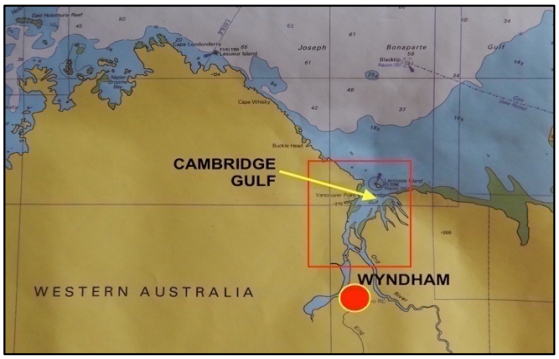
Referral Report No. 7

COMMONWEALTH PROTECTED MATTERS

Boskalis Cambridge Gulf Marine Sand Proposal
Western Australia



Prepared for Boskalis Australia Pty Ltd by EcoStrategic Consultants

For submission to:
- Western Australia Department of Water & Environmental Regulation
- Western Australia Environmental Protection Authority

In support of Project Referral under Section 38 of the Western Australia *Environmental Protection Act*

AUGUST 2024

Boskalis

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ACRONYMS

AMSA	Australian Maritime Safety Authority
BC Act	WA Biodiversity Conservation Act
BIA	Biologically Important Area
BKA	Boskalis Australia Pty Ltd
BWM Convention	International Convention for the Control & Management of Ships' Ballast Water & Sediments
CG	Cambridge Gulf
CMS	Convention on Migratory Species
COLREGS	International Regulations for Preventing Collisions at Sea
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
DPLH	WA Department of Planning, Lands & Heritage
EIS	Environmental Impact Statement (under EPBC Act)
EPA	WA Environmental Protection Authority
EP Act	WA Environmental Protection Act
EPBC Act	Commonwealth *Environment Protection & Biodiversity Conservation Act*
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships
MNES	Matters of National Environmental Significance (under Commonwealth EPBC Act)
OPMs	Other Protected Matters
PMST	(Commonwealth) Protected Matters Search Tool
PER	Public Environment Report (under EPBC Act)
Ramsar	Convention on Wetlands of International Importance
SPV	Sand Production Vessel
SWEK	Shire of Wyndham & East Kimberley
TO	Traditional Owner
TSHD	Trailer Suction Hopper Dredger
WA	Western Australia (State of)

REFERRAL DOCUMENTS

Report Citation: Boskalis Australia (BKA) (2024f), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 - Referral Report No. 7: *Commonwealth Protected Matters.*

This report is part of a larger set of documents submitted as part of Boskalis Australia's project Referral under section 38 of the Western Australia (WA) *Environmental Protection Act* (EP Act), as listed below.

Documents submitted as part of this Referral package (August 2024):	
Short Title	**Full citation**
EPA Form: *Referral of a Proposal under s38 of EP Act.*	EPA Form (2024): Referral of a Proposal under s38 of EP Act - Boskalis Cambridge Gulf Marine Sand Proposal.
EPA Template: *Proposal Content Document.*	EPA Template (2024): Proposal Content Document - Boskalis Cambridge Gulf Marine Sand Proposal.
Referral Report No. 1: *Environmental Regulatory Framework.*	Boskalis Australia (BKA) (2024a), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 1: *Environmental Regulatory Framework.*
Referral Report No. 2: *Proposal Setting & Existing Environment Descriptions.*	Boskalis Australia (BKA) (2024b), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 2: *Proposal Setting & Existing Environment Descriptions.* Annexes include: – Sand resource assessment report - Boskalis. – BCH mapping methods statement - MScience – Coastal LiDAR report - Sensorem. – Sediment contamination assessment report. – eDNA report - University of Canberra. – Turtle nesting report - EcoStrategic / DBCA.
Referral Report No. 3: *Traditional Owner Matters.*	Boskalis Australia (BKA) (2024c), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 3: *Traditional Owners, Native Title & Aboriginal Cultural Heritage*. Annexes include: – Letters of support from the two TO groups.
Referral Report No. 4: *Impact Assessments.*	Boskalis Australia (BKA) (2024d), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 *Referral Report No. 4: Impact Assessments of Key Environmental Factors.*
Referral Report No. 5: *Metcocean & Sediment Dynamics.*	Port & Coastal Solutions (PCS) (2024a), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 5: *Metcocean & Sediment Dynamics - System Understanding, Conceptual Model & Initial Modelling.* – Annex 1: PCS (2024b) Supplementary Technical Note. – Annex 2: PCS (2024c) Factual Data Report.
Referral Report No. 6: *Consultation Report.*	Boskalis Australia (BKA) (2024e), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 6: *Stakeholder Engagement & Consultation Report.*
Referral Report No. 7: *Commonwealth Matters.*	Boskalis Australia (BKA) (2024f), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 7: *Commonwealth Protected Matters.* THIS REPORT.
Documents still being developed (to be submitted later).	
Referral Report No. 8: *Metcocean & Sediment Dynamics Full Modelling.*	Port & Coastal Solutions (PCS) (2024d), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 8: *Hydrodynamic, Coastal Processes & Sediment Plume Modelling.*
Referral Report No. 9: *IMSA Package.*	Boskalis Australia (BKA) (2024g), Cambridge Gulf Marine Sand Proposal - WA EP Act s38 Referral Report No. 9: *IMSA Metadata Package Statement.*

PROJECT LOCATION

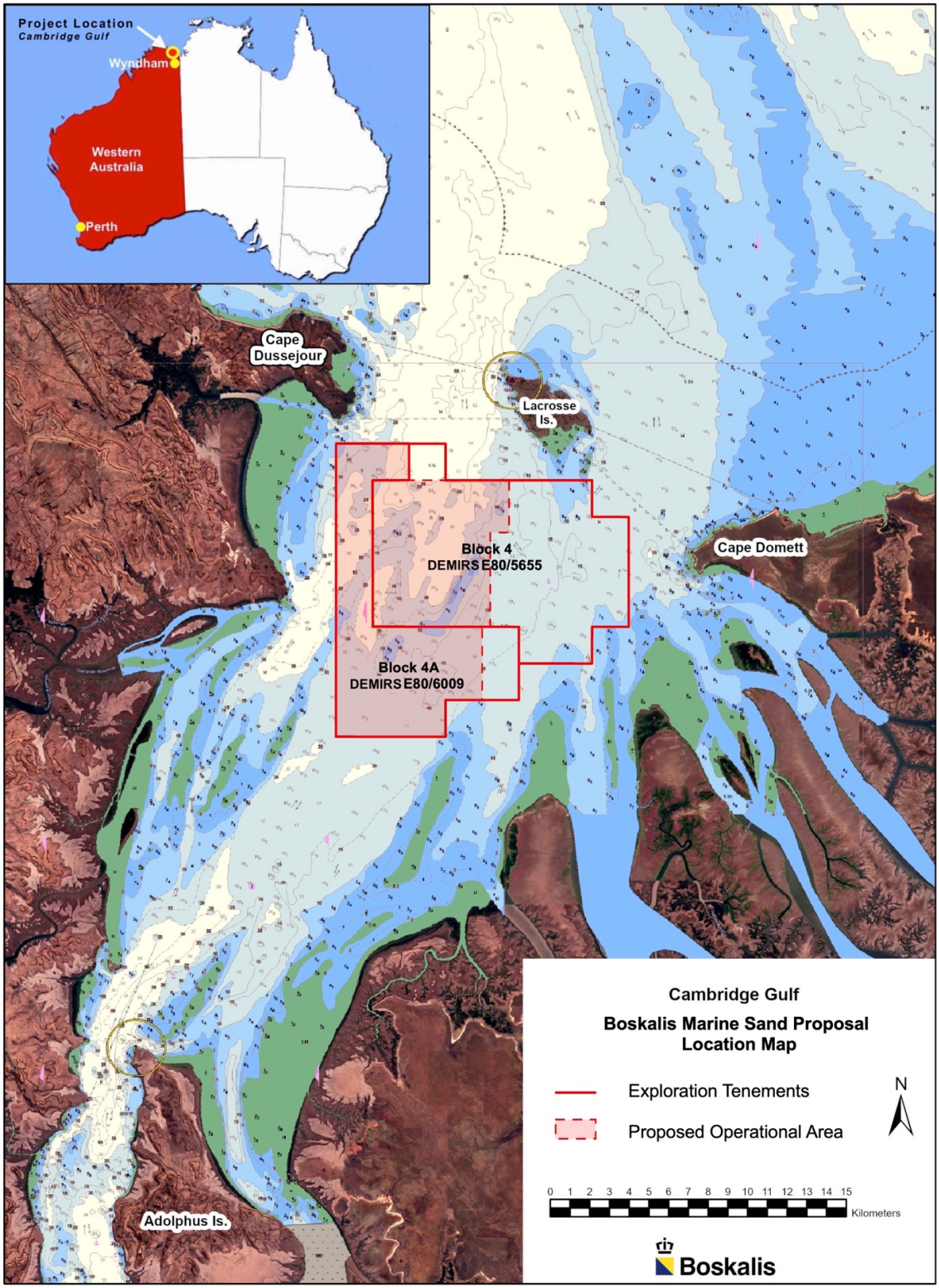


FIGURE 1: *Location of the proposal in Cambridge Gulf near Wyndham in the northeast of Western Australia.*

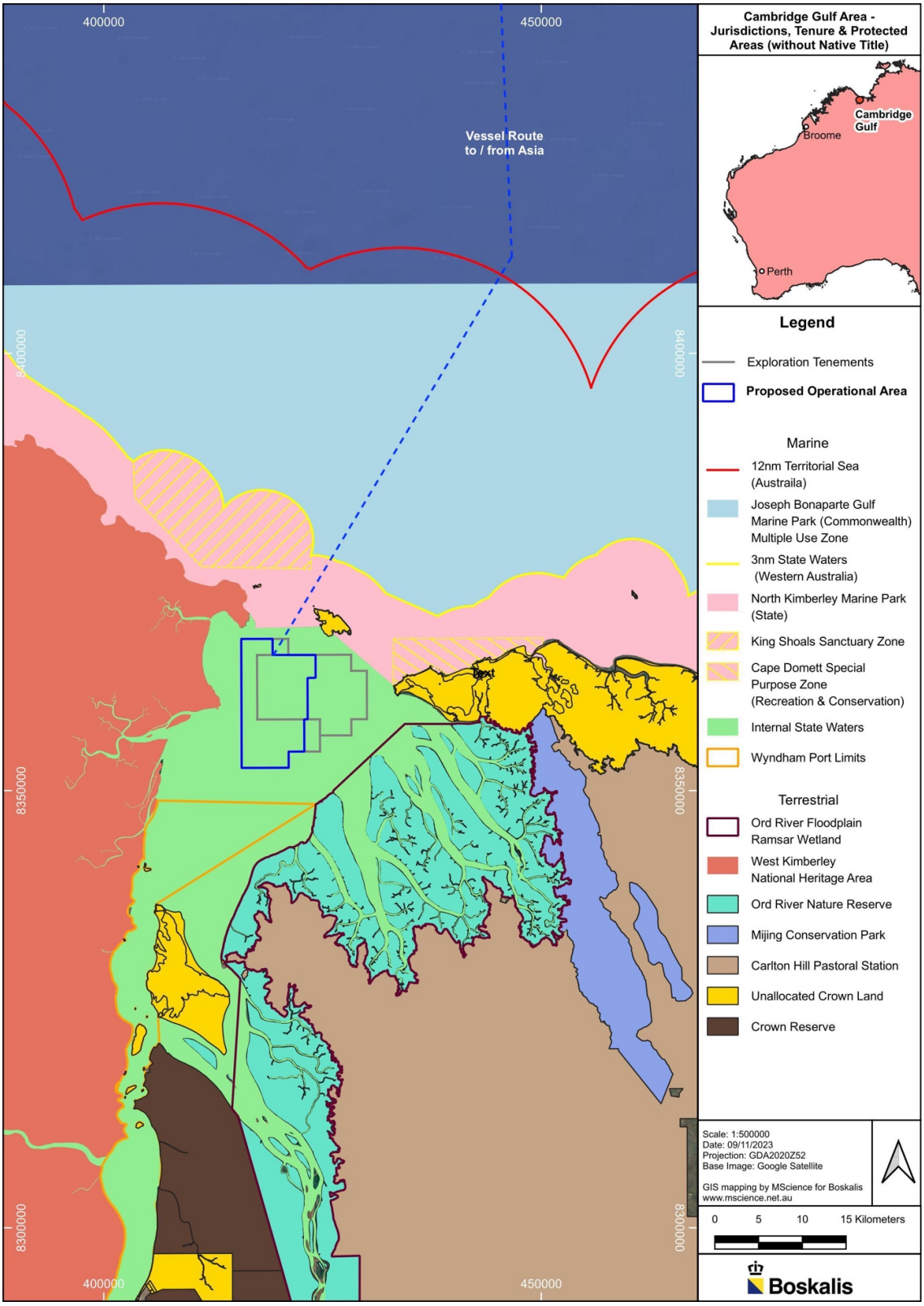


FIGURE 2: *Jurisdictions and tenure in the vicinity of the proposed operational area and the indicative route for the Sand Production Vessel (SPV) to/from Asia.*

EXECUTIVE SUMMARY

1. Boskalis Australia Pty Ltd (BKA) is assessing the feasibility of developing a marine sand-sourcing operation in Cambridge Gulf (CG) near Wyndham in the northeast of Western Australia (WA) (Figure 1). BKA currently holds two sand exploration tenements in CG under the WA *Mining Act*, as the basis for the proposal.

2. To support its assessment BKA has undertaken a wide range of comprehensive studies since 2018. These studies find that the proposal is feasible and viable and unlikely to cause significant environmental impacts, as defined under the WA *Environmental Protection Act* (EP Act) and the Commonwealth *Environmental Protection & Biodiversity Conservation Act* (EPBC Act). Given these findings and the fact that the proposal is subject to the WA *Mining Act,* including the comprehensive environmental assessment and management framework under that Act, as well as a range of other environmental regulatory requirements, BKA considers that the proposal may not require an assessment process under the WA EP Act or Commonwealth EPBC Act.

3. Never-the-less, as a responsible company with stringent environmental and social policies, BKA has committed to self-referring the proposal to both the State and the Commonwealth under their respective Acts, for their determination of what further environmental assessments might be required, if any. If it is determined that assessment is required under both Acts, BKA will seek a joint process under the WA environmental assessment system, which is accredited by the Commonwealth.

4. Subject to the outcomes of the WA EP Act and Commonwealth EPBC Act 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' on Figures 1 and 2.

5. *The purpose of this report is to support BKA's self-referral under the State regulatory framework, by describing Commonwealth environmental matters under the EPBC Act, including Matters of National Environmental Significance (MNES), as they relate to the proposal.*

6. Separate referral documents are submitted to the Commonwealth under the EPBC Act in accordance with the Commonwealth referral requirements on format, structure etc, however the technical content and findings are the same.

7. This report is supported by the suite of reports listed under Referral Documents above. These and other supporting reports are cited where relevant throughout the sections below, and need to be referred to for the scientific and technical bases for the findings presented in this report.

8. A search of the EPBC Act Protected Matters Search Tool (PMST) found that the proposed operational area 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 proposed operational area overlaps with the range of some additional MNES species.

9. 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 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 the report where relevant.

10. 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).*

11. The PMST search found that the 10 km buffer around the proposed operational area overlaps slightly with three area-based MNES, the West Kimberley National Heritage area (the eastern boundary of which follows the west coast of CG), the Ord River Floodplain Ramsar site located on the eastern side of CG, and Commonwealth waters including the Joseph Bonaparte Gulf Marine Park located offshore from CG.

12. The potential for the proposed sand-sourcing operation to cause significant impacts on the identified MNES is systematically assessed in accordance with the EPBC Act significant impact criteria for each MNES type, as per the Commonwealth Significant Impact Guidelines[1], considering the nature, scope, scale and duration of the proposed operation, and the application of the WA EPA's impact mitigation hierarchy of avoid, minimize, offset and rehabilitate impacts.

