA program.

4. BKA has significant experience in applying MFOA measures and procedures on its dredgers and offshore work vessels in various environmentally sensitive sea areas around the world, as outlined in the *Boskalis MFOA Capability Sheet* in sub-Annex 2.2 below.

Purpose of the MFOA measures:

1. The primary purpose of the MFOA measures is to prevent potential significant negative impacts on populations of surface-dwelling marine fauna in CG, such as dolphins, marine turtles and crocodiles, from vessel strikes by the SPV, by maintaining constant watch for such species in the vicinity of the SPV when it is operating in the Proposed Operational Area (POA), and to trigger marine fauna avoidance actions when animals enter within set avoidance zones around the SPV (as outlined below).

2. A secondary purpose of the MFOA measures is to collect data on the presence, distribution, numbers, movement, behaviour and seasonality of large marine fauna in CG, so as to inform the further strengthening of marine fauna protection measures, and to assist the general conservation of the species in CG and elsewhere.

3. The MFOA program will also monitor for signs of pathogens and diseases in marine fauna, report any observed signs of pathogens and diseases to Wildlife Health Australia via the WA DBCA Wildlife Duty Officer, and If practicable, feasible and safe to do so, rescue the diseased animal for possible sending to rehabilitation centre (closest is at Charles Darwin Univ. in Darwin).

Target species:

1. The MFOA measures will apply to any and all large, surface-dwelling marine fauna species that might be observed in the vicinity of the SPV, and avoidance actions will be instigated by the SPV when any large marine animal is observed to enter within the set avoidance zones around the SPV (as outlined below), regardless of species.

2. The main large, surface-dwelling marine fauna species than can occur in the CG area overall are Australian Snubfin Dolphins *(Orcaella heinsohni)*, Australian Humpback Dolphins *(Sousa sahulensis)*, Flatback Turtles *(Natator depressus)* and Saltwater Crocodiles *(Crocodylus porosus)*. Particular attention will be paid by the MFOs to detecting these species.

3. Other species of dolphin and whales and dugong have never been reported within CG, most likely due to unsuitable habitat and inhospitable environmental conditions and lack of food sources. Any sightings of these and other species will be recorded and reported, and appropriate avoidance actions will be taken if required, as per other species.

Guidelines & standards:

1. There are currently no specific guidelines or standards for all-species MFOA procedures in Australia, although there are several related guidelines from which useful guidance can be drawn and applied. These are summarised in Table A.2.1, including identification of the main elements of each that have been applied to this project.

2. These guidelines mainly relate to either whale and dolphin watching, conducted for tourism and recreational purposes, or to the protection of marine mammals, mainly cetaceans, from offshore oil and gas exploration activities, such as seismic surveys.

Both of these categories are not applicable to the proposed sand-sourcing operation in CG, and do not include other large marine fauna such as marine turtles or crocodiles, which are included in this program.

3. In the US jurisdiction, the National Oceanographic and Atmospheric Administration (NOAA) has published the *National Standards for a Protected Species Observer and Data Management Program, 2013*. While these are not mandated in Australia, they have some relevance to the BKA CG MFOA program, as they are not restricted to cetaceans and apply to all protected large marine fauna species under US legislation, including marine turtles, and they are not restricted to a particular human activity, such as whale watching tourism or seismic exploration, but apply to a broader range of vessel-based industry activities, that might impact on protected large marine fauna species.

TABLE A.2.1: *Existing MFOA-related guideline documents in Australia*

Guideline Document	Application & Scope	Elements Applied to this Project
Australian National Guidelines for Cetacean Observation (ANZECC 2000). Superseded by the *Australian National Guidelines for Whale & Dolphin Watching 2017* (see below).	– Apples to cetacean (whale & dolphin) watching. – Does not cover other species or activities. – Provides national standards for human behaviour and vessel operations when interacting with cetaceans at sea, both for commercial operators and members of the public. – Sets a Caution Zone for adult dolphins of 150m around a vessel, within which vessel should slow to 'no wake' speed. – Prohibits vessels approaching within a 50m Avoidance Zone for adult dolphins (unless they actively move towards the vessel of their own volition and cannot be avoided). – Vessels should not approach within the 150m Caution Zone when calves are present. – If cetaceans show disturbance behavior, vessel should withdraw beyond the Caution Zone at 'no wake' speed. – Includes provisions on aircraft, touching, feeding, swimming etc, which are not relevant to this project. – Recommends posting of an observer on the vessel when within the Caution Zone to guide compliance with the requirements. – No guidance on MFOs more generally.	The 150m Caution Zone and 50m Avoidance Zone are increased to a 1km Observation Zone and a 500m Exclusion Zone for this project. This doubling of the zone distances does not imply that the operation poses a higher risk than other vessel operations (in fact it poses a lower risk for a number of reasons including very low operational speed of ~2 knots). It represents BKA's responsible approach to environmental protection, in accordance with the precautionary principle. When loading sand in the POA the SPV will operate at a very low sped of <2 knots – which is already a 'no wake' speed. Therefore, the SPV will automatically be in compliance with the Caution Zone speed limits, even when marine animals are outside of the Caution Zone, adding a further higher level of protection.

Australian National Guidelines for Whale & Dolphin Watching 2017.	– Similar to above but apply only in Commonwealth waters.
	– Includes provisions on aerial drones (classified as aircraft) and requires that aircraft, including drones, must not:
	  – fly lower than 300m within a 300m radius of a whale or dolphin,
	  – approach a whale or dolphin from head on; or
	  – land on the water within 300m of a whale or dolphin.
		Not applicable in CG (not Commonwealth waters).
		
		Has the same zones as above, which have been doubled for this project, in accordance with the precautionary principle.
		
		Aerial drones will be used to enhance the effectiveness of the MFAO observations, and the 300m restrictions in these guidelines would curtail the benefits of that.
		
		The type of drone that will be used will be no-where near the same noise as an aircraft. For the CG MFOA program the WA 60m rule for large marine animals and drones is applied, as per the WA *Biodiversity Conservation Regulations.*

EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales (2008).	– Provides practical standards to minimise the risk of acoustic injury to whales in the vicinity of seismic survey operations. – Does not cover other species or activities.	Not relevant. Whales are not found in CG (too shallow and turbid with no food resources) and the sand sourcing operation does not involve seismic survey activities.
Industry Guideline for the Collection and Submission of Marine Mammal Observer Data from Marine Seismic Surveys (APPEA 2021).	– Provides technical standards for the offshore oil and gas exploration industry on observer data for marine mammals in the vicinity of seismic survey operations.	While whales and seismic surveys are not relevant to CG, elements of the minimum data collection standards and qualifications and roles of MMOs (MFOs) outlined in these guidelines, provide useful guidance for the CG project and are applied as outlined below.

Guideline Document	Application & Scope	Elements Applied to this Project
	– Developed by industry in response to *EPBC Act Policy Statement 2.1* above, to assist compliance by industry members. – Does not cover other species or activities. – Includes guidance on minimum data collection standards and qualifications and roles of Marine Mammal Observers (MMOs) (equivalent MFOs for the CG project – but focused only on marine mammals).	

MFO team requirements:

1. As outlined above BKA plans to contract the local TO groups (Balanggarra and Miriuwung-Gajerrong) as the MFOs, and provide all relevant training and equipment, subject to agreed contract arrangements and the ability of the groups to provide the necessary number of MFOs. The MFOA program will require a dedicated team, able to deploy during every SPV sand-loading cycle in CG for 1-to 2-days every two weeks, plus data, reporting and equipment maintenance work between each sand loading cycle, for up to 15-years.

2. As outlined in Annex 1 above, the MFOs will also be trained and equipped to undertake the separate CG-SWASP monitoring. This will create significant employment opportunities for the local TOs in the Wyndham and Kununurra area.

3. It is also standard procedure for relevant crew members on BKA vessels to be trained as MFOs, and this will also apply for this project, to supplement the contracted, independent MFOs.

4. The number of fully trained MFO team members required is shown in Table A.2.1. The baseline team is two independent MFOs and one independent aerial drone operator on duty on the SPV at all times during each 1- to 2-day sand loading cycle in CG, equating to a baseline, on-duty team of three.

5. Two teams are required, working in alternating shifts during each 1- to 2-day sand loading cycle, requiring a **team of six** (4 MFOs and 2 drone operators) on board the SPV during each sand loading cycle.

6. Ideally, there will be a fully trained pool available on-shore that is double the required six, to cover when individuals may not be available = an ideal pool of 12 trained MFO personnel available in the general Wyndham / Kununurra / WA area.

7. Initial, general discussions have been held with both Balanggarra and Miriuwung-Gajerrong on this proposed approach, and contractual and operational details will be developed in close consultation with the TO groups when/if project approval is granted, which will allow more certainty of planning.

8. If the two, local TO groups are not able to provide the necessary number of trained MFOs, BKA will contract a professional MFO consultancy service to fill any gaps in providing the necessary independent MFOs and/or drone operators (there are several providers in WA and in Australia more broadly). It is possible that the makeup of the MFO team may be a joint team from both the TO groups and an MFO consultancy service (see also training below), supplemented by SPV crew who are also trained MFOs.

9. An additional two active MFOs will be on duty at all times during the peak turtle nesting period (August-September inclusive). These will be vessel crew who are fully trained in MFO procedures. Vessel crew who carry-out the MFO role will not undertake other duties when on a MFO shift.

TABLE A.2.1: *Required MFO team numbers.*

NOTE: *Numbers, make-up and positions of MFOs should remain flexible and should be optimized in consultation with regulatory agencies and MFO experts prior to commencement of operations. They should also be refined and optimized in response to lessons-learned on-site during operations, through quarterly reviews.*

Standard Arrangements (during each 1- to 2-day sand-loading cycle in CG):			
Role	**On duty each shift**	**Alternate Team (shift changes)**	**Total on-board SPV**
Independent MFOs: (Trained TOs and/or MFO consultancy)	2	2	**4**
Independent Aerial Drone Operator: (Trained TOs and/or MFO consultancy)	1	1	**2**
Total:	**3**	**3**	**6**

Enhanced Arrangements (during peak turtle nesting season - two months of Aug-Sept inclusive):			
Role	**On duty each shift**	**Alternate Team (shift changes)**	**Total on-board SPV**
Independent MFOs: (Trained TOs and/or MFO consultancy)	2	2	**4**
Independent Aerial Drone Operator: (Trained TOs and/or MFO consultancy)	1	1	**2**
Additional MFOs for enhanced observation: (Trained SPV crew)	2	2	**4**
Total:	**5**	**5**	**10**

Observation methods:

1. Marine fauna observation will be based on two methods:

    a) visual observation by human MFOs; and

    b) aerial drone survey with high resolution camera and AI-enhanced large marine fauna species recognition, similar to the Mobius Observer system (see www.whaleseeker.com/mobiusobserver). There will be a live video feed from the aerial drone directly to a screen on the SPV's bridge, allowing immediate reactions to sightings.

2. The use of aerial drones as part of MFOA procedures significantly increases the marine fauna detection capability at much further distances from the vessel, allowing more effective fauna-avoidance responses, and will be a significant enhancement to the CG MFOA program.

3. The MFO team will transfer to and from the SPV using the project's small support vessel out of Wyndham, and will be fully accommodated and catered for when on the SPV.

4. At all times (day and night) when the SPV is operating in CG, two MFOs will be based in the 'crows-nest' on the forecastle light tower near the bow of the SPV, as shown in Figure A.2.2. The tower will provide the MFOs with excellent fields of view out to several kilometres. As the SPV will be moving directly forward in set transect lines during sand-loading operations, and as the objective is to avoid potential vessel strikes, each MFO will cover the port and starboard bow sectors in front and to the sides of the SPV respectively. This will enable detection and avoidance of any marine fauna that are sighted within the Caution and Avoidance Zones in the path of the SPV as it progresses forward (noting that the SPV will operate at a very low speed of ~ 2 knots).

5. The MFOs will be equipped with:

    a) high-powered, range-finding binoculars,

    b) GPS-enabled digital SLR cameras with telephoto lenses,

    c) hand-held VHF radios for communications with both the drone operator and bridge personnel (to alert the helmsman to sightings and allow avoidance measures to be instigated),

    d) tablets for electronic recording of observation data into a standard data template; and

    e) for night-time observations, high-powered night vision scopes.

6. For aerial drone operations:

    a) the drone operator will be based on the bow or on the bridge of the SPV (to be refined based on operational lessons once operations commence); and

    b) the drone will be flown high and ahead of the SPV, to enhance the effectiveness of fauna detection and avoidance.

7. The duplicate teams of MFOs and drone operators will work in alternating shifts during the 1- to 2-day sand loading cycle, with one team on duty and one on meals, resting etc. The shift periods will be set in accordance with best practice and personnel well-being requirements, noting that each deployment on the SPV is very short (1- to 2-days), with a two-week break until the next sand loading cycle.

8. The enhanced MFOA measures during the peak turtle nesting season (Aug-Sept) will involve an additional two trained MFOs from the vessel crew, based high on the SPV's bridge wings.

9. *Final, optimized MFO positions and arrangements will be determined in consultation with MFO experts prior to commencement of operations, and refined and improved in response to lessons-learned on-site.*

<u>Observation & Exclusion Zones and SPV response actions</u>:

1. The Observation and Exclusion Zones will be based on the zones for dolphins under the Australian cetacean watching guidelines listed in Table A.2.1, but increased significantly to 1km for the Observation Zone and to 500m for the Exclusion Zone, and applied to all large marine fauna that might be detected by observations, not only dolphins. This increase of the zone distances does not imply that the operation poses a higher risk than other vessel operations (in fact it poses a lower risk for a number of reasons, including the very low operational speed of ~2 knots). The increase of the zone distances represents BKA's responsible approach to environmental protection, in accordance with the precautionary principle, and is consistent with the State zones.

2. The Observation and Exclusion Zones are further strengthened in that under the Australian cetacean watching guidelines, the zones are measured as radii around the animals, based on the fact that cetacean-watching vessels actively manoeuvre to approach the animals for viewing purposes. In the case of the SPV, it will not actively manoeuvre to approach any animals. The SPV will run on directional transects when loading sand, and any proximity to marine animals will only occur because the animals themselves swim into one of the zones, or the SPV's path happens to takes it towards animal(s) that might be in the area.

3. In this operational setting, it is more effective in terms of preventing potential vessel strikes, to measure the zones from all sides of the SPV (port, starboard, bow and stern). The effect of this approach is that the SPV will be permanently 'enclosed' by virtual zone boxes, no matter where it is in CG. Any marine animals that enter one of the zones, wherever the SPV might be in CG, will then trigger the necessary response and avoidance actions by the SPV. The zone 'boxes' around the SPV, based on the doubled cetacean watching distances, are shown on Figure A.2.1, and the associated response actions are described in Table A.2.2.