13. *This assessment finds that the proposed action does not pose a risk of significant impact on any of the identified MNES, as defined by the Commonwealth Significant Impact Guidelines.*

[1] www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

1. BACKGROUND & BRIEF DESCRIPTION OF THE PROPOSAL

Brief summary only - pls refer Proposal Content Document for details.

1. Boskalis Australia Pty Ltd (BKA) is assessing the feasibility of developing a marine sand-sourcing operation in Cambridge Gulf (CG) near Wyndham in the northeast of Western Australia (WA) (Figure 1). The sand in CG is derived from natural terrestrial sources via river inputs. The sand would be exported to Asian markets for use in construction projects. In proposing CG, BKA has screened alternatives as outlined in Referral Report No. 4 - *Impact Assessments* (BKA 2024d).

2. The proposal is subject to the WA *Mining Act* including the comprehensive environmental assessment and management framework under that Act. BKA currently holds two exploration tenements in CG, E80/5655 (Block 4) and E80/6009 (Block 4A) (Figures 1 to 3). Based on sand distribution, the proposed operational area where BKA proposes to apply for a mining tenement is the western part of Block 4 and all of Block 4A (Figure 1 & 2). Key data 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 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 Figures 1 and 2. Water depths within the area average -25 m MSL. The seabed within and around the proposed operational area 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.

    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) (Figure 4). 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 at this stage, indicative specifications are Length Overall (LoA) of ~350 m, draft of ~19 m, sand capacity 75K m^3 to 125K m^3 and crew of ~25.

    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. There will be no refuelling or waste discharges in CG.

    f) Sand volumes: Exploration surveys indicate that there is a minimum of 300 million m^3 of sand in the proposed operational area 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 proposed operational area, and a much smaller % of the volume of sand that occurs throughout CG overall.

    g) Low footprint each loading cycle: During each one- to two-day sand loading cycle, the SPV will work over an area of ~0.5 km^2 within the proposed operational area, 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.

    i) No significant environmental impacts: Overall, due to the above factors and other factors as assessed in Referral Report No. 4 - *Impact Assessments* (BKA 2024d) and Referral Report No. 5 - *Metocean & Sediment Dynamics* (PCS 2024a), and with the implementation of best-practice impact avoidance, prevention, minimization, mitigation, management and monitoring measures, the proposal is unlikely to cause significant environmental impacts. If the proposal proceeds, BKA will seek to support research and monitoring initiatives to improve environmental protection and biodiversity conservation in the area, in cooperation with relevant stakeholders including TOs (see BKA 2024d).

    j) Economic benefits & TO support: The proposal will generate a range of economic benefits, including payment of State royalties, payment of voluntary royalties to TO groups, up to 40-50 local jobs, service contracts and business opportunities with a priority focus on TOs, and support for local Indigenous Ranger groups and community development. Both TO groups in the area, Balanggarra and Miriuwung-Gajerrong, have issued letters of support for the proposal (see Referral Report No. 3 - *Traditional Owner Matters*, BKA 2024c).

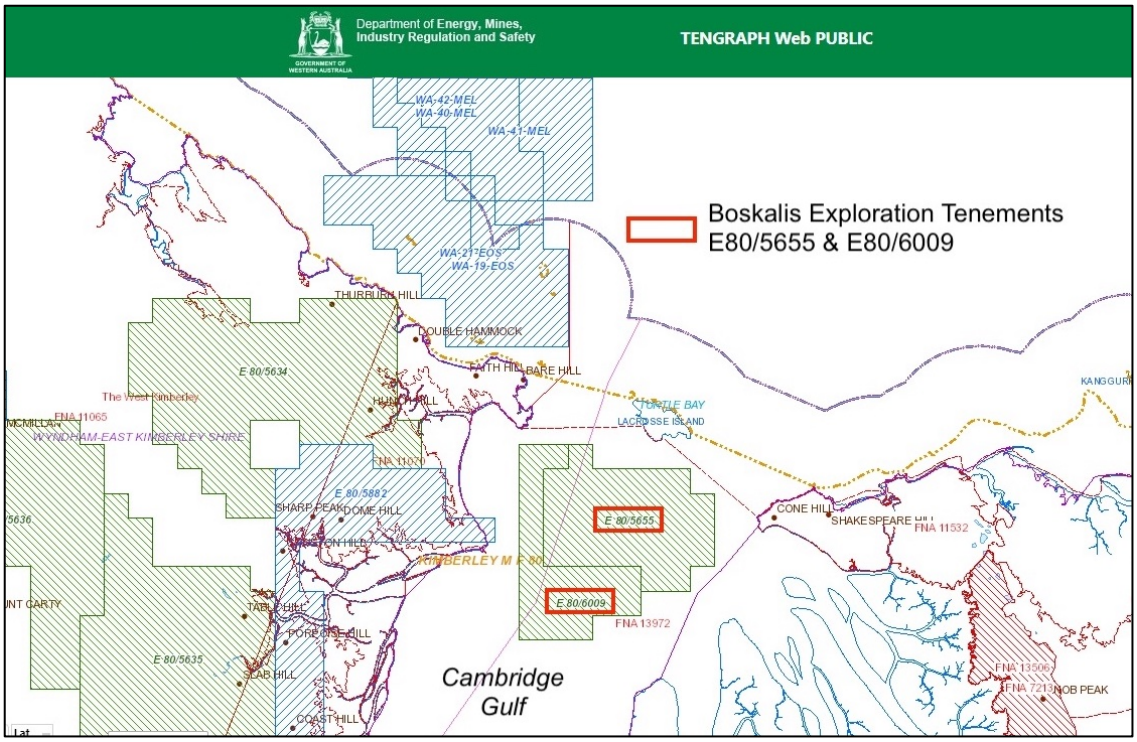


FIGURE 3: *DEMIRS Tengraph map of BKA's two exploration tenements in Cambridge Gulf.*

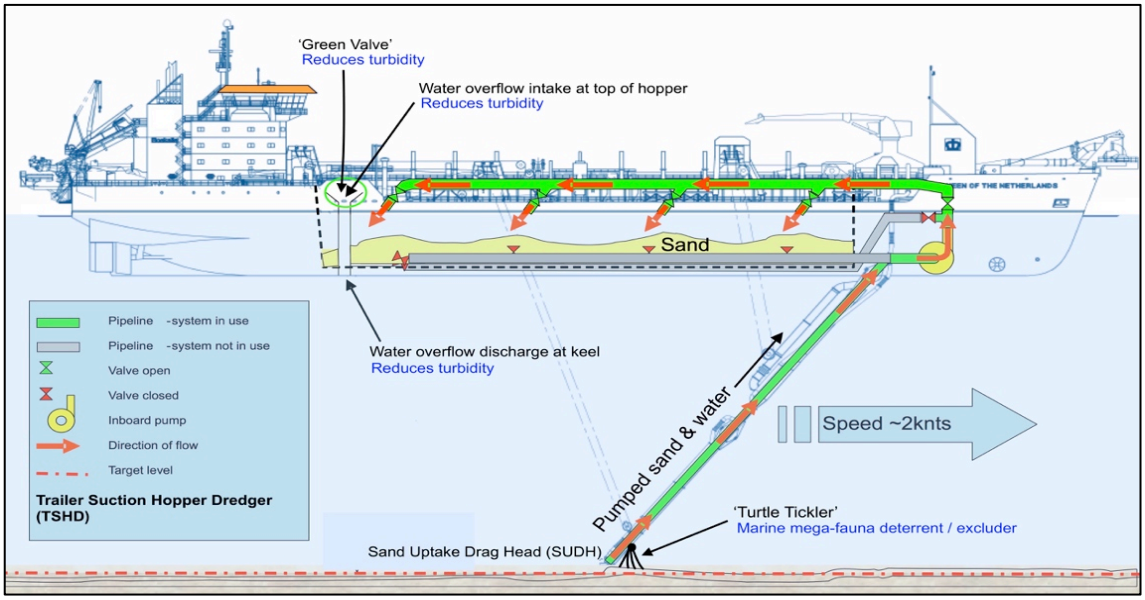


FIGURE 4: *The proposed operation will involve a single Sand Production Vessel (SPV) based generally on the design of a large Trailer Suction Hopper Dredger (TSHD).*

2. PURPOSE OF THIS REPORT

1. To support its assessment of the feasibility of the CG marine sand proposal, BKA has undertaken a wide range of environmental, engineering, economic and other studies since 2018. These studies find that the proposal is feasible and viable and unlikely to cause significant environmental impacts, as defined under the WA *Environmental Protection Act* (EP Act) and the Commonwealth *Environmental Protection & Biodiversity Conservation Act* (EPBC Act). The findings of these studies in terms of State impact assessments are presented in Referral Report No. 4 - *Impact Assessments* (BKA 2024d).

2. Despite the low likelihood of significant environmental impacts, as a responsible company with stringent environmental and social policies, BKA has committed to self-referring the proposal to the WA Environmental Protection Authority (EPA) under section 38 of the EP Act, and to the Commonwealth under Part 7 of the EPBC Act, for their determination of what further environmental assessments might be required, if any. If it is determined that assessment is required under both Acts, BKA will seek a joint process under the WA environmental assessment system, which is accredited by the Commonwealth.

3. As outlined in section 1 the proposal is subject to the WA *Mining Act,* including the comprehensive environmental assessment and management framework under that Act. Subject to the outcome of the WA EP Act and Commonwealth EPBC Act referral processes, BKA plans to apply to the WA Department of Energy, Mines, Industry Regulation & Safety (DEMIRS) to convert part the two Exploration Tenements to a single Mining Tenement, excluding the eastern half of Block 4 due to the lack of sand in that area, and covering the proposed operational area only, as shown on Figures 1 and 2.

4. *The purpose of this report is to support BKA's self-referral under the State regulatory framework, by describing Commonwealth environmental matters under the EPBC Act, including Matters of National Environmental Significance (MNES), as they relate to the proposal.*

5. Separate referral documents are submitted to the Commonwealth under the EPBC Act in accordance with the Commonwealth referral requirements on format, structure etc, however the technical content and findings are the same.

6. This report is supported by the suite of reports listed under Referral Documents above, and in particular the scientific and technical assessments contained in:

   - Referral Report No. 2 - *Proposal Setting & Existing Environment Descriptions* (BKA 2024b).
   - Referral Report No. 4 - *Impact Assessments of Key Environmental Factors* (BKA 2024d).
   - Referral Report No. 5 - *Metcocean & Sediment Dynamics (PCS 2024a, b & c)*

7. These and other supporting reports are cited where relevant throughout the sections below, and need to be referred to for the scientific and technical bases for the findings presented in this report.

3. OVERALL JURISDICTIONAL SETTING

1. A detailed description of the CG environment is contained in Referral Report No. 2 - *Proposal Setting & Existing Environment Descriptions* (BKA 2024b). This section presents a brief description of the jurisdictional setting only, in order to provide some context for the assessment of Commonwealth protected matters in the following sections.

2. As shown on Figures 2, 5 and 6, Cambridge Gulf (CG) and BKA's proposed operational area are located within the State Internal Waters of WA (landward of the Territorial Sea Baseline), and are thus subject to the full jurisdiction of the State of WA. The area is also within the sovereign territory of Australia and subject to relevant Commonwealth laws.

3. To seaward of CG is the State North Kimberly Marine Park, which extends from the Territorial Sea Baseline seaward to the 3 nm State limit, also within the jurisdiction of WA. Seaward of the 3 nm State limit are Commonwealth waters of the Commonwealth Joseph Bonaparte Gulf Marine Park.

4. The Port of Wyndham is located ~80 km upstream from the main body of CG and is under the jurisdiction of the Kimberley Ports Authority (KPA). The proposed operational area is not within the declared port area (the seaward extent of the port limits is shown on Figure 5). The local Government for the area is the Shire of Wyndham & East Kimberley (SWEK), with its main office in Kununurra.

5. As shown on Figure 5, the coast and hinterland on the western side of CG are Native Title lands of the Balanggarra peoples, which includes marine areas of the State Marine Park out to 3 nm. The coast and hinterland on the eastern side of CG are Native Title lands of the Mirriuwung-Gajerrong peoples, which includes marine areas within the 'False Mouths of the Ord River', which are part of the State Ord River Nature Reserve. There is no Native Title determination over marine waters within the main body of CG, including the proposed operational area (see also Referral Report No. 3 - *Traditional Owner Matters*) (BKA 2024c).