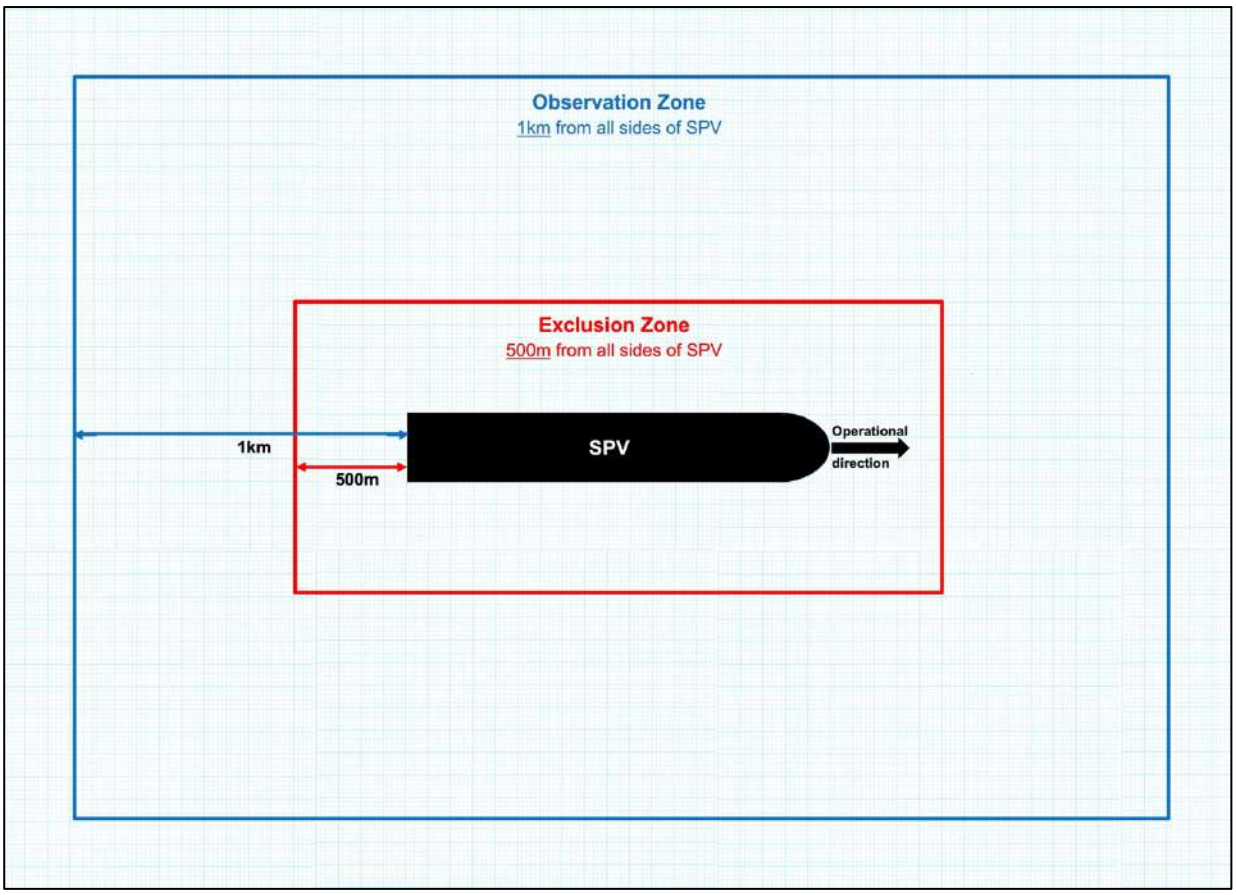

FIGURE A.2.1: *Observation and Exclusion Zones around the SPV*

TABLE A.2.2: *Caution and Avoidance Zones and associated SPV response actions*

NOTE: When loading sand in the POA the SPV will operate at a very low sped of <2 knots – which is already a 'no wake' speed. Therefore, the SPV will automatically be in compliance with the Caution Zone speed limits, even when marine animals are outside of the Caution Zone.

Zone	Trigger for Action	SPV Response Actions
Observation Zone 1km radius around the SPV. (double the zone perimeter in the Australian cetacean watching guidelines, in accordance with the precautionary principle)	Any large marine fauna except dolphin calves observed in the Observation Zone:	- SPV to not exceed 'no wake' speed but can continue with normal operations. - MFOs and drone to maintain close watch on the animal(s) and SPV to prepare for avoidance action should the animal(s) begin to approach the Avoidance Zone. - MFOs and drone to attempt photo ID to add to Species ID Photo-Catalogue for CG. - MFOs to record observations and response actions as per data recording protocols.
	Dolphin calves observed in the Observation Zone: (Observation Zone becomes Exclusion Zone when dolphin calves are present)	- Maneuver the SPV away from the dolphins at 'no-wake' speed until the dolphin calves are beyond the Caution Zone. - MFOs and drone to attempt photo ID to add to Species ID Photo-Catalogue for CG. - MFOs to record observations and response actions as per data recording protocols. - Maintain watch for changes in movement and any need for further avoidance action.
Exclusion Zone 500m radius around the SPV. (double the zone perimeter in the Australian cetacean watching guidelines, in accordance with the precautionary principle)	Any large marine fauna except dolphin calves observed in the Exclusion Zone: (dolphin calves are covered above)	- Maneuver the SPV away from the animal(s) at 'no-wake' speed until the animal(s) are beyond the Avoidance Zone. - Maintain the SPV at 'no-wake' speed until the animal(s) are beyond the Caution Zone. - MFOs and drone to attempt photo ID to add to Species ID Photo-Catalogue for CG. - MFOs to record observations and response actions as per data recording protocols. - Maintain watch for changes in movement and any need for further avoidance action.

Data recording and reporting:

1. Standardised data recording and reporting protocols will be developed in accordance with standard practices for MFOA programs and in accordance win regulatory agency requirements, and will include as a minimum:

   - All marine fauna sightings (location, date, time, species, size, movement, behaviour, sea and weather conditions etc).
   - Any marine fauna interactions with the SPV.

2. The MFOs will be equipped with tablets for electronic recording of observation data into a standard data template.

3. The MFOs and drone operators will attempt photo ID of all animal sightings, to add to a Species ID Photo-catalogue that will be developed for CG.

4. All drone video will be recorded and permanently saved as part of the MFOA program's dataset.

5. All data will be available to WA DBCA and DCCEEW and to the public on the project web site, and will further assist protection and conservation of these species both in CG and in other areas.

Incident reporting:

1. Reporting of any vessel strikes that might occur will be carried out as specified for Report 1b in Table 19 in 9.4 Section above.

2. Reporting of any signs of wildlife diseases that might be observed will be carried out as specified for Report 1c in Table 19 in 9.4 Section above.

MFO training:

a) Training of MFOs will be carried out as specified for MFOs in Table 18 in Section 7 above.

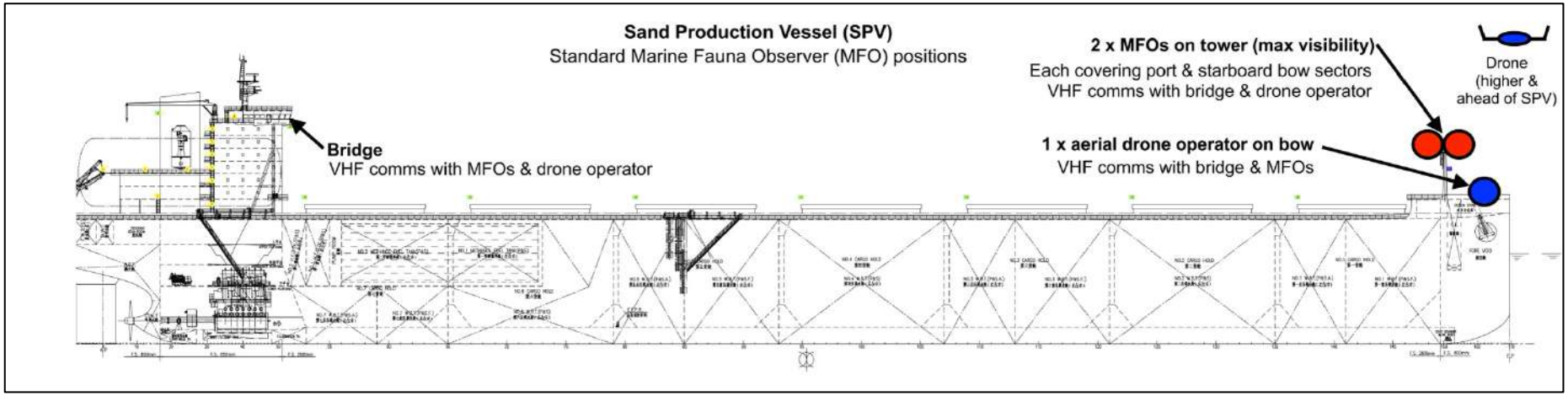

FIGURE A.2.2: *Indicative MFO positions on the SPV (two x MFOs on forecastle tower, plus one drone operator on bow). Final, optimized positions will be determined in consultation with MFO experts and regulatory agencies prior to commencement of operations, and refined and improved in response to lessons-learned on-site (e.g. the drone operator could be located on the vessels' bridge).*

Annex 2.1: Boskalis MFOA Capability Sheet

- MFOA = Marine Fauna Observation & Avoidance.
- Applies to avoiding potential vessel strikes and potential impacts of underwater noise on marine fauna.
- Please see next two pages.

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CAPABILITY SHEET

MARINE MEGA-FAUNA
OBSERVATION & IMPACT PREVENTION

A Humpback whale (*Megaptera novaeangliae*) at Barrow Island, Western Australia
B Mating Sea turtles near Barrow Island, Western Australia
C Short-beaked dolphin (*Delphinus delphis*) observed during MMF observation procedures (source: Gardline)

INTRODUCTION

Boskalis' vessels, including dredgers and other work vessels, often operate in areas that host populations of marine mega-fauna (MMF) species, including, depending on the location, marine mammals (whales, dolphins, dugong, manatees and seals), marine turtles, crocodiles and sharks and rays. In certain countries some of these species may be protected under national laws.