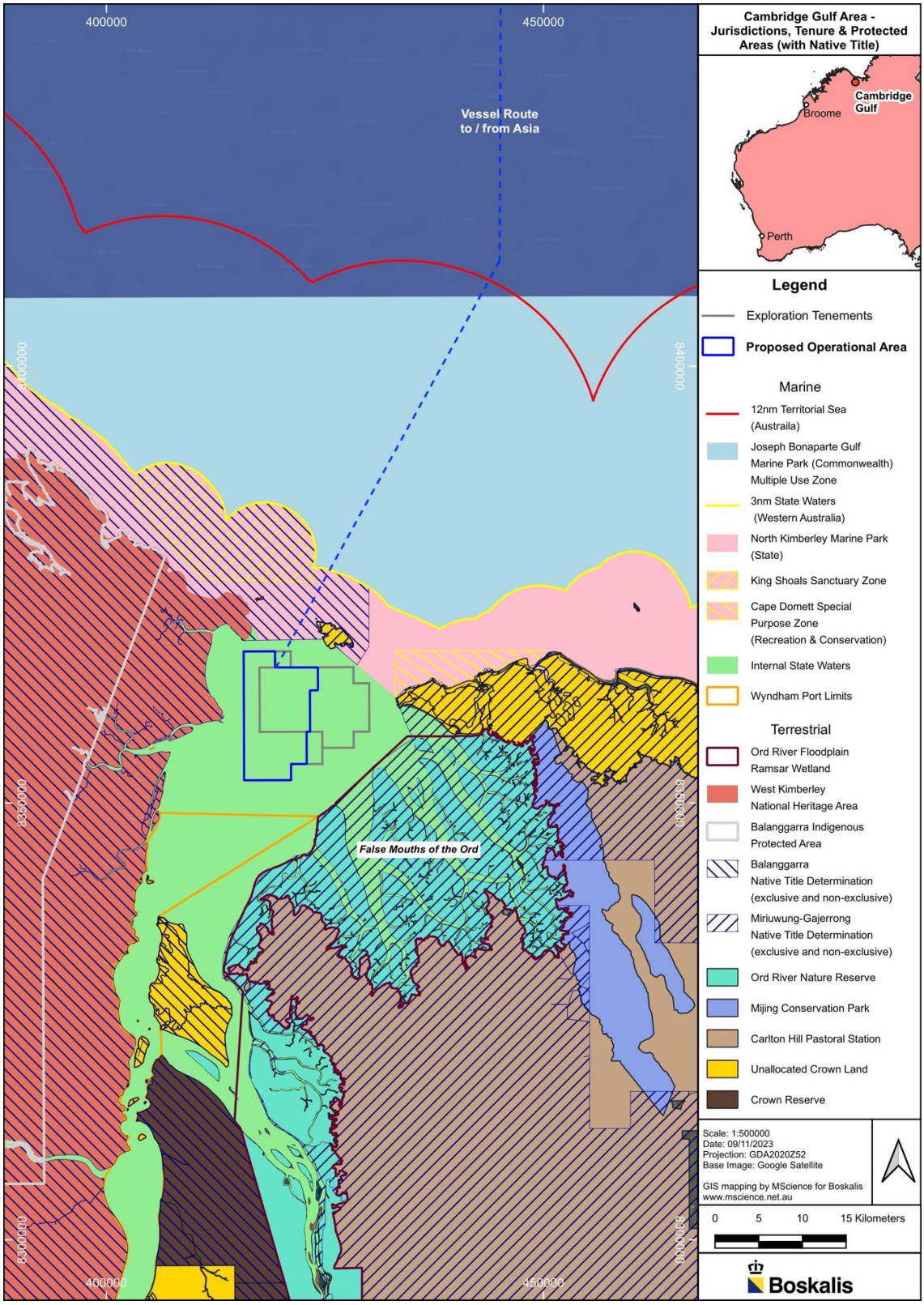


FIGURE 5: *Jurisdictions and tenure in the area including Native Title.*

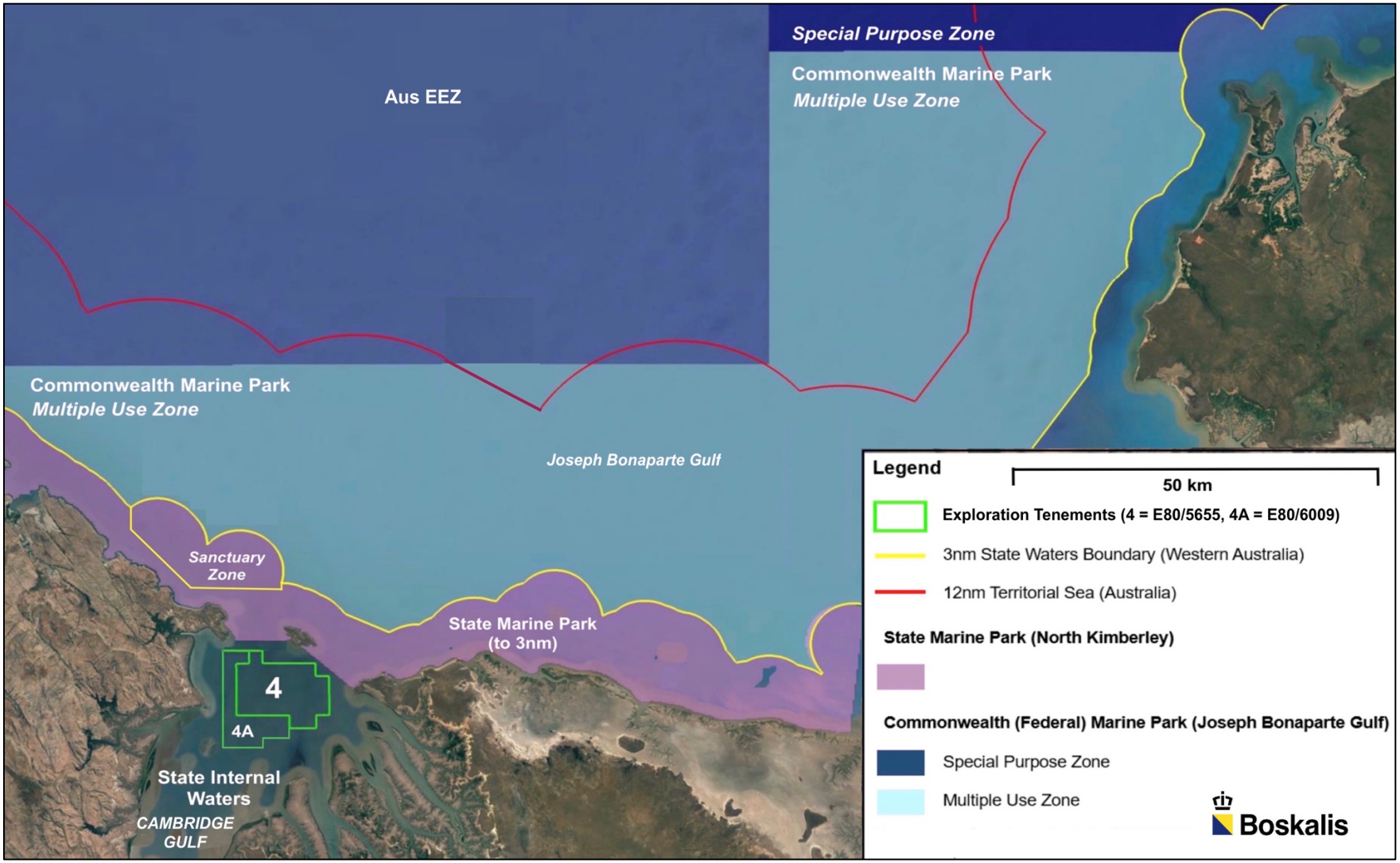


FIGURE 6: *Marine jurisdictions in and around CG.*

4. THE EPBC ACT, MNES & OTHER PROTECTED MATTERS

4.1 The EPBC Act

1. The primary national environmental law in Australia is the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act), administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (www.dcceew.gov.au). The objectives of the EPBC Act are:

    a) protection of the environment, especially defined Matters of National Environmental Significance (MNES) (see section 4.2 below),

    b) promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources,

    c) conservation of biodiversity,

    d) protection and conservation of heritage,

    e) a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and

    f) co-operative implementation of Australia's international environmental responsibilities.

2. The EPBC Act applies throughout the Australian jurisdiction, which includes all States and Territories and marine waters out to the outer limits of Australia's Exclusive Economic Zone (EEZ) or continental shelf (whichever extends further). It can also apply to Australian individuals, corporations, entities, vessels and aircraft beyond the EEZ or continental shelf.

3. The EPBC Act does not exclude or limit the concurrent operation of any State or Territory law. The Act applies in *addition to*, and not *instead of* State and Territory law.

4. The EPBC Act is divided into two volumes, with Volume 1 being relevant to this assessment. Some of the main provisions of Volume 1 include, *inter alia:*

    a) A prohibition on taking any action that causes, will cause or is likely to cause significant impact on MNES (see section 4.2 below), unless such action is approved by the Commonwealth-Minister for the Environment or another prescribed approval (criteria for 'significant impact' for each MNES are laid out in guidelines[2]).

    a) Procedures for referring a proposed action to the Commonwealth, and for assessing whether or not a proposed action requires assessment and approval, including consideration of whether it may cause significant impact to MNES (if a proposed action is deemed to require assessment and approval, it becomes a controlled action).

    b) The level and type of assessment required for a controlled action, ranging from preliminary documentation, to a Public Environment Report (PER), to an Environmental Impact Statement (EIS) to an Inquiry with Commissioners, and their procedures and processes.

    c) Arrangements for bilateral agreements between the Commonwealth and States, under which EPBC Act assessments and approvals can be undertaken by the States.

    d) Procedures for listing threatened ecological communities, threatened species and migratory species (which once listed, become MNES).

    e) Procedures for listing other marine species for protection (which once listed, are protected under the EPBC Act but are not necessarily classed as MNES).

    f) Provisions for the protection of all whales and other cetacean species (in addition to those listed as MNES).

5. The EPBC Act defines offences, penalties and strict liability under its various provisions, including for individuals and corporations (civil penalties up to $5.5 million or criminal penalties up to seven years imprisonment).

[2] www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

4.2 Matters of National Environmental Significance (MNES)

1. The EPBC Act, Chapter 2, Part 3, Division 1 lists ten MNES as follows:

    a) World Heritage sites.

    b) National Heritage sites.

    c) Wetlands of international importance (Ramsar sites) (designated under the *Convention on Wetlands of International Importance* signed at Ramasr, Iran in 1971).

    d) Listed threatened ecological communities (classed as Critically Endangered, Endangered, Vulnerable or Conservation Dependent) (list issued by the Minister and updated periodically[3]).

    e) Listed threatened species (classed as Critically Endangered, Endangered, Vulnerable or Conservation Dependent) (list issued by the Minister and updated periodically[4]).

    f) Listed migratory species (protected by international conventions, list issued by the Minister and updated periodically[5]).

    g) Nuclear actions, including uranium mines.

    h) Commonwealth marine areas – all Australian waters from the 3 nm State limit out to the outer limits of Australia's Exclusive Economic Zone (EEZ) or continental shelf - whichever extends further.

    i) The Great Barrier Reef Marine Park.

    j) Protection of water resources from coal seam gas and coal mining.

2. As outlined under 4.1 above, the Act creates offences for actions that have, will have, or are likely to have a significant impact on MNES. The Act also requires that when there is potential for a project (an 'action') to cause significant impact on MNES, it may be classified as a controlled action, the environmental assessment requirements of the Act are triggered, and a Commonwealth Environmental Approval (EA) must be applied for.

4.3 Other Protected Matters (OPMs)

1. In addition to defining and protecting MNES, the EPBC Act also protects a range of other environmental resources and values (referred to in this report as Other Protected Matters or OPMs). These include *inter alia*:

    a) Commonwealth Lands.

    b) Commonwealth Heritage.

    c) Listed Marine Species (in addition to those listed as MNES).

    d) Whale and Other Cetacean Species (in addition to those listed as MNES).

    e) Critical Habitats.

    f) Commonwealth Reserves - Terrestrial.

    g) Australian Marine Parks.

2. While the presence of OPMs in or near the footprint of a proposed action does not potentially trigger the EPBC Act assessment and approval process in the same way that MNES can, the fact that they are protected under the EPBC Act means that the proposal must still ensure that significant impacts are not caused on OPMs. Hence, they are included in this report.

[3] https://www.dcceew.gov.au/environment/biodiversity/threatened/communities
[4] https://www.dcceew.gov.au/environment/epbc/our-role/approved-lists#species
[5] https://www.dcceew.gov.au/environment/biodiversity/migratory-species

4.4 Biologically Important Areas (BIAs)

1. The Commonwealth can declare BIAs over areas where a specific biologically important behaviour for marine species that are protected under the EPBC Act is assessed to occur, such as breeding, foraging, resting and migration. BIA's can be spatial (a defined geographical area) and/or temporal (e.g. a breeding or migration season).

2. BIAs do not have legal standing or regulatory bases in themselves, they are designed to 'flag' the importance of an area to a particular protected species, and should be taken into account when assessing potential impacts of any proposed development(s) in that area.

3. BIAs can be taken into account when designing suitable and effective measures to prevent, mitigate, manage and monitor potential impacts on protected species, considering the biologically important behaviour of the species that the BIA relates to (breeding, foraging, resting, migration etc).

4. BIAs may also assist with identifying information gaps about the protected species and their biologically important behaviour(s) and prioritising future research.

5. BIAs can be located anywhere within the Australian marine environment including State, Commonwealth and adjacent waters. They can also be designated over terrestrial areas used for biologically important behaviours by marine species, for example land-based nesting habitats for marine turtles and seabirds.

6. Designated BIAs in the CG area relate to marine turtle species and the Snubfin Dolphin (*Orvaella heinsohni*), as summarized in section 7 and assessed in detail in sections 10.2 and 10.3.

5. METHODS USED TO ASSESS COMMONWEALTH PROTECTED MATTERS

1. The assessment in this report was undertaken following the procedures and criteria outlined in the DCCEEW document:

   Commonwealth of Australia 2013, Matters of National Environmental Significance, Significant Impact Guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999 (the Significant Impact Guidelines)[6].

2. This included the following step-wise procedure:

   a) identify if there are there any MNES at four scales, within BKA's proposed operational area and within a 10, 20 and 30 km buffer around the area, using the DCCEEW Protected Matters Search Tool (PMST[7]) (Figures 7 & 8),

   b) assess if there is potential for impacts on MNES, considering the nature, scale and duration of BKA's proposed operational activities at their broadest scope,

   c) assess possible measures to prevent, reduce and mitigate impacts on MNES, and any residual impacts,

   d) assess whether any impacts on MNES are likely to be significant (as defined by the Significant Impact Guidelines); and

   e) include potential indirect and offsite impacts in the assessment.

3. Although the EPBC Act and the Guidelines only require assessment of potential significant impacts on MNES, for completeness this report also includes assessment of potential significant impacts on the OPMs and BIAs that were identified in the PMST search.

4. To facilitate a systematic approach to assessing potential impacts, all identified MNES were incorporated into 'assessment tables' or 'analysis matrices' (the tables in sections 9 & 10 below), giving consideration to:

   a) the nature of each MNES and their quality, value, vulnerability and sensitivity to impacts,

   b) the nature, scope, scale and duration of the proposed operation, as summarised in section 1 above, and whether the operation presents any mechanisms whereby significant impacts might be caused, and what these mechanisms are,

   c) proposed impact prevention, reduction and mitigation measures, and any remaining residual impacts.

5. The assessment of likely significant impact took a conservative approach based on the Precautionary Principle, and was based on the criteria and procedures outlined in the Significant Impact Guidelines.

6. The Guidelines state that generally, the assessment of significant impact should consider the scale, duration and intensity of the proposed action and its impacts, and this is reflected in the assessment.

7. The Guidelines state that for a significant impact to be assessed as 'likely', it is not necessary for it to have a greater than 50% chance of occurring; it is sufficient if there is a real or not remote chance or possibility of it occurring, and this is reflected in the assessment.

8. The Guidelines also provide detailed criteria that should be applied when assessing the potential for significant impact on each type of MNES. These are summarized in Table 1 and are included and assessed as relevant for each MNES in the assessment tables in sections 9 and 10.

9. The potential for indirect and offsite impacts was considered in the assessment.

10. The Significant Impact Guidelines also provide specific guidance on the assessment of marine activities, including examples of what types of marine activities are considered to present a risk of significant impacts to MNES and those that do not. Because the BKA proposal is a wholly marine activity, section 13 includes an assessment against the Guidelines' marine criteria.

[6] www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance
[7] www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

TABLE 1: *Detailed criteria for assessing the potential for significant impact on each type of MNES.*

From www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance

MNES (as listed in the EPBC Act)	Significant Impact Criteria
1. World Heritage sites:	Not relevant to this proposed action – none in the area.
2. National Heritage places:	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.
3. Wetlands of international importance:	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: • areas of the wetland being destroyed or substantially modified, • 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 habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected, • 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 • 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.
4. Listed threatened ecological communities:	Not relevant to this proposed action – none in the area.
5. Listed threatened species (with the following two sub-categories):	
– Critically Endangered & Endangered species:	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of a population, • reduce the area of occupancy of the species, • fragment an existing population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of a population, • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat, • introduce disease that may cause the species to decline; or • interfere with the recovery of the species.
– Vulnerable species:	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species, • reduce the area of occupancy of an important population, • fragment an existing important population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of an important population • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.

MNES (as listed in the EPBC Act)	Significant Impact Criteria
6. Listed migratory species:	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
7. Nuclear actions, including uranium mines:	Not relevant to this proposed action.
8. Commonwealth marine areas:	An action is likely to have a significant impact on a Commonwealth marine area if there is a real chance or possibility that the action will: • result in a known or potential pest species becoming established in the Commonwealth marine area, • modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results, • have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution, • result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health, • result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected; or • have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of a historic shipwreck.
9. Great Barrier Reef Marine Park:	Not relevant to this proposed action.
10. Protection of water resources from coal seam gas and coal mining:	Not relevant to this proposed action.

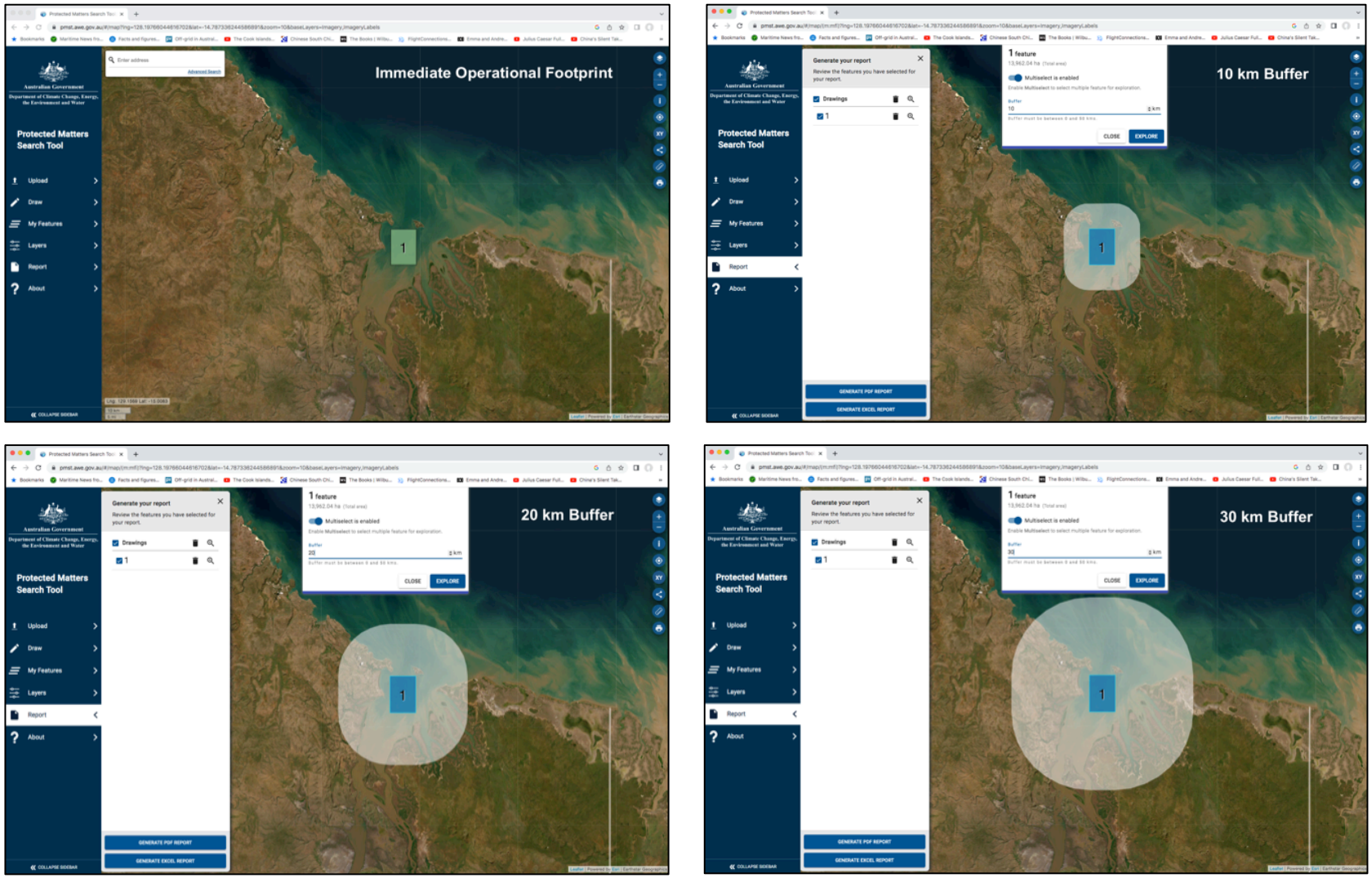
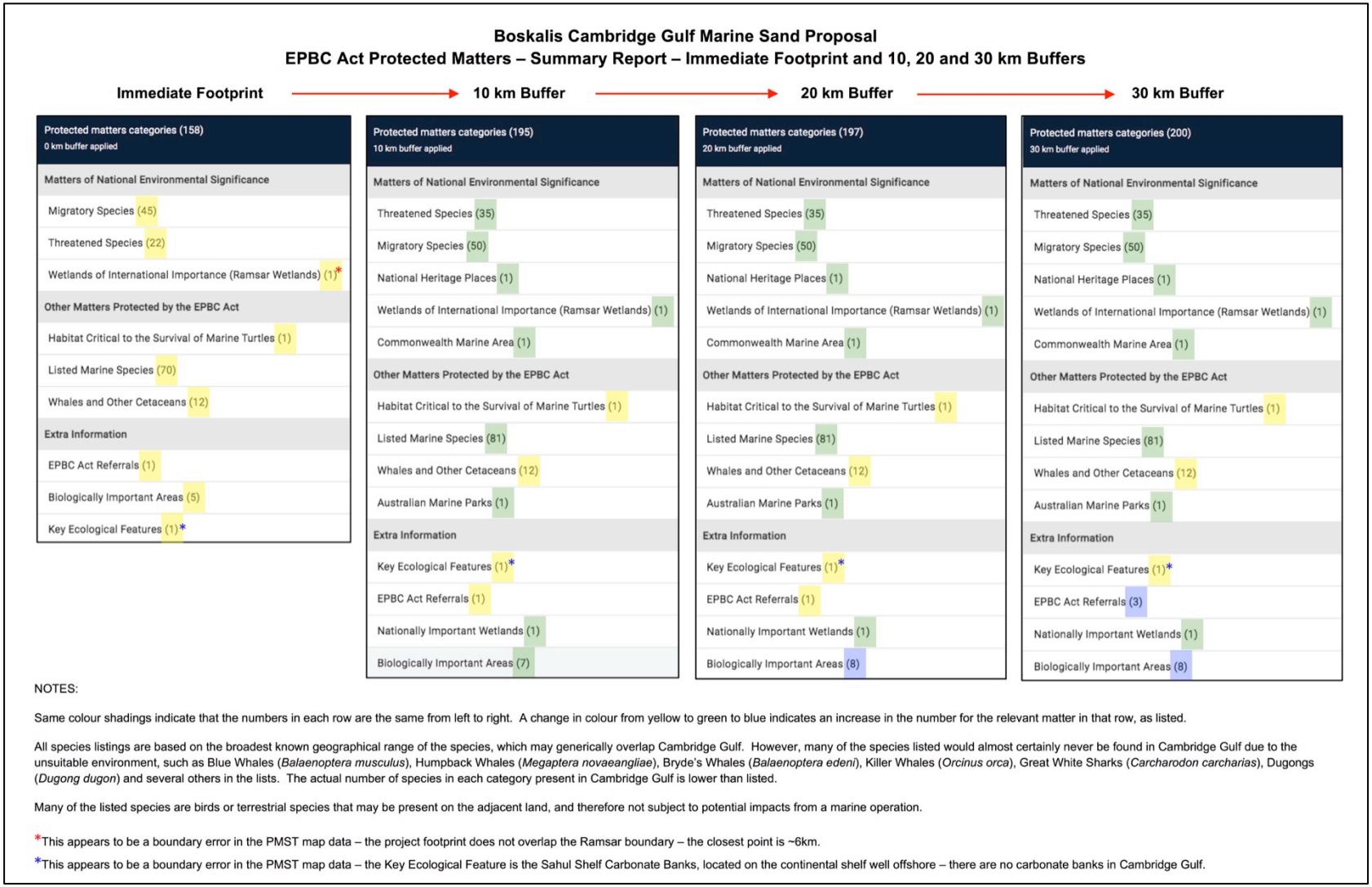


FIGURE 7: *The four search areas applied in the Commonwealth Protected Matters Search Tool (www.dcceew.gov.au/environment/epbc/protected-matters-search-tool).*



NOTES:

Same colour shadings indicate that the numbers in each row are the same from left to right. A change in colour from yellow to green to blue indicates an increase in the number for the relevant matter in that row, as listed.

All species listings are based on the broadest known geographical range of the species, which may generically overlap Cambridge Gulf. However, many of the species listed would almost certainly never be found in Cambridge Gulf due to the unsuitable environment, such as Blue Whales (*Balaenoptera musculus*), Humpback Whales (*Megaptera novaeangliae*), Bryde's Whales (*Balaenoptera edeni*), Killer Whales (*Orcinus orca*), Great White Sharks (*Carcharodon carcharias*), Dugongs (*Dugong dugon*) and several others in the lists. The actual number of species in each category present in Cambridge Gulf is lower than listed.

Many of the listed species are birds or terrestrial species that may be present on the adjacent land, and therefore not subject to potential impacts from a marine operation.

*This appears to be a boundary error in the PMST map data – the project footprint does not overlap the Ramsar boundary – the closest point is ~6km.

*This appears to be a boundary error in the PMST map data – the Key Ecological Feature is the Sahul Shelf Carbonate Banks, located on the continental shelf well offshore – there are no carbonate banks in Cambridge Gulf.

FIGURE 8: *Summary of the Protected Matters findings for the immediate footprint and the 10, 20 and 30 km buffers. Same colour shadings indicate that the numbers in each row are the same from left to right. A change in colour indicates an increase in the number for the relevant matter in that row. Note there is almost no difference between the buffers.*

6. PRESENCE & PROXIMITY OF MNES

1. Because, as shown on Figure 8, there is almost no difference in MNES between the 10, 20 and 30 km buffers, and because there are limited mechanisms whereby impacts might occur beyond the proposed operational area, the findings are presented for the operational area and the 10 km buffer. The findings for the 10 km buffer can be interpolated to the 20 and 30 km buffers, but with decreasing potential for impacts.

6.1 Species Range Resolution in PMST results

1. It should be noted that biogeographical range data in the PMST is broadscale and subject to generalizations and errors due to lack of local range data for many species in many areas around Australia. It should be noted that many species listed as potentially present in the proposed operational area and/or the 10 km buffer, based on the PMST search, are not actually present in CG, due to the inhospitable environmental conditions and unsuitable habitat in CG.

2. For example (amongst others) the PMST identifies that Dugongs (*Dugong dugon*), Great White Sharks (*Carcharodon carcharias*), Whale Sharks (*Rhincodon typus*), Blue Whales (*Balaenoptera musculus*), Brydes Whales (*Balaenoptera brydei)*, Humpback Whales (*Megaptera novaeangilae*), Killer Whales (*Orcinus orca*) and other large species may be present in CG, when the environmental conditions in CG relative to the requirements and preferences of these species make this extremely unlikely, and they have never been sighted there (BKA 2024b).

3. Similarly, the PMST search lists multiple migratory wader birds and shorebird as known to occur in the proposed operational area, despite the fact that these species feed along the shoreline and roost above the high tide line, and are therefore highly unlikely that to be found in the open-water marine area of the proposed operational area in the middle of CG. The PMST even lists some wholly-terrestrial species as being in the marine waters of the proposed operational area.

4. The number of MNES species in an area as indicated by the PMST search are therefore be significant over-estimates. The lack of species range resolution in PMST search results should be taken into account when considering what species are actually present and likely to be present. Reference should be made to local-scale surveys and data, as presented in BKA (2024b). This is addressed for each species where relevant in the assessments in section 10.

5. It should also be noted that there appear to be other scale errors in the PMST search – for example the PMST identifies one Wetland of International Importance (the Ord River Floodplain Ramsar Site) as being within the proposed operational area, when in fact there is no overlap – the closest distance is ~6 km, and there is therefore an overlap with the 10 km buffer.

6. Finally, it should be noted that some species are repeated in the different lists, for example some marine turtle species appear in the Threatened Species, Migratory Species and Marine Species lists (there are multiple other examples). This means that the actual number of species identified by the PMST is less than the sum of the species in all list categories.

6.2 Non-relevant MNES

1. The PMST search finds that five of the ten MNES listed under the EPBC Act are not relevant to the BKA proposal, as follows:

    a) World Heritage sites (none in the area).
    b) Listed threatened ecological communities (none in the area).
    c) The Great Barrier Reef Marine Park (located over 1,7600 km away).
    d) Nuclear actions (not part of the proposed action).
    e) Coal seam gas and coal mining (not part of the proposed action).

6.3 MNES in the Proposed Operational Area

1. Table 2 shows the PMST search results in the proposed operational area, including MNES. The search finds two relevant MNES as follows:

    a) Listed Threatened Species - 22 such species are ‘potentially’ present in the proposed operational area.

    b) Listed Migratory Species - 45 such species are ‘potentially’ present in the proposed operational area.

2. The full details of each species are presented in section 10, including assessment of potential impacts of the proposal. Considering the point under section 6.1 on the lack of bio-geographic range resolution in PMST data, most of the species identified by the search are not actually found in CG, as addressed for each species in section 10.

6.4 MNES in the 10 km Buffer

1. Table 3 shows the PMST search results for the 10 km buffer, including MNES. The search finds five relevant MNES as follows:

    a) Listed Threatened Species - an additional 13 such species (in addition to those listed for the proposed operational area) are 'potentially' present in the 10 km buffer.

    b) Listed Migratory Species - an additional 5 such species (in addition to those listed for the proposed operational area) are 'potentially' present in the 10 km buffer.

    c) National Heritage Place - there is a slight overlap of the 10 km buffer with the eastern boundary of the West Kimberley National Heritage Place on the west coast of CG.

    d) Wetland of International Significance - there is a slight overlap of the 10 km buffer with the Ord River Floodplain Ramsar Site to the east of CG.

    e) Commonwealth Marine Area - there is a slight overlap of the 10 km buffer with the commencement of Commonwealth waters including the Joseph Bonaparte Gulf Marine Park located offshore from CG.

2. The full details of each of these MNES including each of the listed threatened and migratory species are presented in section 10, including assessment of potential impacts of the proposal.

3. Similar to the search results for within the proposed operational area, considering the point under section 6.1 on the lack of bio-geographic range resolution in PMST data, most of the species identified by the search are not actually found in the 10 km buffer or in the broader area, as addressed for each species in section 10.

7. PRESENCE & PROXIMITY OF OPMS & BIAS

Other Protected Matters (OPMs)

1. Table 2 shows the search results for the proposed operational area, including OPMs. These are:

    a) Listed Marine Species - 70 such species are 'potentially' present in the proposed operational area.

    b) Whale & Other Cetacean Species - 12 such species are 'potentially' present in the proposed operational area (these are included in and are not in addition to the 70 Listed Marine Species).

    c) Habitat critical to marine turtles - the Flatback Turtle inter-nesting buffer BIA listed below.

2. Table 3 shows the search results for the 10 km buffer, including OPMs. These are:

    a) Listed Marine Species – an additional 11 such species (in addition to those listed for the proposed operational area) are 'potentially' present in the 10 km buffer.

    b) Whale & Other Cetacean Species – the same 12 such species listed for the proposed operational area are 'potentially' present in the 10 km buffer.

    c) Australian Marine Park - there is a slight overlap of the 10 km buffer with the commencement of the Commonwealth Joseph Bonaparte Gulf Marine Park located offshore from CG.

    d) Habitat critical to marine turtles - the Flatback Turtle inter-nesting buffer BIA listed below.

3. Similar to the search results for MNES, considering the point under section 6.1 on the lack of bio-geographic range resolution in PMST data, most of the OPM species identified by the search are not actually found in CG, the 10 km buffer or in the broader area, as addressed for each species in section 10.

Biologically Important Areas (BIAs)

1. Table 2 shows the search results for the proposed operational area, including BIAs. These are:

    a) Snubfin Dolphin (*Oracella heinshoni*) – the proposed operational area is within breeding, calving, foraging and resting BIA for this species (Figure 9).

    b) Flatback Turtle (*Natator depressus*) – the proposed operational area is within the inter-nesting buffer BIA for this species within a 60 km radius around Cape Domett (Figure 10).

2. Table 3 shows the search results for the 10 km buffer, including BIAs. These are, in addition to the two BIAs listed for the proposed operational area above:

    a) Green Turtle *(Chelonia mydas)* - the 10 km buffer slightly overlaps with a foraging BIA for this species (Figure 11).

    b) Olive Ridley Turtle *(Lepidochelys olivacea)* - the 10 km buffer slightly overlaps with a foraging BIA for this species (Figure 12).