MMF observation and impact prevention procedures during vessel operations are therefore a critical component of Boskalis' environmental protection efforts, aimed at preventing and minimizing potential vessel strikes on MMF and potential impacts of vessel-generated underwater noise on MMF.

As part of the company's values, which emphasize sustainability and biodiversity in every project, Boskalis applies extensive mitigation requirements, especially in the presence of important and protected MMF.

MMF observation involves the systematic monitoring for MMF in their natural habitats. Exclusion zones around the working vessel that are appropriate to the MMF species in the area are established, and these are continuously monitored for MMF activity. Avoidance procedures are followed to ensure that the vessel remains clear of MMF during operations. In some jurisdictions exclusion zones and observation and avoidance procedures are specified in guidelines or mandated by law.

PRACTICES AND PROTOCOLS

In general, as a minimum Boskalis applies the following MMF prac tices and protocols during dredging and other relevant vessel operations:

- Pre-operations Surveys: Before operations begin, surveys are conducted to identify the presence of MMF in the area. This helps in planning the dredging activities to avoid critical habitats or times when MMF is most likely to be present.
- Monitoring During Operations: Trained observers, either on board the vessels or on nearby platforms, monitor the presence of MMF throughout the dredging other relevant vessel operation. The use of both visual and acoustic monitoring techniques allows for the detection of marine life even under poor visibility conditions or underwater.
- Implementing Mitigation Measures: If MMF is/are observed in the vicinity of vessel activities, specific mitigation measures are implemented. These can include changing the vessel's speed and/or direction, pausing operations, reducing vessel noise levels, or adjusting the location or timing of the activities to minimize disturbance.
- Reporting and Documentation: Observations and any mitigation actions taken are meticulously documented and reported to relevant authorities. This data contributes to the understanding of MMF behavior and the impact of dredging and other vessel operations, informing future guidelines and best practices.

TECHNOLOGIES AND TECHNIQUES

MMF observation can employ a variety of technologies to ensure effectiveness and minimize impacts. These technologies are designed to detect the presence of MMF in and around dredging and other marine work sites, enabling timely implementation of mitigation measures. Considering the variation in project requirements across clients and geographical locations, Boskalis adapts its MMF observation technologies accordingly.

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MARINE MEGA-FAUNA
OBSERVATION & IMPACT PREVENTION


D

As outlined above, often a combination of acoustic and visual monitoring is applied.

1. Visual observation of surfacing MMF species. Marine fauna observers (MFOs) use binoculars and thermal imaging cameras. The latter can detect marine mammals and some other MMF based on their body heat, which is particularly useful during low visibility conditions or at night.
2. Passive acoustic monitoring to detect vocalizations of marine mammals. Hydrophones and passive acoustic monitoring systems are used to detect marine mammal vocalizations. This is especially useful for species that are difficult to spot visually. Usually, these systems are mounted on a buoy.

INNOVATIONS – AUTOMATED MMF OBSERVATION

Boskalis is working on an innovation that allows for the automatic detection of certain MMF, and especially marine mammals, using AI technology. The aim of the system is more efficient and reliable MMF observation, with fewer interfaces and increased safety for MFO personnel.

The automated MMF observation system intends to automatically detect MMF and especially marine mammals using a set of visual and acoustic sensors. The data from these sensors is processed real-time through an algorithm using AI technology. This allows for real-time MMF detections and high accuracy species localization and identification. Imagery and data are transmitted in real-time to onshore office(s) and verification of the detections can be done onshore by a qualified MFO. Imagery and data is also backed-up to provide a permanent record of observations and can be further analysed for research and learning purposes.

In future when the automatic system is fully proven it can reduce the need for MFOs on site / on vessels, thus improving safety, simplifying logistics and reducing greenhouse gas emissions through a reduced need for auxiliary vessels, as well as a reduced need to travel to and from work sites.

EXPERIENCES / EXAMPLE PROJECTS

Boskalis has extensive experience with MMF observation and impact prevention procedures on its marine projects, and below are some examples.

OFFSHORE WIND PROJECT - CHANGFANG XIDAO, TAIWAN

Between 2021 and 2023, Boskalis installed 62 pre-piled jackets for the 589 MW offshore wind farm Changfang Xidao in Taiwan, an area inhabited by the endangered Chinese White Dolphin (Sousa chinensis). To mitigate the potential impact of underwater noise from piling operations on these marine mammals, Boskalis employed surface-based visual observation and underwater passive acoustic monitoring (PAM) methods. These measures ensured compliance with environmental regulations, aiming to protect the dolphins from potential hearing damage by preventing their proximity to the piling location during operations.


E

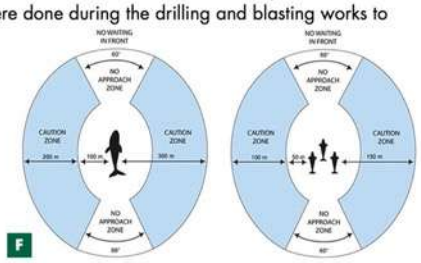
DREDGING PROJECT – KITIMAT, CANADA

Between 2018 and 2021, Boskalis worked on the dredging and remediation of a port basin in Kitimat, Canada, an area inhabited by Humpback Whales (*Megaptera novaeangliae*) and Killer Whales (*Orcinus orca*). The dredging scope involved sailing to and from an offshore disposal area with a Trailing Suction Hopper Dredger (TSHD). To mitigate the potential for vessel strikes in these animals, especially during sailing, 10 MFO's were employed.

Six Observers were stationed around the port basin, two on board of the bridge of the dredger, and another two on smaller vessels patrolling the port and following the dredger to the offshore disposal area. In case of any sightings, the dredging would be paused to avoid and minimize disturbance.

DREDGING PROJECT – DUQM, OMAN

As part of the development of a liquid bulk port facility in Duqm, Oman, Boskalis conducted extensive dredging works with a Cutter Suction Dredger (CSD) and several TSHD's between 2017 and 2019. To protect the local population of Humpback Whales, it was required to have a dedicated MFO on board each of the TSHDs to prevent collisions when the vessels were in transit between the port basin and offshore borrow and disposal areas. Inside the port, observations were done during the drilling and blasting works to remove a small area of rocky material. For this activity, another three MFOs were stationed on board the drilling and blasting barge, on the nearest jetty, and at the entrance to the port basin.



F

D Passive Acoustic Monitoring during dredging works, Gabon.
E Trained crew observing from the bridge of the Boskalis dredger Causeway.
F Example of safe distances for whales and dolphins (source: www.dbca.wa.gov.au - Western Australia Department of Biodiversity Conservation & Attractions)

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ANNEX 3: SPV LIGHTING SPECIFICATIONS

1. As outlined in Tables 1, 12 and 15 above, CEO 10: SPV Lighting aims to prevent significant negative impacts on nesting and hatching Flatback Turtles at nesting beaches in the CG area from the SPV's lighting.

2. The mitigation and monitoring measures to achieve CEO 10 include the permanent fitting of turtle safe external and deck lighting on the SPV, in accordance with turtle-safe specifications in the *National Light Pollution Guidelines for Wildlife* (DCCEW 2023). For safety reasons the SPV's mandatory navigation lights will be standard as required by relevant IMO and AMSA maritime safety regulations. However, these are a small number of specific lights, including green starboard running lights and red port running lights, a white stern light and a white masthead light, that do not emit significant light that could potentially impact on turtles.

3. Table A.3.1 presents the specifications for the three types of external lights that will be fitted to the SPV. These are:

   - Type 1: External deck lights – will be positioned approximately every 10 meters along the external passageways along both the port and starboard sides of the SPV.

   - Type 2: Flood lights – will be placed around mooring winches, deckhouse, lifeboat, gangway and dredging equipment.

   - Type 3: Additional floodlights – will be placed at each cargo hold and at the navigational deck.

4. These lights have been selected to meet the 'turtle safe' criteria specified in the Australian *National Light Pollution Guidelines for Wildlife* (DCCEEW 2023), and the principle outlined in the guidelines of **'keep lights 'long'.** Yellow light is preferable to short wavelengths, with wavelengths > 500nm having the least impact on marine turtles. These lights were used in the modelling and assessment of potential light impacts in nesting and hatching Flatback Turtles, as reported in EPBC Referral Supplementary Report No. 1 - *Light Assessment* (Nocterra 2025), which found no impacts from the SPV.