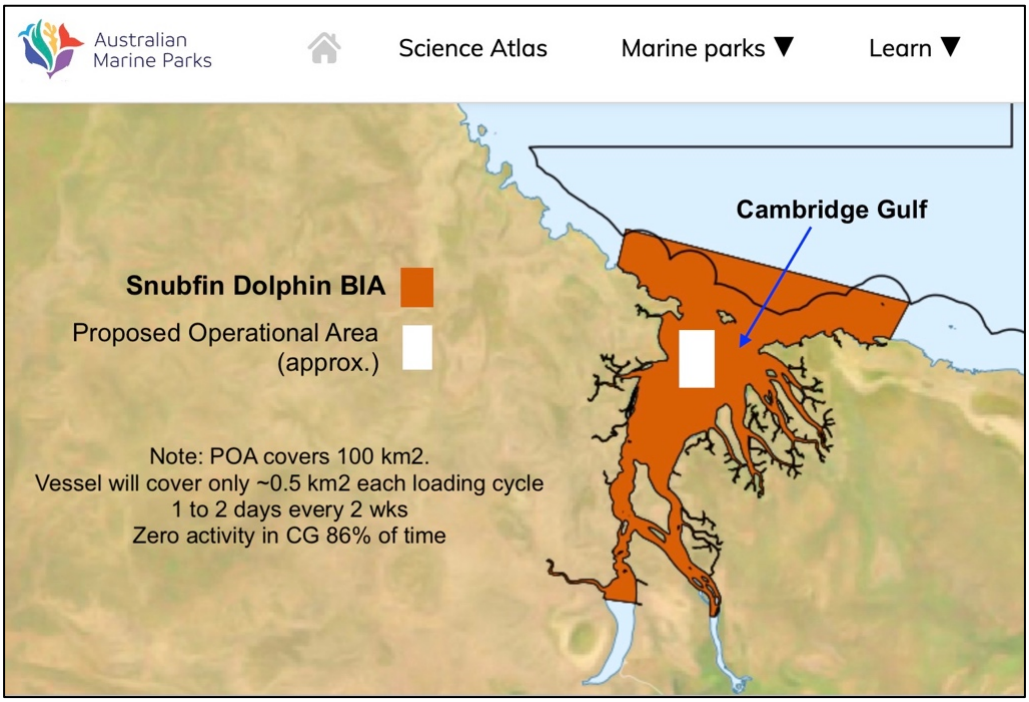


FIGURE 9: *Snubfin Dolphin (Oracella heinshoni) breeding, calving, foraging and resting BIA.*

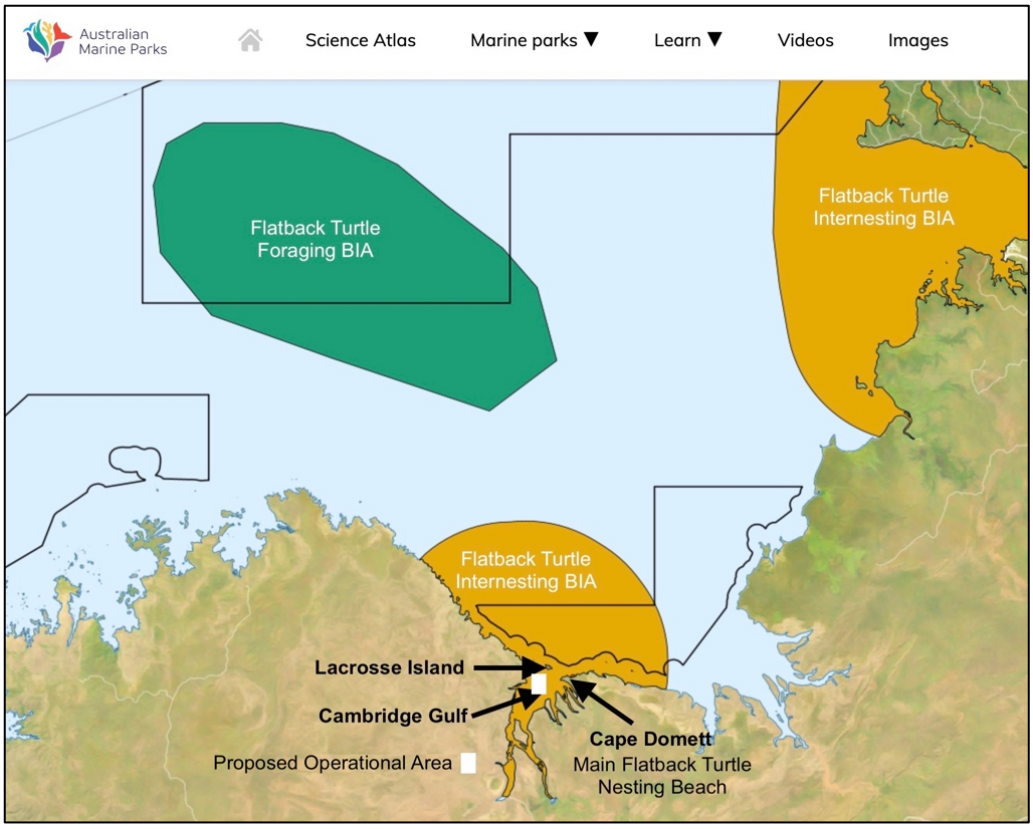


FIGURE 10: *Flatback Turtle (Natator depressus) inter-nesting buffer BIA within 60 km radius around Cape Domett.*

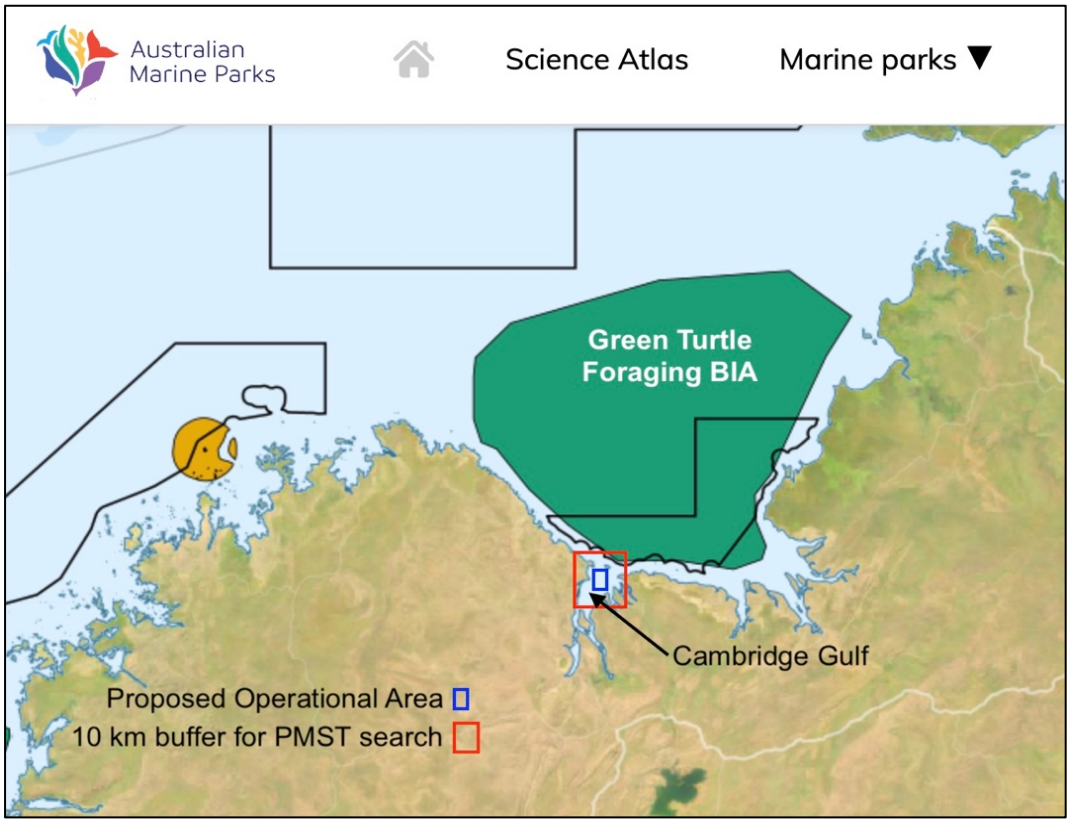


FIGURE 11: *Green Turtle (Chelonia mydas) foraging BIA offshore from CG.*

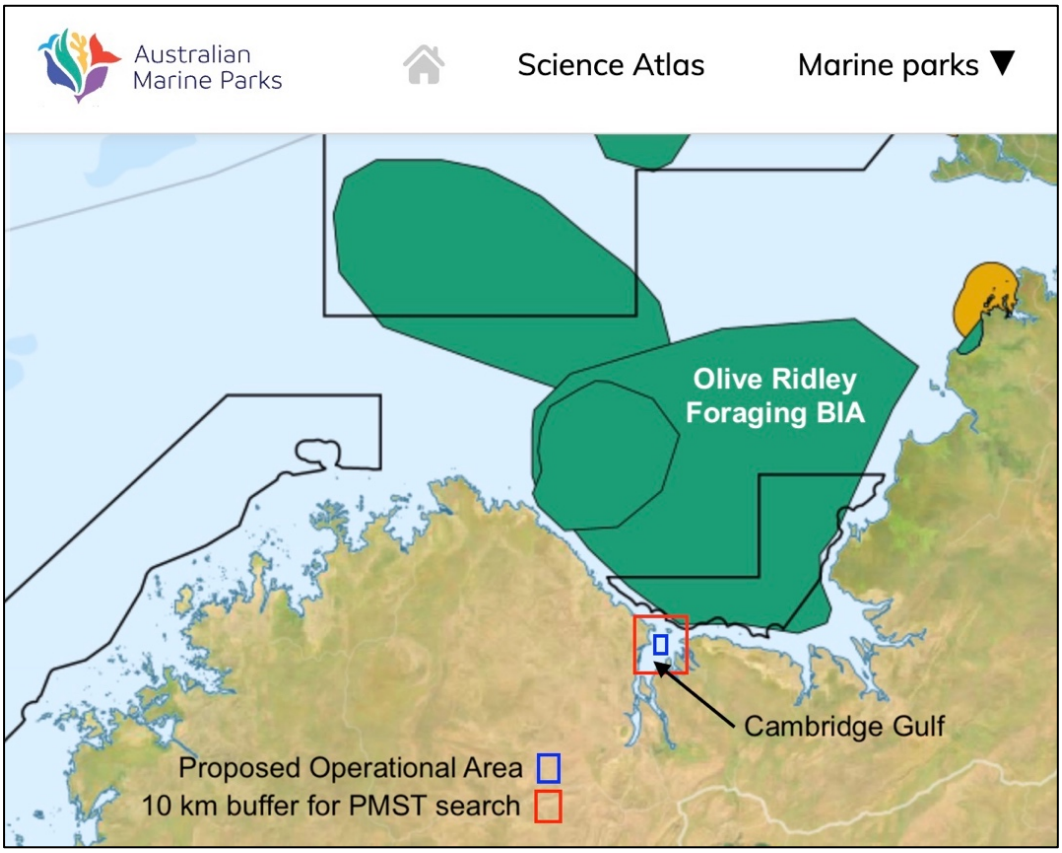


FIGURE 12: *Olive Ridley Turtle (Lepidochelys olivacea) foraging BIA offshore from CG.*

TABLE 2: *MNES, OPMs and BIAs that are present or potentially present within the proposed operational area.*

MNES	Number	Description / Notes
1. World Heritage:	**None**	• N/a
2. National Heritage:	**None**	• N/a
3. Wetlands of International Importance:	**1** identified by PMST Actually **None**	• The PMST identifies the Ord River Floodplain Ramsar Site as being within the proposed operational footprint. This is an error in PMST. • No overlap – the closest distance is ~6 km (Figures 2 & 5).
4. Commonwealth Marine Areas:	**None**	• N/a
5. Threatened Ecological Communities:	**None**	• N/a
6. Listed Threatened Species:	**22**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
7. Listed Migratory Species:	**45**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
OPMs		
8. Commonwealth Lands or Heritage:	**None**	• N/a
9. Listed Marine Species:	**70**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their geographical ranges, but in fact are not actually present in CG.
10. Whale & Other Cetacean Species:	**12**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
11. Critical Habitats:	**None**	• N/a
12. Commonwealth Reserves - Terrestrial:	**None**	• N/a
13. Australian Marine Parks:	**None**	• N/a
14. Habitat Critical to the Survival of Marine Turtles:	**1** identified by PMST Actually **None**	• The PMST identifies nesting habitat for Flatback Turtles (*Natator depressus*) within the proposed operational footprint. • This is an error as turtles nest on beaches, not in the sea itself. • The closest distance to nesting habitat (Lacrosse Is.) is ~6 km.
BIAs		
15. Snubfin Dolphin (*Oracella heinshoni*)	**1**	• The proposed operational footprint is within breeding, calving, foraging and resting BIA for this species (Figure 9).
16. Flatback Turtle (*Natator depressus*)	**1**	• The proposed operational footprint is within the overall inter-nesting buffer BIA for this species, which covers a 60 km radius around the Cape Domett nesting beach (Figure 10).

TABLE 3: *MNES, OPMs and BIAs that are present or potentially present within the 10 km buffer.*

MNES	Number	Description / Notes
1. World Heritage:	**None**	• N/a
2. National Heritage:	**1**	• The closest distance between the eastern coastal boundary of the West Kimberley National Heritage Place and the proposed operational footprint is ~2 km as shown on Figures 2 & 5. • The 10 km buffer therefore overlaps the eastern coastal boundary of the West Kimberly National Heritage Place.
3. Wetlands of International Importance:	**1**	• The closest distance between the Ord River Floodplain Ramsar Site and the proposed operational footprint is ~6 km as shown on Figures 2 & 5. • The 10 km buffer therefore overlaps part of the Ramsar Site.
4. Commonwealth Marine Areas:	**1**	• The closest distance between Commonwealth waters and the proposed operational footprint is 9.5 km as shown on Figures 2, 5 & 6. • The 10 km buffer therefore slightly overlaps Commonwealth waters.
5. Listed Threatened Ecological Communities:	**None**	• N/a
6. Listed Threatened Species:	**35**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
7. Listed Migratory Species:	**50**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
OPMs		
8. Commonwealth Lands or Heritage:	**None**	• N/a
9. Listed Marine Species:	**81**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
10. Whale & Other Cetacean Species:	**12**	• Refer section 10 for species details. • Some of these are only 'potentially present' based on their broad geographical ranges, but in fact are not actually present in CG.
11. Critical Habitats:	**None**	• N/a
12. Commonwealth Reserves - Terrestrial:	**None**	• N/a
13. Australian Marine Parks:	**1**	• The closest distance between the Joseph Bonaparte Gulf Marine Park and the proposed operational footprint is 9.5 km as shown on Figures 2, 5 & 6. • The 10 km buffer therefore slightly overlaps the Marine Park.
14. Habitat Critical to the Survival of Marine Turtles:	**1**	• The 10 km buffer overlaps the less significant turtle nesting beaches on Lacrosse Island, East Bank Point and Cape Dussejour, which are respectively 6 km, 6 km and 7 km from the closest boundary of the proposed operational area. • The 10 km buffer does not overlap the main turtle nesting beach at Cape Domett, which is 12 km from the closest boundary of the proposed operational area.
BIAs		
15. Snubfin Dolphin (*Oracella heinshoni*):	**1**	• The 10 km buffer is within is within breeding, calving, foraging and resting BIA for this species (Figure 9).
16. Flatback Turtle *(Natator depressus):*	**1**	• The 10 km buffer is within the overall inter-nesting buffer BIA for this species, which covers a 60 km radius around the Cape Domett nesting beach (Figure 10).
17. Green Turtles *(Chelonia mydas):*	**1**	• The 10 km buffer very slightly overlaps a foraging BIA for this species (Figure 11).
18. Olive Ridley Turtles *(Lepidochelys olivacea):*	**1**	• The 10 km buffer very slightly overlaps a foraging BIA for this species (Figure 12).

8. SCALE, DURATION & INTENSITY OF THE PROPOSED OPERATION

1. As outlined in section 5 above the EPBC Act Significant Impact Guidelines state that the assessment of significant impact should consider the scale, duration and intensity of the proposed action and its impacts. The parameters of each of these factors for the BKA marine sand proposal are therefore outlined below.

8.1 Scale

1. Table 4 summarizes some key data relating to the scale of the proposed action.

2. The total area of the proposed operational area as shown on Figures 13A is 100 km^2. This equates to 5.3% of the main body of CG from Lacrosse Island to Adolphus Island, which has an area of approximately 1,900 km^2, including the intertidal flats on both sides of the CG (Figure 13A). Further, this equates to 2.8 % of the total marine area of CG from Lacrosse Island upstream past Wyndham and the upper tidal reaches of East Arm, which is approximately 3,700 km^2 (Figure 13B).

3. The area of sand within the proposed operational area that is the subject of the proposed operation is ~75 km^2, which equates to 3.9% of marine area of the main body of CG, and 2.1% of the total marine area of CG.

4. It should be noted that operations will not occur over the entire operational area at any one time. The SPV will have one sand uptake drag-head. The width of the drag-head will be approximately 6 m, so the scale of direct physical contact with the seabed will be a width of 6 m.

5. During each cycle when the SPV will be present in CG loading sand (for a period of one- to two-days only, see section 8.2), the sand-uptake drag-head will have physical contact with the seabed over an area of approximately 0.5 km^2, until the SPV is fully loaded, and then departs to deliver the sand to market in Asia. This means that the SPV drag head will physically contact only 0.5 % of the proposed operational area (100 km^2) during each period of operational presence in CG.

6. The sand capacity of the SPV will be between 75K m^3 to 125K m^3 (subject to final design) and this volume of sand will be loaded during each 1 to 2-day loading cycle in CG.

7. Studies to date indicate that there is a minimum of 300 million m^3 of suitable sand in the proposed operational area, and a much larger volume in CG overall (BKA 2024b). To meet market demand BKA would be seeking to export up to 70 million m^3, representing a maximum of 23% of the minimum 300 million m^3 sand resource in the proposed operational area, and a much smaller % of the total sand resource in the CG overall.

8. The operation is proposed over an initial period of approximately 15 years, and during this period an average of <1 m of sand would be removed over the total area of the tenement.

9. The SPV may occasionally navigate outside the tenement for turning purposes at the end of each sand uptake run. However, the drag-head will be lifted and there will be no sand uptake during any such navigation outside the tenement. The SPV will be equipped with real time track monitoring.

10. To avoid passing the main turtle nesting beach on the seaward side of Cape Domett, it is proposed that the SPV will enter and leave CG via West Entrance, with a navigational footprint that is no different than the cargo vessels that already transit CG when entering and exiting the upstream port of Wyndham (Figure 13A).

11. As outlined in section 1 the operation does not require the construction of any marine, coastal or land-based facilities or infrastructure, which eliminates the scope for impacts from such activities and restricts the scale of the operation to the on-water aspects only.

12. Overall, considering the points above, the scale of the proposed action at any one time is relatively small (only 0.5 km^2), This compares to many other coastal and marine development projects in WA, such as on the Pilbara coast, which can cover many square kilometres.

8.2 Duration

1. Table 4 summarizes some key data relating to the duration of the proposed action. As outlined in section 1 the initial operational life of the proposed action will be approximately 15 years. It should be noted that operations would not occur constantly in CG during the 15-year project life.

2. As outlined in section 1, there would only be sand-loading activity in CG for one- to two-days (24 to 48 hours) every two weeks, which equates to a maximum of only 52 days in any year, or only 14% of the time.

3. Between each sand-loading cycle there will be a two-week period (10 to 14 days) when there is no operational activity in CG at all. This means that there will be zero operational activity for 86% of the time during the 15-year project lifespan.

4. The lack of a permanent or continuous operational presence significantly reduces the scope for impacts, including compared to many other marine development projects in WA such as in the Pilbara region, which can have a major permanent presence and operate continuously, 24 hours per day seven days per week, for decades.

8.3 Intensity

1. The EPBC Act Significant Impact Guidelines state that 'intensity' of impacts should be taken into account when assessing whether or not the impacts are significant – but the Guidelines do not define what is meant by intensity.

2. In environmental practice it is generally accepted that intensity relates to 'severity' of impacts, and includes factors such as whether the impacts are permanent and irreversible (severe) or temporary and reversible (less severe), whether species or ecological communities are killed outright (severe) or if the impacts are sub-lethal (less severe) etc.

3. Types of impacts need to be identified before their intensity or severity can be assessed - *this is assessed for each MNES in sections 9 and 10 below, noting that no significant, severe, irreversible impacts on MNES are identified.*

TABLE 4: *Key data relating to the scale and duration of the proposal*

1. Cambridge Gulf total marine area (Lacrosse Is. to upper reaches of West & East Arms):	3,700 km^2
2. Cambridge Gulf main marine area (Lacrosse Is. to Adolphus Is.):	1,900 km^2
3. Proposed operational area (over approx. 15 years):	100 km^2 (5.3% of item 1) (2.8% of item 2)
4. Area of sand within proposed operational area:	75 km^2 (3.9% of item 1) (2.1% of item 2)
5. SPV length overall:	Up to 350 m
6. SPV draft:	Up to 20 m
7. SPV sand capacity:	Up to 125K m^3
8. SPV drag-head width:	6 m
9. Area of drag-head in contact with seabed during one loading cycle:	0.5 km^2 (0.5% of item 3)
10. Estimated sand volume in proposed operational area:	Minimum of 300M m^3
11. Sand volume to be exported (over 15 years):	Up to ~ 70M m^3 (23% of item 10)
12. Average depth of sand removal across operational area over 15 yrs:	< 1 m below current seabed
13. Operational life of the proposal:	Up to 15 years.
14: SPV sand-loading cycle in Cambridge Gulf:	1 to 2 days (24 to 48 hours) every 2 weeks
15. Voyage to / from Asian sand delivery port	10 to 14 days each cycle
16. No. of days / year SPV present in CG:	Up to 52 days (14% of time in a year)
17. Zero operational activity in CG:	86% of time each year / over project lifespan.

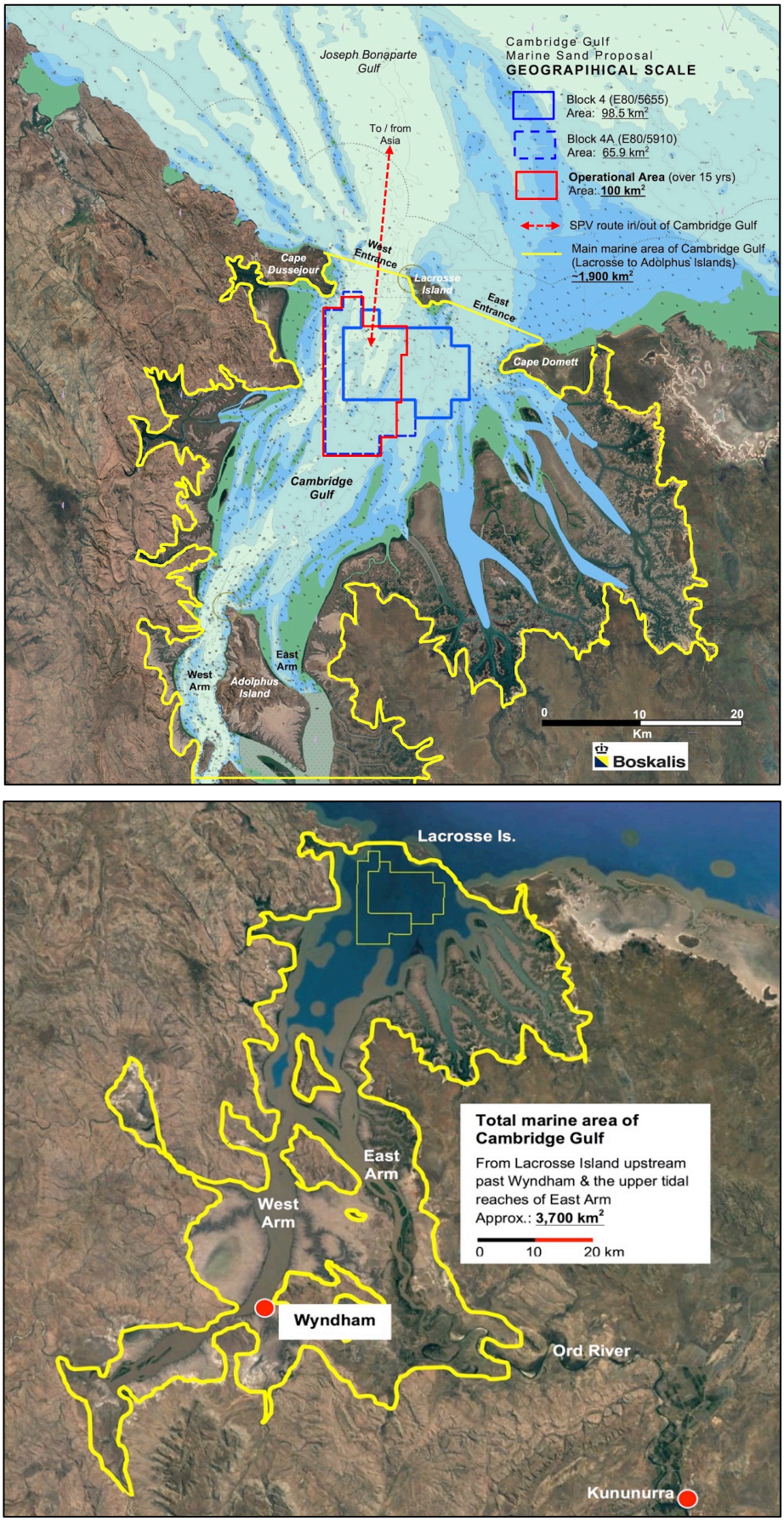


FIGURE 13A & B: *Geographical scale of the proposed operational area relative to marine areas of CG.*

9. POTENTIAL IMPACTS ON AREA-BASED MNES

1. As outlined in section 6 there are no area-based MNES that overlap with the proposed operational area, while the 10 km buffer around the proposed operational area overlaps slightly with three area-based MNES as follows:

    a) National Heritage Place - the eastern boundary of the West Kimberley National Heritage Place is located on the west coast of CG. The shortest distance between the western boundary of the proposed operational area and the west coast of CG, which constitutes the eastern boundary of the West Kimberley National Heritage Place, is 1.5 km at Cape Dussejour (Figures 2, 5 & 14).

    b) Wetland of International Significance - the Ord River Floodplain Ramsar Site is located on the eastern side of CG, including the complex system of mangrove-lined tidal inlets known as the 'False Mouths of the Ord'. The Ramsar site is protected as the State-designated Ord River Nature Reserve. The shortest distance between the eastern boundary of the proposed operational area and the western boundary of the Ramsar site is 6 km (Figures 2, 5 & 15).

    c) Commonwealth Marine Area - there is a slight overlap (500 m) of the 10 km buffer with the commencement of Commonwealth waters including the Joseph Bonaparte Gulf Marine Park located offshore from CG. The shortest distance between the northern boundary of the proposed operational area and the southern (inshore) boundary of the Joseph Bonaparte Gulf Marine Park is 9.5 km (Figures 2, 5 & 6).

2. Potential impacts of the proposed sand-sourcing operation on each of these three area-based MNES are assessed in Tables 5, 6 and 7 respectively. Each table includes:

    - a brief description of the MNES,
    - its proximity to the proposed operational area,
    - the relevant EPBC Act significant impact criteria,
    - an assessment of potential impacts against the criteria; and
    - an overall finding of the potential impacts.

8. The assessments of potential impacts are based on the scientific and technical assessments contained in the following supporting reports, as cited where relevant in the tables. These can be referred to for the scientific and technical bases for the findings presented in the tables.

    - Referral Report No. 2 - *Proposal Setting & Existing Environment Descriptions* (BKA 2024b).
    - Referral Report No. 4 - *Impact Assessments of Key Environmental Factors* (BKA 2024d).
    - Referral Report No. 5 - *Metcocean & Sediment Dynamics (PCS 2024a, b & c)*

3. Table 5 presents the assessment of whether the proposed sand-sourcing operation is likely to cause significant impacts on the West Kimberly National Heritage Place, in accordance with the EPBC Act Significant Impact Criteria, and finds no significant impact against each criterion. There is no scope for direct impacts as the proposed operation does not overlap with this area. There is no mechanism whereby the proposed operation could cause indirect impacts that would result in the loss, degradation, damage, notable alteration, modification or obscuring of any of the area's listed National Heritage values.

4. Table 6 presents the assessment of whether the proposed sand-sourcing operation is likely to cause significant impacts on the Ord River Floodplain Ramsar Site, in accordance with the EPBC Act Significant Impact Criteria, and finds no significant impact against each criterion. There is no scope for direct impacts as the proposed operation does not overlap with this area. The potential for indirect impacts on the wetland from uptake of sand from within CG, including potential changes in coastal processes, is assessed in Referral Report No. 4 - *Impact Assessments* (BKA 2024d) and Referral Report No. 5 - *Metcoean & Sediment Dynamics* (PCS 2024a, b & c). These assessments find no significant impacts.

5. Table 7 presents the assessment of whether the proposed sand-sourcing operation is likely to cause significant impacts on the Commonwealth Marine Area, in accordance with the EPBC Act Significant Impact Criteria, and finds no significant impact against each criterion. There is no scope for direct impacts from the sand-sourcing operation itself, as the proposed operation does not overlap with this area. The SPV will transit through the Commonwealth Marine Park when arriving at and departing from CG, as marked on Figure 2 and 5. This is the same route used by the commercial vessels that routinely enter and depart CG to service the Port of Wyndham. Shipping transit is a routine activity through the Marine Park, and the SPV will comply with all relevant maritime laws and regulations and there will not be any discharges from the SPV when transiting the Marine Park.

TABLE 5: *Assessment of potential for significant impacts on the West Kimberly National Heritage Place*

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
• Refer Figure 14. • The West Kimberly National Heritage Place (NHP) covers a huge area of 420,000 km^2 extending from Broome in the west to the west coast of Cambridge Gulf in the east. • It was inscribed on the National Heritage List in 2011 in recognition of the area's geological, evolutionary, biological, ecological and Aboriginal and European cultural heritage values. • The eastern boundary includes the coastline (assumed to be HAT) along the west coast of Cambridge Gulf. • This coastline has rocky cliffs and rocky shores and numerous small inlets with narrow bands of fringing mangroves backed by small intertidal mudflats and salt-flats.	• The proposed operational area does not overlap. • 10 km buffer overlaps. • The closest distance between the proposed operational area and the eastern boundary of the NHP is ~1.5 km.	An action is likely to have a significant impact on a NHP 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.	• Most of the listed values of the NHP are located in the North Kimberly, Central Kimberly and South-west Kimberly sub-regions of the NHP. These areas have dedicated sections in the Australian Heritage Commission (AHC) Final Assessment Report. • The East Kimberly sub-region, where Cambridge Gulf is located, is only occasionally and briefly mentioned in the AHC Report, mainly in passing in relation to cattle ranching history. • There is no overlap between the proposed operation and the NHP and therefore no scope for direct impacts. • There is no mechanism whereby the proposed operation could cause indirect impacts that would result in the loss, degradation, damage, notable alteration, modification or obscuring of any of the area's listed National Heritage values.	**No significant impact.**

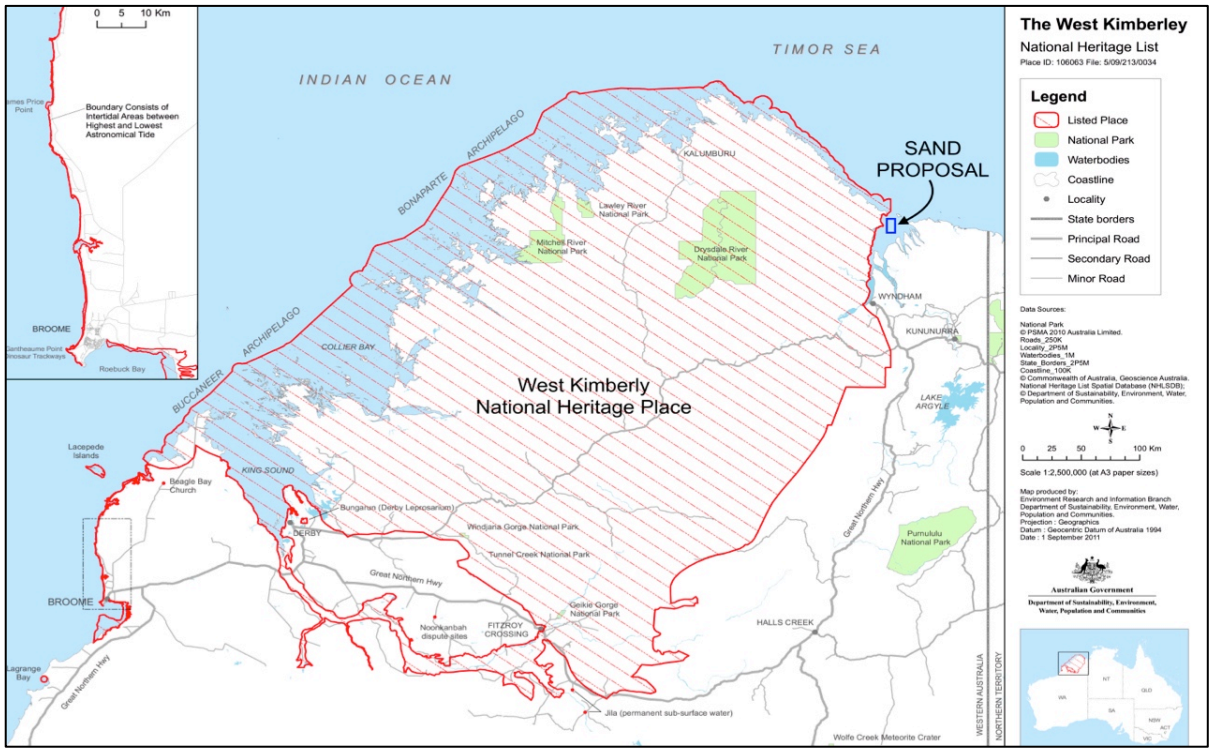


FIGURE 14: *The West Kimberley National Heritage Place & the location of the Boskalis sand proposal.*