5. In addition to selecting lights with 'turtle safe' specifications, the following design and construction measures will be incorporated in fitting the lights to the SPV, in accordance with the principles outlined in the in the Australian guidelines (DCCEEW 2023):

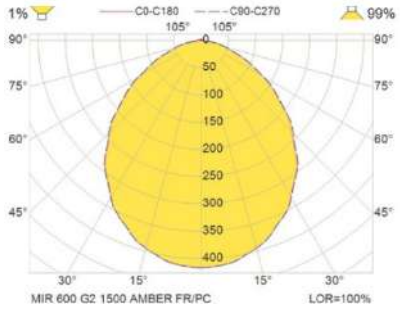
   - **Keep lights 'low'.** All lights will be fitted as close as possible to the SPV's deck.

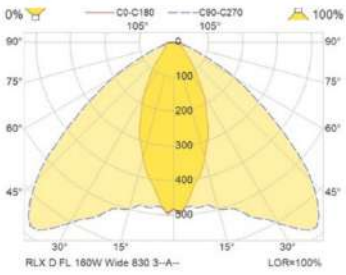
   - **Keep lights 'directed'.** Light-spill and sky-glow will be minimized by directing lights onto the areas where it is needed for safe operations. In example, the planned external lights have a light down distribution of 98% and the flood lights have a large beam angle which can minimize the projected area.

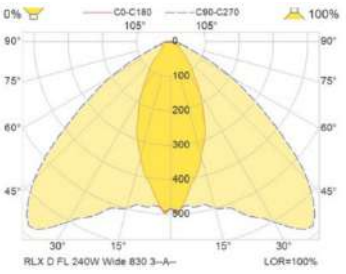
   - **Keep lights 'shielded'.** Where possible, shields and deflectors will be fitted to deck lights to minimize light spill and sky-glow.

6. In addition, the operational measure of **'keep lights 'off'** will be applied wherever possible. With crew safety having paramount priority, a selection of some deck lights may be switched off during sand loading operations in Cambridge Gulf to further minimize the SPV's light signature.

TABLE A.3.1: *Specifications for the three types of external lights that will be fitted to the SPV*

LIGHT TYPE 1:	**External Deck Light – MIRS67-600(M) G2 1500 HF AMBER TW M20 FR/PC**	
	**Lumen Out:**	1.540 lm
	Power:	25W
	Illumination pattern:	
	Warmth (Kelvin):	1.800
	Manufacturer:	Glamox

LIGHT TYPE 2:	**Floodlight – RLX D FL 160W100-277VACD wide 830 3XEABKX**	
	**Lumen Out:**	14.893 lm
	Power:	160W
	Illumination pattern:	
	Warmth (Kelvin):	3.000
	Manufacturer:	Glamox

LIGHT TYPE 3:	**Floodlight – RLX D FL 240W100-277VACD Wide 830 3XEABKX**	
	**Lumen Out:**	21.204 lm
	Power:	240W
	Illumination pattern:	
	Warmth (Kelvin):	3.000
	Manufacturer:	Glamox

ANNEX 4: MARINE FAUNA DEFLECTER / EXCLUDER SPECIFICATIONS

1. As outlined in Tables 1, 12 and 15 above, CEO 11: Drag-head Entrainment aims to prevent significant negative impacts on large marine animals near the seabed in CG from potential entrainment in the SPV's drag-head (including marine turtles, sharks and sawfish).

2. The mitigation and monitoring measures to achieve CEO 11 include the permanent fitting of a marine fauna deflector / excluder device ('tickler chains') in front of the drag head. This is a recognized mitigation measure in the Australian Marine Turtle Recovery Plan (DCCEW 2017) and has been accepted as best practice in dredging projects across Australia for over ten years.

3. Figure A.4.1 shows the general location of 'fauna tickler chains' as typically fitted to Boskalis dredgers, and Figure A.4.2 shows the design drawing for the 'fauna tickler chains' fitted to the Boskalis Trailer Suction Hopper Dredger (TSHD) *Gateway*, as used for dredging operations in Western Australia elsewhere in Australia in recent years, under both Commonwealth and State permitting conditions. The drag-head for the SPV will be of a similar size and specifications to the *Gateway*, and will be fitted with similar marine fauna deflector / excluder chains.

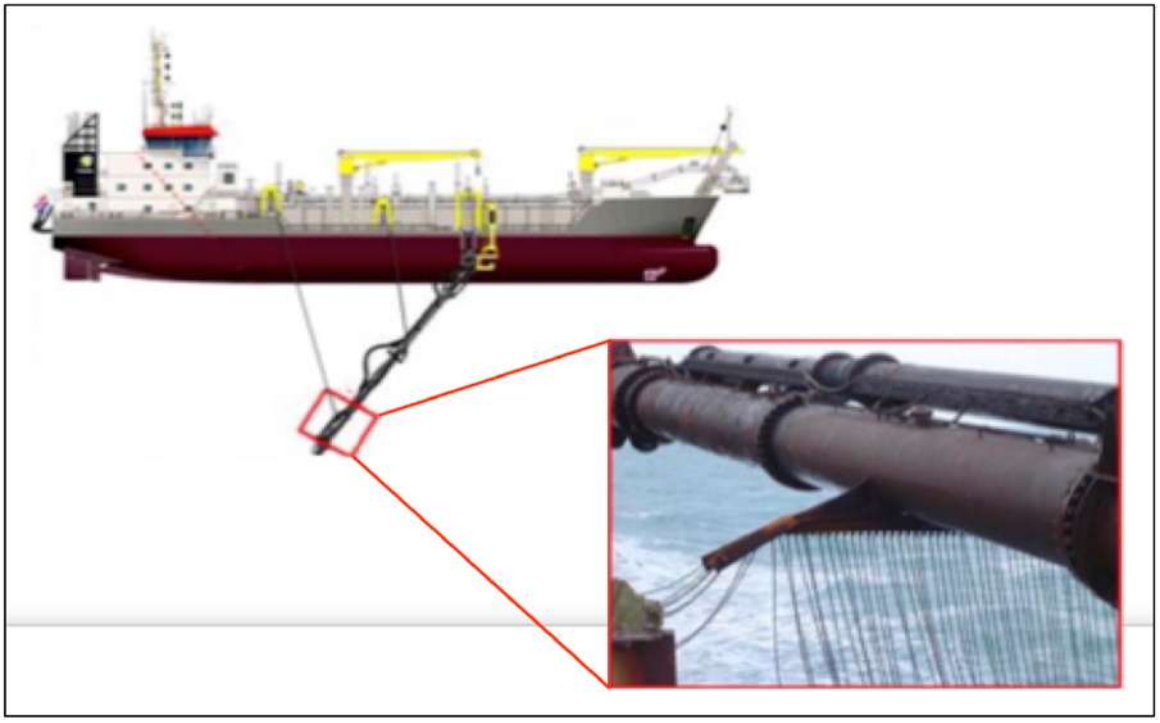


FIGURE A.4.1: *Marine-fauna deterrent / deflector chains are standard on Boskalis dredgers in turtle areas.*