TABLE 6: *Assessment of potential for significant impacts on Wetlands of International Importance - the Ord River Floodplain Ramsar Site*

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
• Refer Figure 15. • The Ord River Floodplain was designated as a Ramsar Site (Wetland of International Importance) in 1990. • The Ramsar Site covers the 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 backed by intertidal flats, known as the 'False Mouth of the Ord River'. • It also extends southwards to cover the Lower Ord River itself and freshwater wetlands at Parry Lagoons. • The site represents the best example of wetlands associated with the floodplain and estuary of a tropical river system in the Kimberley region of WA. • Of the 19 species of mangrove found in WA, 15 have been recorded within the Ramsar Site. • The Ramsar Site is a nursery, feeding and/or breeding ground for migratory birds and waterbirds. • The site supports a number of species protected under the EPBC Act, including Freshwater Sawfish (*Pristis microdon) a and* Green Sawfish *(Pristis zijsron)* (although no records of their presence found), endangered Northern River Shark *(Glyphis garricki)*, Saltwater Crocodile *(Crocodylus porosus)* and the Australian Painted Snipe *(Rostratula australis)*. • The site regularly supports 1% of the population of Plumed Whistling Duck *(Dendrocygna eytoni)* and Little Curlew *(Numenius minutes)*. • A globally significant nesting beach for Flatback Turtles *(Natator depressus)* is located on the seaward beach of Cape Domett, immediately north of the Ramsar Site (although not part of the site).	• The proposed operational area does not overlap. • The 10 km buffer overlaps. • The closest distance between the proposed operational area and the boundary of the Ramsar Site is ~6 km as shown on Figure 15.	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:		

		• areas of the wetland being destroyed or substantially modified,	• There is no overlap between the proposed operation and the Ramsar Site and therefore no scope for direct impacts that could destroy or substantially modify an area of the wetland.
			• The potential for indirect impacts on the wetland from uptake of sand from within CG, including potential changes in sediment dynamics and coastal processes, is assessed in Referral Report No. 4 - *Impact Assessments* (BKA 2024d) and Referral Report No. 5 - *Metcoean & Sediment Dynamics* (PCS 2024a, b & c).
			• The assessment indicates that there appears to be very little potential for sand sourcing to change coastal processes to any extent that could destroy or substantially modify an area of the wetland. This is because:
			  • the proposed sand-sourcing will not change hydrodynamics, which drive sediment dynamics, in CG to any meaningful degree over the 15-year time frame,
			  • there does not appear to be significant sediment connection between the proposed operational area and the wetland – there appears to be net outflow of sediment from CG, the proposed operational area is located 'downstream' of the wetland, and most input to CG appears to be on the western side of CG (Wolanski et al 2001 & 2004), while the wetland is located on the eastern side. The wetland appears to receive most sediment from its own catchment during wet season flood events; and
			  • the wetland is formed by and naturally adapted to extreme inter-annual variations in wet season flooding and sedimentation (Wolanski et al 2001 & 2004) (Hale 2008) and extreme natural destructive forces such as cyclones (Figures 16 & 17).
				No significant impact

		• 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 hydrological regime of the wetland is driven by the dry-season/wet-season tropical monsoon climate cycle, including acute rainfall events associated with tropical cyclones (Wolanski et al 2001 & 2004) (Hale 2008) – The proposed action is located offshore from and downstream of the wetland and there is no mechanism whereby the proposed action could change these climate-level factors.	**No significant impact**

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding

• The Ramsar Site is protected as the WA State Ord River Nature Reserve.		• the habitat or lifecycle of native species, including invertebrate fauna and fish species, which are dependent upon the wetland being seriously affected,	• There are a number of species that are dependent upon the wetland including, *inter alia:*
			  • Protected species such as River Sharks *(Glyphis spp)* and Saltwater Crocodiles *(Crocodylus porosus),* and potentially Sawfish *(Pristis spp)*, (although no records of their presence found).
			  • Species of importance to fisheries such as Barramundi *(Lates calcarifer)*, Mud Crabs *(Scylla spp)* and prawns (*Peneaus* spp.)
			• Some of these species spend part of their lifecycle in the wetland and migrate to coastal or offshore waters through CG for other parts of their lifecycle.
			• Because there is no mechanism whereby the proposed operation could cause direct impacts on the wetland, there is similarly no mechanism whereby the proposed action could cause impacts on the habitat or lifecycle these species during the period of their lifecycles spent in the wetland.
			• There is some potential for impacts from the proposed operation when these species might move through CG, including potential direct physical impact from the sand-uptake drag-head and potential effects of turbidity and underwater noise generated by the SPV.
			• With regard to potential direct physical impact from the drag-head:
			  • High tidal current velocities, aphotic seabed conditions and lack of benthic biota make the seabed in the proposed operational area inhospitable and it is unlikely that any wetland-associated species would spend any significant time in the area – they would likely move through it enroute to preferred habitat.
			  • The SPV will only operate in the area for 1 to 2 days every 2 weeks (14% of the time over a year), significantly reducing the likelihood of encountering any such species that may occasionally be present moving through the area.
			  • As a precautionary impact prevention measure the drag- head will be fitted with a best-practice marine mega-fauna deterrent/excluder device (‘turtle tickler’), to prevent physical impact on any such species that may occasionally be present on or near the seabed in the proposed operational area.
			• With regard to turbidity:
			  • Turbidity is naturally very high in CG and especially up the inlets of the Ramsar wetland, and all wetland-associated species present in the area are naturally adapted to very high turbidity – otherwise they would not be present there.
			  • Turbidity generated by the SPV will not exceed the naturally high background levels for any spatial or temporal extent sufficient to cause impacts on these species. This is because:
				No significant impact

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
			• The SPV will only operate on site for 24 to 48 hours for each cycle, followed by a 10- to 14-day break, thus limiting turbidity generation. • The SPV will target sand that does not contain fine silts, thus significantly minimizing turbidity generation. • The SPV will not undertake any 'dumping' – all sand will be shipped to market in Asia. • Any turbidity generated by the dredging will be rapidly dispersed into the naturally high background turbidity with each change for the tide. • As a precautionary impact prevention and mitigation measure the SPV will be fitted with best practice turbidity reduction measures, including high-set overflow intake, 'green valve' in the overflow intake and overflow discharge at the keel. • With regard to underwater noise: • The SPV will be a 'new-build' vessel and thus able to incorporate relevant noise reduction measures from the design-phase, as per the IMO 2023 Underwater Noise Guidelines (IMO 2023). • The SPV will only operate on site for 24 to 48 hours for each cycle, followed by a 10- to 14-day break, thus limiting the period of underwater noise emissions. • The SPV will operate in Cambridge Gulf at a very low speed (2 knots). • Given all of these factors, it is assessed that there is almost no potential for the proposed action to seriously affect species that are dependent on the wetland. • More detailed assessments for each relevant species are included in the Listed Species tables below.	
		• 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 SPV will not cause any routine operational discharges of any forms of pollutants. • All garbage and other wastes will be retained on-board the SPV for appropriate disposal at the sand delivery port. • The SPV will not undertake any bunkering (fuelling) operations in CG - eliminating the risk of potential spills from this potential source (which global statistics indicate is the highest frequency cause of spills). • The SPV will be designed, built and operated in full compliance with all relevant latest requirements of the International Maritime Organization (IMO) and the Australian Maritime Safety Authority (AMSA), including COLREGs, SOLAS, STCW, AFS Convention, BWM Convention and MARPOL, including relevant protection of fuel tanks to prevent puncturing and fuel spills. • As part of BKA's fleet decarbonisation program, the SPV will be designed for duel-fuel use, allowing adoption of alternative fuels such as methanol as they become viable in future.	**No significant impact**

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
			• In the highly unlikely event of a spill of fuel from the SPV, it would likely disperse very quickly under the influence of the strong tidal currents, high sea-surface and air temperatures and strong solar UV radiation. • The SPV will have an IMO- and AMSA-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill. • Given all of these factors, it is assessed that there is almost no potential for the proposed action to cause substantial and measurable change in the water quality of the wetland, to adversely impact on biodiversity, ecological integrity, social amenity or human health.	
		• 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.	• The SPV will comply in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, will be fitted with IMO-compliant ballast water treatment systems, and adhere to a stringent biofouling management regime and dry-space biosecurity regime. • The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.	**No significant impact**

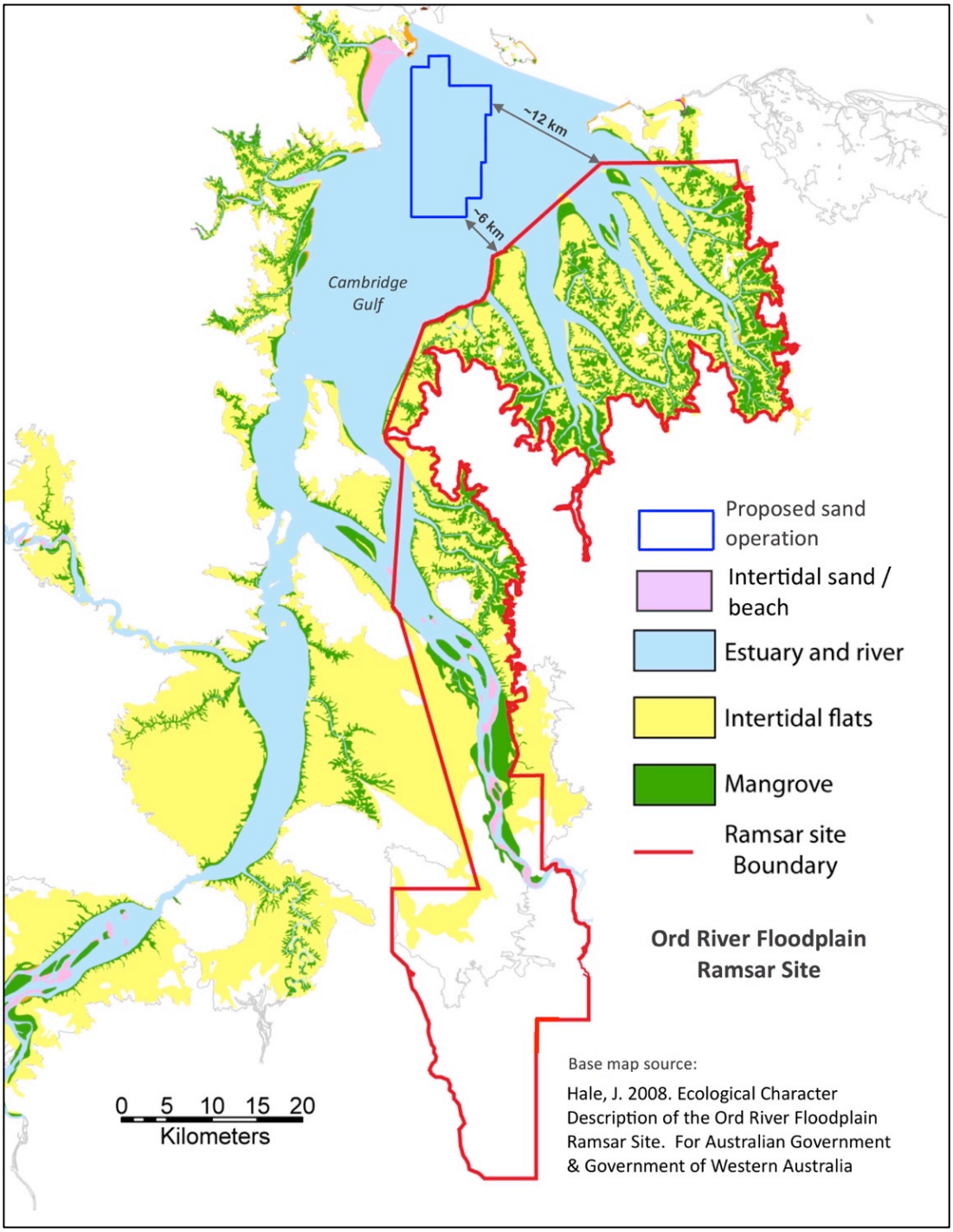


FIGURE 15: *The location of the proposed operational area in relation to the Ord River Floodplain Ramsar Site.*

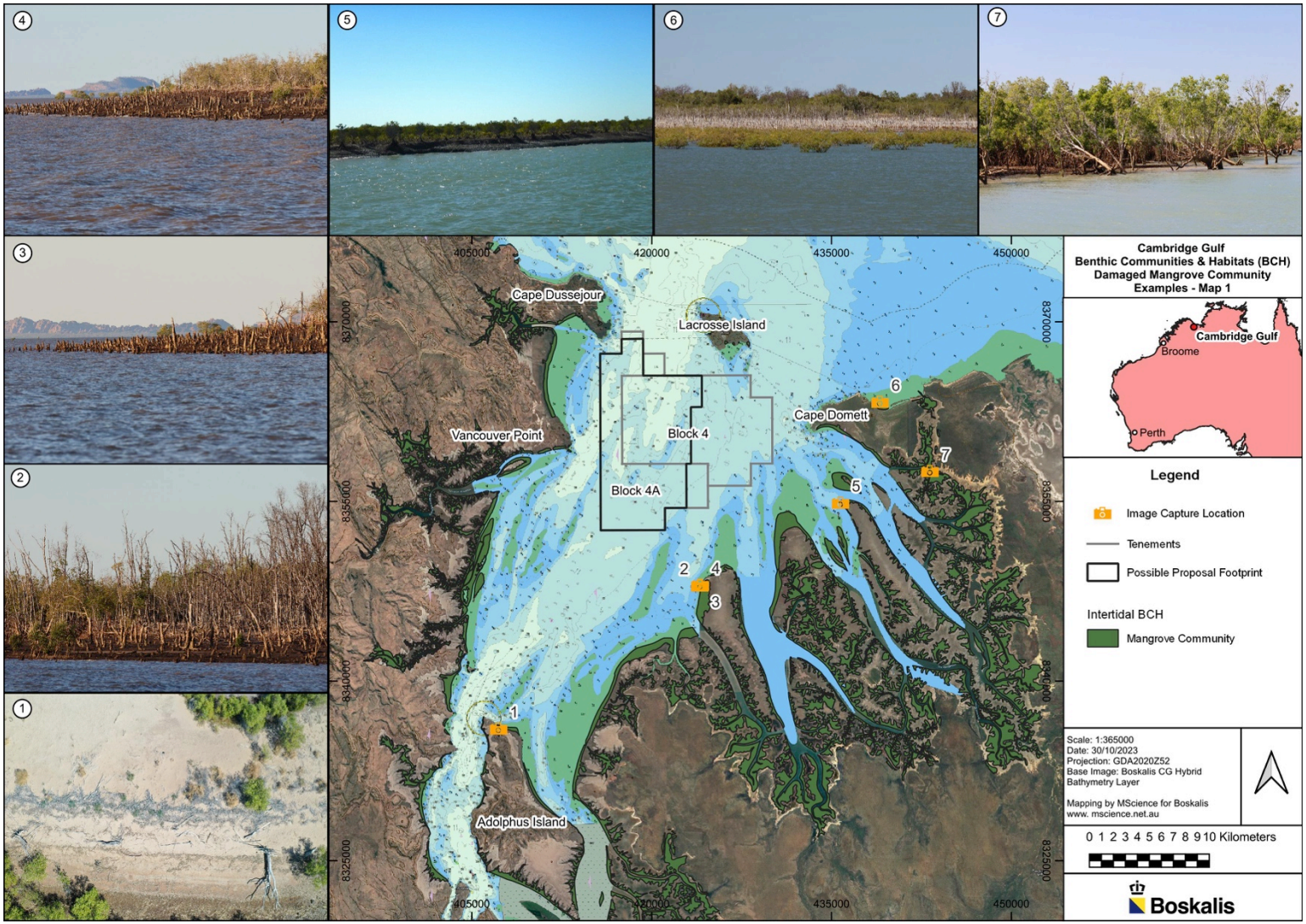


FIGURE 16: *The Ord River Floodplain Ramsar Site is formed by and naturally adapted to extreme inter-annual variations in wet season flooding and sedimentation and extreme natural destructive forces such as cyclones, as shown in these images from July-August 2023 (BKA 2024b).*