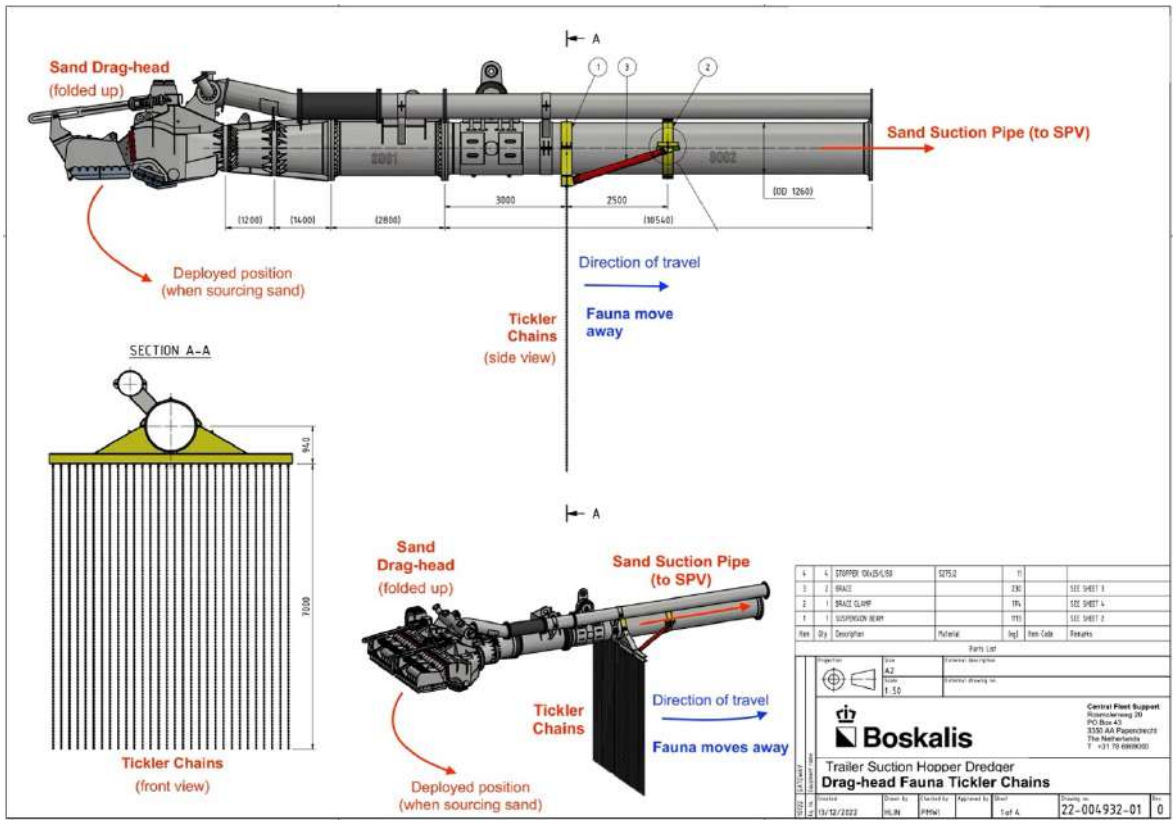


FIGURE A.4.2: *Design drawing for the 'tickler chains' fitted to the Boskalis TSHD Gateway for dredging operations in Australia in recent years.*

ANNEX 5: MANGROVE MAPPING METHODS

1. As outlined in Tables 1, 10, 11, 13 and 14 above, CEO 1: Coastal Processes & Mangroves aims to confirm the impact assessment finding that removal of sand from the POA will not cause significant changes to coastal processes that result in net loss of mangrove cover in the LAU, in the context of natural mangrove dynamics, including the mangroves in the West Kimberley NHP and the Ord River Floodplain Ramsar site.

2. The monitoring measures to achieve CEO 1 include baseline mangrove mapping immediately before commencement of operations, followed by biennial (every 2 years) GIS mapping of mangrove cover in the LAU, building on the pre-commencement baseline, as well as assessment of environmental factors that could cause changes to mangroves.

3. It should be noted that Referral Report No 8 - *Full Modelling*, assessed that potential changes to mangroves caused by the project are negligible (i.e. not measurable), over the full project time-span of 15-years. This finding was confirmed by two independent expert reviewers. The mangrove monitoring described in this section is proposed by BKA purely as a precautionary and confirmatory measure.

4. The monitoring is designed to allow assessment of mangroves against Trigger Response Criteria (TRC) 1.1 – a measured 2% reduction in mangrove cover in the LAU over two years that cannot be explained by non-project causes, as well as Threshold Criteria (THC) 1.1 – a measured 5% reduction in mangrove cover in the LAU over two years that cannot be explained by non-project causes. Non-project natural causes include cyclones, heatwaves causing mangrove die-back and changes in catchment sediment inputs, amongst others.

5. The biennial mangrove mapping will be based on quantitative assessment of open-source satellite imagery, covering all mangrove areas within the LAU (Figure 3 in Section 1.2.1 above). Relevant satellite imagery assessment and GIS mapping methods are described in Bunting et al (2022) (Global Mangrove Watch). They assessed previous changes over time in CG (and other sites globally) between 1996 and 2020, as per Figure 7 in Section 1.2.4 above. They used L-band Synthetic Aperture Radar (SAR) global mosaic datasets from the Japan Aerospace Exploration Agency for 11 epochs from 1996 to 2020, to develop a long-term time-series of mangrove extent and change. The same methods will be used to ensure consistency and continuity.

6. The methods from Bunting et al (2022) will be supplemented by the satellite (Landsat) imagery assessment methods used by Geoscience Australia for previous assessments in CG, including mangrove mapping, under their Digital Earth Australia (DEA) program – see https://www.ga.gov.au/scientific-topics/dea/environment.

7. The rationale for biennial assessments is that any potential changes in mangrove cover would not be measurable annually (unless there was a sudden acute change due a catastrophic natural event such as a major cyclone hit on CG). In fact, biennial is also likely to be too frequent in terms of being able to assess any measurable changes from the project, and every five years might be more appropriate. Again, it should be noted that Referral Report No 8 - *Full Modelling*, assessed that potential changes to mangroves caused by the project are negligible (i.e. not measurable), over the full project time-span of 15-years. However, BKA has proposed mangrove mapping every two years in accordance with the precautionary principle.

8. The rationale for the 2% and 5% change over two-years under TRC 1.1 and THC 1.1 described above, is because inherent accuracy limits in satellite remote sensing and mapping methods make it difficult to determine changes at a finer scale than those percentages, while also differentiating changes that might have been caused by the BKA project versus natural or other causes, again noting that the modelling report assessed negligible changes.

9. The assessment of potential non-project causes of any measured changes in mangrove cover will involve reviewing data on any cyclones, heatwaves and changes in catchment sediment inputs and any other significant environmental events in the CG area during the relevant two-year mapping period. This will include assessing data and records from the Australian Bureau of Meteorology, and river flow data from the WA government's river-flow monitoring in the CG catchment. Site assessments might be conducted if required. Meetings and discussion with relevant experts, including from the relevant regulatory agencies, would form part of this assessment, to gain expert views, opinions and inputs.

10. All reports from each biennial mapping assessment, including GIS maps and supporting GIS files, will be available to relevant regulatory agencies and the public on the project web site. As a long-term monitoring program (up to 15 years), it will contribute significantly to the scientific understanding of mangrove dynamics in CG and in northern Australia generally, and further contribute to their protection and conservation.

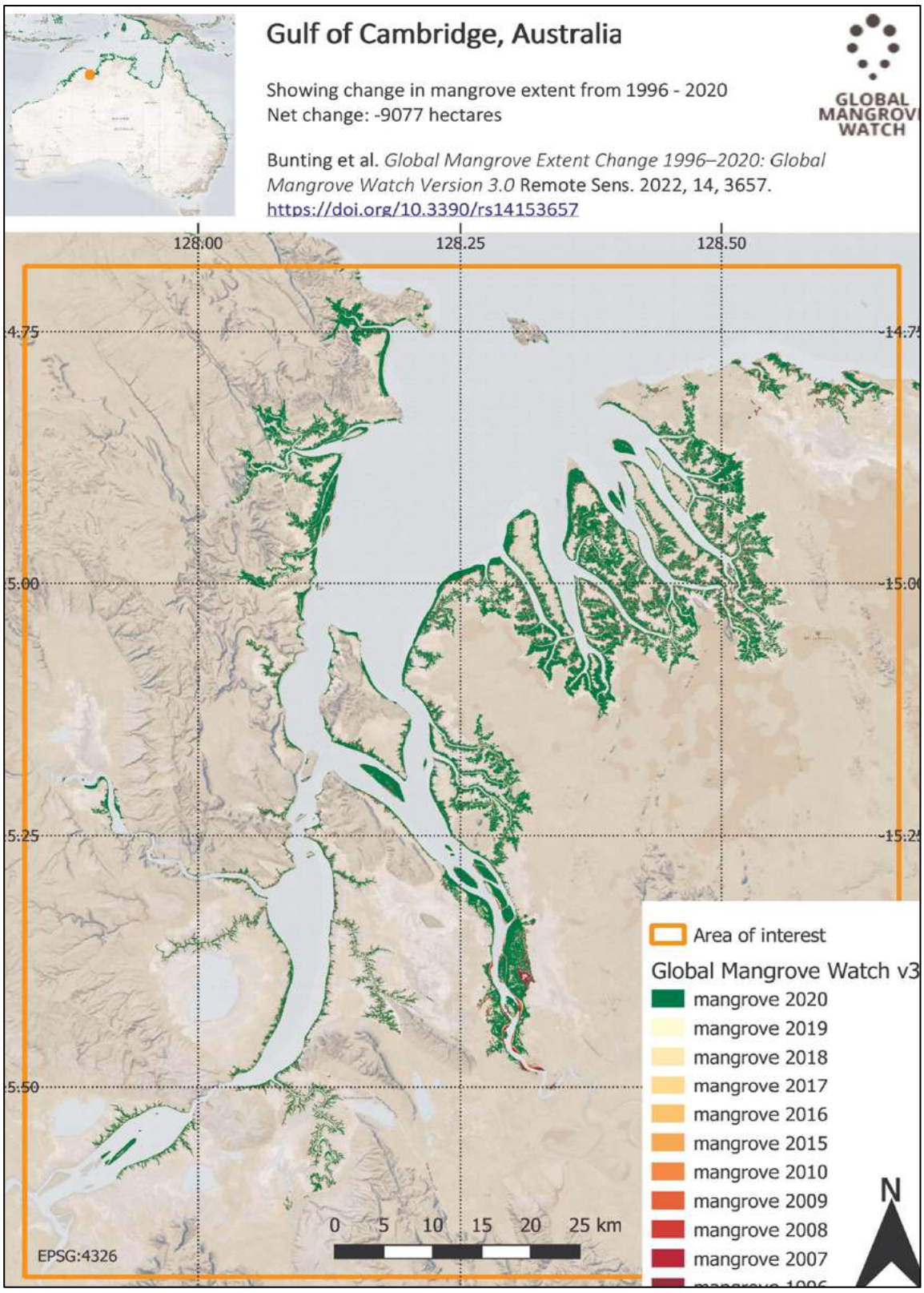


FIGURE A.5.1. *Mangrove mapping in CG in 2020 by Bunting et al (2022). For consistency and continuity, the same methods will be used for the BKA mangrove monitoring (source: http://www.globalmangrovewatch.org/).*

ANNEX 6: BEACH MONITORING METHODS

1. As outlined in Tables 1, 10, 11, 13 and 14 above, CEO 9: Coastal Processes & Beaches aims to confirm the impact assessment finding that removal of sand from the POA does not cause significant changes to coastal processes that result in net loss of turtle nesting beaches in the LAU, in the context of natural beach dynamics.

2. The monitoring measures to achieve CEO 9 include baseline aerial drone LiDAR and ortho-photographic surveys of the beaches before commencement of operations, followed by biennial (every two years) LiDAR and ortho-photographic surveys (in April after end of cyclone season), as well as assessment of environmental factors that could cause changes to beaches.

3. It should be noted that Referral Report No 8 - *Full Modelling*, assessed that potential changes to the beaches caused by the project are negligible (i.e. not measurable), over the full project time-span of 15-years. This finding was confirmed by two independent expert reviewers. The beach monitoring described in this section is proposed by BKA purely as a precautionary and confirmatory measure.

4. The monitoring is designed to allow assessment of beaches against Trigger Response Criteria (TRC) 9.1 – a measured 2% reduction in beach area in the LAU over two years that cannot be explained by non-project causes, as well as Threshold Criteria (THC) 9.1 – a measured 5% reduction in beach area in the LAU over two years that cannot be explained by non-project causes. Non-project natural causes include cyclones, and changes in natural sediment inputs, amongst others.

5. In order to provide a consistent continuum of long-term data at each of the beached, the biennial beach surveys will be based on exactly the same methods and exactly the same beach sites that were assessed in *EPBC Referral Report No. 8 - Full Modelling Report (PCS 2025a)* and surveyed by Sensorem for BKA in 2024, as reported in EPBC Referral Report No. 2 - Annex 10 - *Aerial Drone Lidar Report* (see Figures A.6.1 and A.6.2 below). The report from each subsequent survey will include LiDAR-generated Digital Terrain Model, Digital Elevation Model and ortho-photographic map of each beach, along with quantitative comparison with all preceding surveys, to assess any changes to the beaches over time, including in relation the TRC of 2% change and THC of 5% change.

6. The rationale for biennial assessments is that any potential changes in beaches would not be measurable annually (unless there was a sudden acute change due a catastrophic natural event such as a major cyclone hit on CG). In fact, biennial is also likely to be too frequent in terms of being able to assess any measurable changes from the project, and every five years might be more appropriate. Again, it should be noted that Referral Report No 8 - *Full Modelling*, assessed that potential changes to beaches caused by the project are negligible (i.e. not measurable), over the full project time-span of 15-years. However, BKA has proposed beach surveys every two years in accordance with the precautionary principle.

7. The rationale for the 2% and 5% change over two-years under TRC 9.1 and THC 9.1 described above, is because inherent accuracy limits in mapping methods make it difficult to determine changes at a finer scale than those percentages, while also differentiating changes that might have been caused by the BKA project versus natural or other causes, again noting that the modelling report assessed negligible changes.

8. The assessment of potential non-project causes of any measured changes in beach area will involve reviewing data on any cyclones and changes in natural sediment inputs and any other significant environmental events in the CG area during the relevant two-year mapping period. This will include assessing data and records from the Australian Bureau of Meteorology, and river flow data from the WA government's river-flow monitoring in the CG catchment. Site assessments might be conducted if required. Meetings and discussion with relevant experts, including from the relevant regulatory agencies, would form part of this assessment, to gain expert views, opinions and inputs.

9. All reports from each biennial mapping assessment, including the LiDAR and ortho-photographic outputs, will be available to relevant regulatory agencies and the public on the project web site. As a long-term monitoring program (up to 15 years), it will contribute significantly to the scientific understanding of beach dynamics in CG and in northern Australia generally, and further contribute to their protection and conservation.

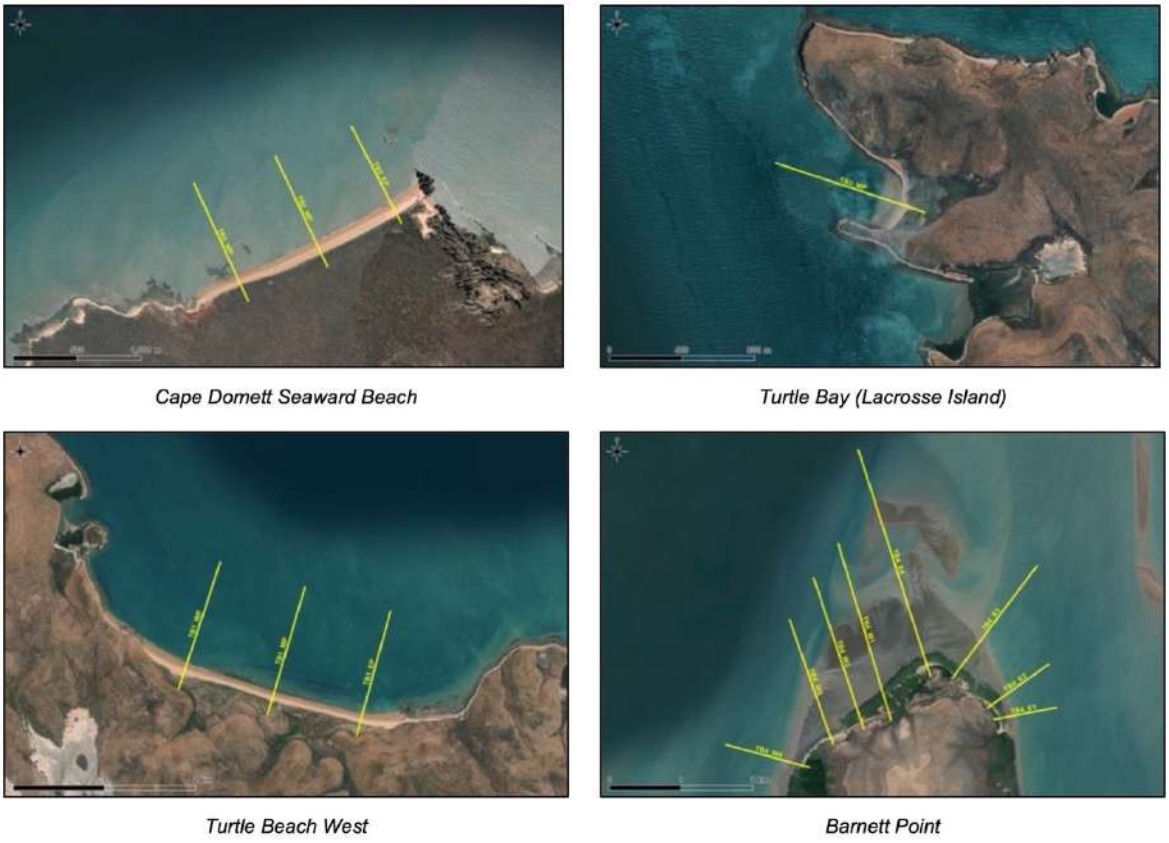


FIGURE A.6.1. *The cross-shore profiles adopted to assess historical shoreline changes at four turtle nesting areas in CG, as reported in EPBC Referral Report No. 8 - Full Modelling Report (PCS 2025a). For consistency and continuity, the same profiles and methods will be used for the ongoing, biannual beach monitoring.*

FIGURE A.6.2. *The four turtle nesting areas in CG where aerial drone high-resolution LiDAR and ortho-photographic surveys were undertaken in 2024, as reported in EPBC Referral Report No. 2 - Annex 10 - Aerial Drone Lidar Report (Sensorem 2025). For consistency and continuity, the same sites and methods will be used for the ongoing, biannual beach monitoring.*

ANNEX 7: UNDERWATER SOUND ASSESSMENT METHODS

1. As outlined in Tables 1, 12 and 15 above, CEO 8: Underwater Noise aims to confirm the impact assessment finding that no significant negative impacts are caused to Snubfin Dolphins, Humpback Dolphins and marine turtles in CG from underwater noise emissions from the SPV.

2. The monitoring measures to achieve CEO 8 include baseline measurement of natural underwater sound levels in CG before commencement of operations, and initial monitoring and reporting of underwater noise emissions from the SPV on commencement of operations in CG, to assess compliance with the assessment in Supplementary Report No. 2 - *Noise Assessment* (Resonate Consultants 2025) and with relevant US NMFS thresholds (as required by WA EPA).

3. It should be noted that Resonate Consultants (2025) assessed potential impacts of underwater noise from the SPV, in terms of auditory injury and behavioural impacts on dolphins and marine turtles in the CG area, using a risk assessment approach and in accordance with the US NFMS 2024 guidelines and criteria. The assessment found that underwater noise from the SPV will not cause significant impacts on dolphins and marine turtles.

4. The monitoring described in this section is proposed by BKA purely as a precautionary and confirmatory measure.

5. Baseline measurement of pre-project underwater sound levels in CG will be undertaken at representative sites in CVG using in-situ passive acoustic sensors, deployed at representative sites, before commencement of operations, over full one-month lunar tidal cycle to capture underwater noise conditions under range of tidal current conditions.

6. Initial monitoring of underwater sound levels will be measured at the same baseline sites on commencement of operations in CG (1st sand loading cycle), to assess whether the underwater noise emissions from the SPV comply with the assessment in Supplementary Report No. 2 (Resonate Consultants 2025) and the relevant NMFS thresholds. Relevant response actions will be implemented in the unlikely event that thresholds are found to be exceeded, as outlined in Table 15.

ANNEX 8: TURTLE NESTING BEACH LIGHT ASSESSMENT METHODS

1. As outlined in Tables 1, 12 and 15 above, CEO 10: SPV Lighting aims to prevent significant negative impacts on nesting and hatching Flatback Turtles at nesting beaches in the CG area from the SPV's lighting.

2. The monitoring measures to achieve CEO 10 include baseline measurement of natural light levels at the turtle nesting beaches before commencement of operations, and initial monitoring and reporting of light levels at the turtle nesting beaches on commencement of operations in CG, to assess compliance with the assessment in Supplementary Report No. 1 - *Light Assessment* (Nocterra 2025) and with relevant thresholds for marine turtles in the National Light Pollution Guidelines for Dredging (DCCEEW 2023).

3. It should be noted that Noctera (2025) found that light the SPV, which will be fitted with turtle-safe lighting as specified in Annex 3 above, will not cause impacts on nesting and hatching turtles at the nesting beaches in the CG area.

4. The monitoring described in this section is proposed by BKA purely as a precautionary and confirmatory measure.

7. Baseline measurement of pre-project natural light levels will be undertaken at the nesting beaches (Figure A.8.1) using in-situ light sensors, deployed before commencement of operations, over full one-month lunar cycle to capture range of lunar-light conditions, in the dry-season (Jul-Aug) with least cloud cover and with overlap with peak turtle nesting season.

8. Initial monitoring of light levels will be measured at the same beach sites on commencement of operations in CG (1st sand loading cycle), to assess whether the light received at the beaches during SPV presence in CG, comply with the assessment in Supplementary Report No. 1 (Nocterra 2025) and the relevant thresholds in DCCEEW (2023). Relevant response actions will be implemented in the unlikely event that thresholds are found to be exceeded, as outlined in Table 15.

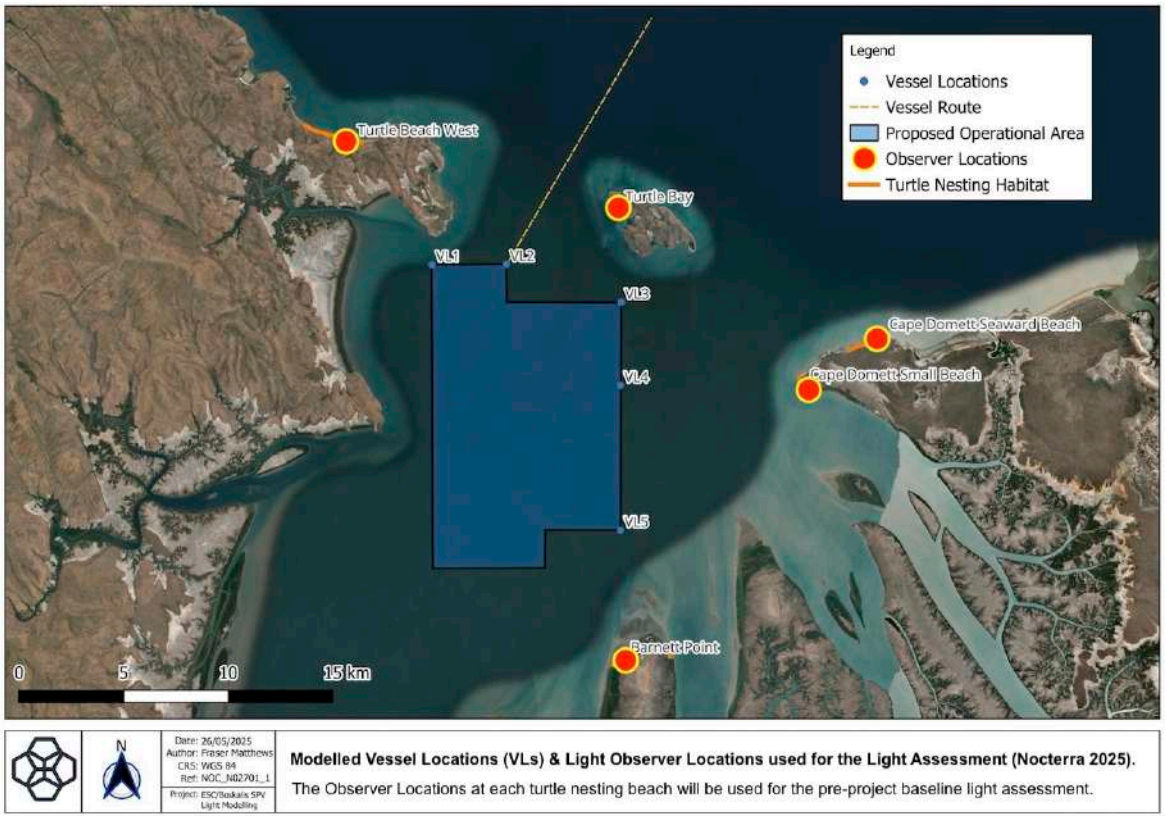


FIGURE A.8.1. *The modelled Light Observer Locations at each turtle nesting site used for the light assessment by Nocterra (2025). For consistency and continuity, the same sites will be used for the pre-project baseline light assessment.*