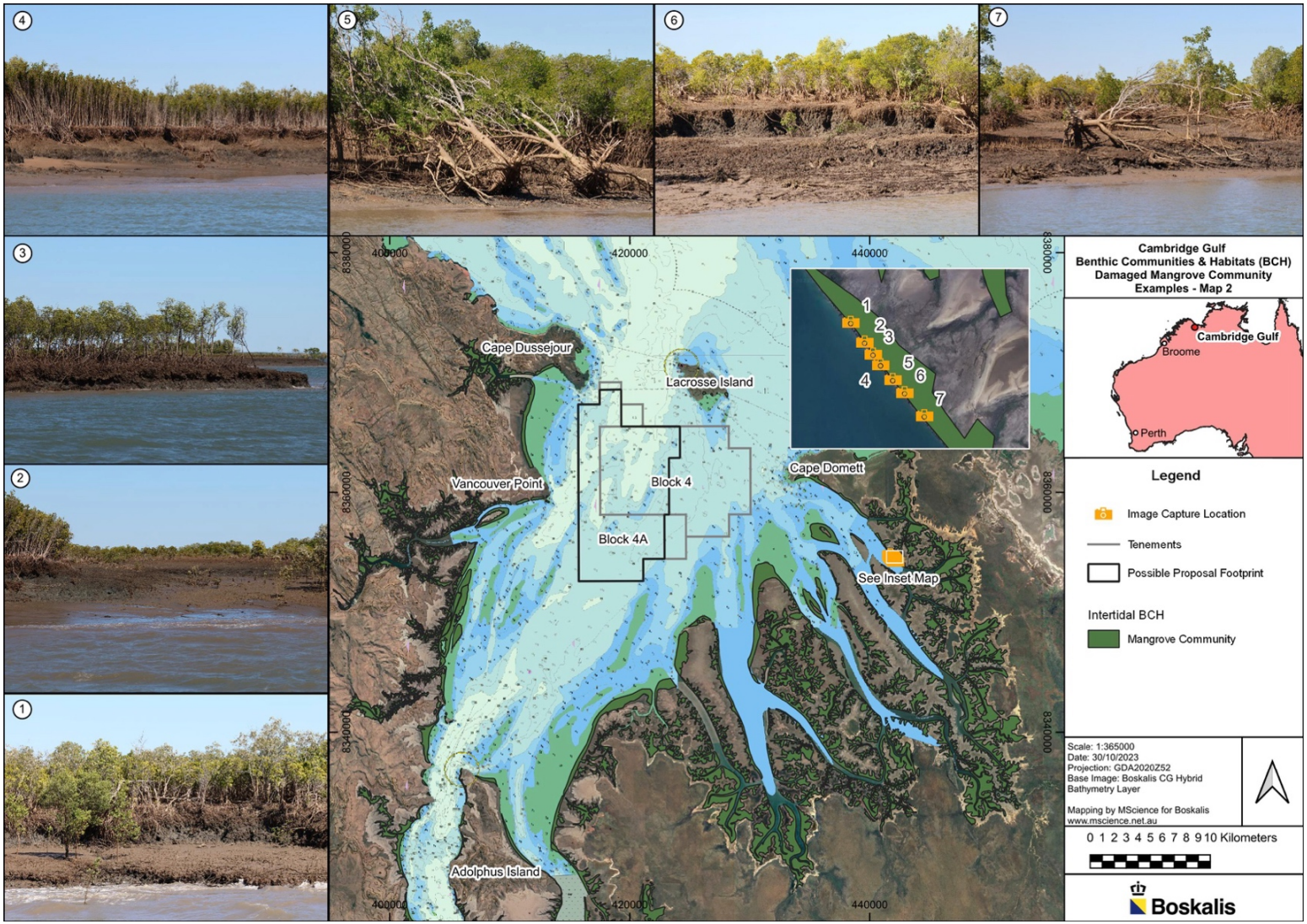


FIGURE 17: *The Ord River Floodplain Ramsar Site is formed by and naturally adapted to extreme inter-annual variations in wet season flooding and sedimentation and extreme natural destructive forces such as cyclones, as shown in these images from July-August 2023 (BKA 2024b)*

TABLE 7: *Assessment of potential for significant impacts on the Commonwealth Marine Area*

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
• Refer Figures 2, 5 & 6. • Jurisdictionally, CG is located wholly within the State Internal Waters of WA (landward of the Territorial Sea Baseline). • To seaward is the State North Kimberly Marine Park, which extends from the Territorial Sea Baseline seaward to the 3 nm State limit. • Beyond 3 nm are the Commonwealth Waters of the Joseph Bonaparte Gulf Marine Park.	• The proposed operational area does not overlap. • The 10 km buffer overlaps slightly (by ~500 m). • The closest distance between the proposed operational footprint and Commonwealth waters and is 9.5 km. • The SPV will transit through the Commonwealth Marine Park when arriving at and departing from CG, as marked on Figure 2 and 5. This is the same route used by the commercial vessels that routinely enter and depart CG to service the Port of Wyndham.	An action is likely to have a significant impact on a Commonwealth Marine Area if there is a real chance or possibility that the action will:		
		• result in a known or potential pest species becoming established in the Commonwealth marine area,	• The SPV will comply in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, will be fitted with IMO-compliant ballast water treatment systems, and adhere to a stringent biofouling management regime. • The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.	**No significant impact**
		• modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity results,	• There is no overlap between the proposed operational area and the Commonwealth Marine Area and therefore no scope for direct impacts that could modify, destroy, fragment, isolate or disturb an important or substantial area of habitat in the Commonwealth Marine Area. • The SPV will pass through the Commonwealth Marine Area when transiting to and from CG, according to normal navigational procedures as per any other vessel that regularly transits the area. • The SPV will operate in full compliance with all relevant requirements of IMO and AMSA, including COLREGs, SOLAS, STCW, MARPOL, AFS Convention, BWM Convention and others. • The DCCEEW Significant Impact Guidelines explicitly state that routine ship transits where appropriate precautions have been taken would not normally be expected to have a significant impact on NMES.	**No significant impact**
		• have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution,	• There is no overlap between the proposed operational area and the Commonwealth Marine Area and therefore no scope for substantial adverse effect on a population of a marine species or cetacean in the Commonwealth Marine Area. • As above the SPV will pass through the Commonwealth Marine Area when transiting to and from CG, according to normal navigational procedures as per any other vessel that regularly transits the area. • The SPV will operate in full compliance with all relevant requirements of IMO and AMSA, including COLREGs, SOLAS, STCW, MARPOL, AFS Convention, BWM Convention and others. • The DCCEEW Significant Impact Guidelines explicitly state that routine ship transits where appropriate precautions have been taken would not normally be expected to have a significant impact on NMES.	**No significant impact**
		• result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological	• The SPV will pass through the Commonwealth Marine Area when transiting to and from CG and air emissions will be in full compliance with MARPOL Annex VI and the implementing AMSA regulation (Marine Order 97). • The SPV will not cause any routine operational discharges of any forms of marine pollutants.	**No significant impact**

Brief Description	Proximity	Significant Impact Criteria	Assessment	Finding
		integrity; social amenity or human health,	• All garbage and other wastes will be retained on-board the SPV for appropriate disposal at the sand delivery port. • The SPV will not undertake any bunkering (fuelling) operations in the Commonwealth Marine Area – eliminating the risk of potential spills from this potential source (which global statistics indicate is the highest frequency cause of spills). • The SPV will be designed, built and operated in full compliance with all relevant latest requirements of the International Maritime Organization (IMO) and the Australian Maritime Safety Authority (AMSA), including COLREGs, SOLAS, STCW, AFS Convention, BWM Convention and MARPOL, including relevant protection of fuel tanks to prevent puncturing and fuel spills. • As part of BKA's fleet decarbonisation program, the SPV will be designed for duel-fuel use, allowing adoption of alternative fuels such as methanol as they become viable in future. • In the highly unlikely event of a spill of fuel from the SPV, it would likely disperse very quickly under the influence of the strong tidal currents, high sea-surface and air temperatures and strong solar UV radiation. • The SPV will have an IMO- and AMSA-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment for responding in the highly unlikely event of a spill. • Given all of these factors, it is assessed that there is almost no potential for the proposed action to cause a substantial change in air quality or water quality, which may adversely impact on biodiversity, ecological integrity; social amenity or human health,	
		• result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected; or	• The SPV will pass through the Commonwealth Marine Area when transiting to and from CG according to normal navigational procedures as per any other vessel that regularly transits the area. • The SPV will not discharge any persistent organic chemicals, heavy metals, or other potentially harmful chemicals into the Commonwealth Marine Area.	**No significant impact**
		• have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of a historic shipwreck.	• Any historic shipwrecks that are located in Commonwealth Waters would not be impacted by the SPV, as it will simply pass through when transiting to and from CG according to normal navigational procedures as per any other vessel that regularly transits the area, and will not interact with the seabed in the Commonwealth marine area.	**No significant impact**

10. POTENTIAL IMPACTS ON SPECIES-BASED MNES

10.1 Assessment Structure

1. Review of the PMST search results for species-based MNES shows that, due to the low resolution of biogeographical range data that supports the PMST, as outlined in section 6.1, many of the species listed as being present or potentially present in the proposed operational area or in the 10 km buffer, 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 as being in CG – when local scale data and/or knowledge of habitat preferences versus environmental conditions in CG indicate that this is highly unlikely or even impossible.

2. Never-the-less, all species-based MNES listed from the PMST search are included in the assessment.

3. Two MNES species stand out in the PMST search as being of particular importance in the CG area:

    a) Flatback Turtles (*Natator depressus*): There is a major nesting site for Flatback Turtles (*Natator depressus*) at Cape Domett Seaward Beach just outside CG, and lesser nesting sites in the area. As outlined in section 7 an inter-nesting 'buffer' BIA is designated within a 60 km radius around Cape Domett and Lacrosse Island, which encompasses CG including the proposed operational area.

    b) Australian Snubfin Dolphin (*Orcaella heinsohni)*: There is a small population of this species in CG and the area is designated as a breeding, calving, feeding and resting BIA for Snubfins.

4. Given the importance of these two species, separate, specific assessments are presented in section 10.2 for Flatback Turtles and in 10.3 for Snubfin Dolphins.

5. All other MNES species from the PMST search are addressed in the assessment tables in sections 10.4 for threatened species and 10.5 for migratory species. The assessment tables list each species, provide notes on their presence/proximity based on the PMST listing, and assess likely impacts of the proposed sand-sourcing operation, against the relevant EPBC Act significant impact criteria. The tables are arranged as follows:

    10.4 Threatened species:

    - Table 8 - Listed Threatened Species – critically endangered and endangered birds.
    - Table 9 - Listed Threatened Species – vulnerable birds.
    - Table 10 - Listed Threatened Species – critically endangered and endangered mammals.
    - Table 11 - Listed Threatened Species – vulnerable mammals.
    - Table 12 - Listed Threatened Species – critically endangered and endangered reptiles.
    - Table 13 - Listed Threatened Species – vulnerable reptiles.
    - Table 14 - Listed Threatened Species – critically endangered and endangered sharks.
    - Table 15 - Listed Threatened Species – vulnerable sharks.

    10.5 Migratory species:

    - Table 16 - Listed Migratory Species – migratory marine birds.
    - Table 17 - Listed Migratory Species – migratory marine species.
    - Table 18 - Listed Migratory Species – migratory terrestrial species.
    - Table 19 - Listed Migratory Species – migratory wetland species.

6. It should also be noted that some species are repeated in the different lists, for example marine turtles appear in both the Threatened Species and Migratory Species lists (there are multiple other examples). This is highlighted in the tables.

10.2 Specific Assessment for Flatback Turtles

10.2.1 Flatback conservation status & nesting in the CG area

1. Flatback Turtles (*Natator depressus)* are listed as both a threatened species (currently classified as 'vulnerable') and a migratory species under the EPBC Act, hence their status as MNES. They are also afforded general protection under the EPBC Act as 'marine' species. They are also protected by the WA *Biodiversity Conservation Act* under which they are also classified as 'vulnerable'.

2. As outlined in section 7 an inter-nesting 'buffer' BIA for Flatback Turtles is designated within a 60 km radius around Cape Domett and Lacrosse Island, linked to the significant Flatback Turtle nesting site at the Cape Domett Seaward Beach. This radius covers much of the main body of CG including BKA's proposed operational area, as per Figure 10 in section 7.

3. There is a globally significant nesting site for Flatback Turtles at Cape Domett Seaward Beach, outside and to the east of the eastern entrance to CG. The beach is 1.9 km long, faces north towards the offshore waters of Joseph Bonaparte Gulf and is separated from CG by Cape Domett itself. The nearest point of the proposed operational area is 12 km. Initial surveys at the Cape Domett Seaward Beach by Whiting et al (2008) estimated that the Flatback nesting population is one of the largest known, with an estimated yearly population in the order of several thousand turtles (estimated ~3,250). Peak nesting for Flatbacks at the Cape Domett is in the winter dry-season August-September each year, which differs from the west coast of WA where peak nesting season is in summer.

3. Since 2012 the WA Department of Biodiversity Conservation & Attractions (DBCA) has been undertaking annual monitoring of turtle nesting at the Cape Domett Seaward Beach, in cooperation with the Traditional Owners (TOs) of the area. Ten years of this data from 2013 to 2022 inclusive was analysed by BKA under a data-sharing agreement with DBCA. The report (Price & Raaymakers 2024) is included as an Annex to BKA (2024b). Amongst other findings, the annual DBCA monitoring indicates that Flatback Turtle nesting numbers at Cape Domett Seaward Beach may not have changed significantly since the surveys by Whiting et al (2008),

4. Aerial drone surveys were commissioned by BKA in late July 2023 to assess all supra-tidal sand areas in the CG region for signs of turtle nesting. In addition to Cape Domett, Flatback nesting was also observed at the locations listed in Table 8, which includes track and nest counts from the drone video at each site, and shown on Figure 18 (BKA 2024b).

5. It should be noted that the counts are based on a single drone flight over each area – and are therefore one-off counts. Never-the-less, the data provides a relative indication of which sites are more significant than others in terms of numbers, at least on the days in late July 2023 when the drone was flown. Clearly, Cape Domett Seaward Beach is the most significant nesting site in terms of numbers.

6. It is clear from the studies by Whiting et al (2008), the DBCA data for Cape Domett 2013 - 2022 (Price & Raaymakers 2024) and the surveys by BKA in 2023, that Cape Domett is extremely significant and that other sites near CG are somewhat significant as Flatback Turtle nesting sites. BKA has therefore put significant effort into assessing potential impacts of the proposed marine sand-sourcing operation on the nesting sites and marine turtles generally.

7. Referral Report No. 4 - *Impact Assessments* (BKA 2024d) includes a detailed assessment of potential impacts of the proposed operation on Flatback Turtles. This is not repeated here for reasons of economy, but some of the main points are summarized in sections 10.2.2 to 10.2.4 below.

TABLE 8: *Aerial drone surveys Cambridge Gulf July 2023* (see Figure 18 for locations)

Flatback Nesting Site	Beach Length (km)	No. Nests	No. Track Sets	Likely Species*
1. Cape Domett Seaward Beach:	1.9	190	449	Flatback
1A. Cape Domett Small Beach:	0.4	7	7	"
2. Turtle Beach West (W of Cape Dussejour):	3	28	34	"
3. Turtle Bay (Lacrosse Island):	0.3	6	6	"
4. Barnett Point:	2.9	13	82	"

*Based on track characteristics.

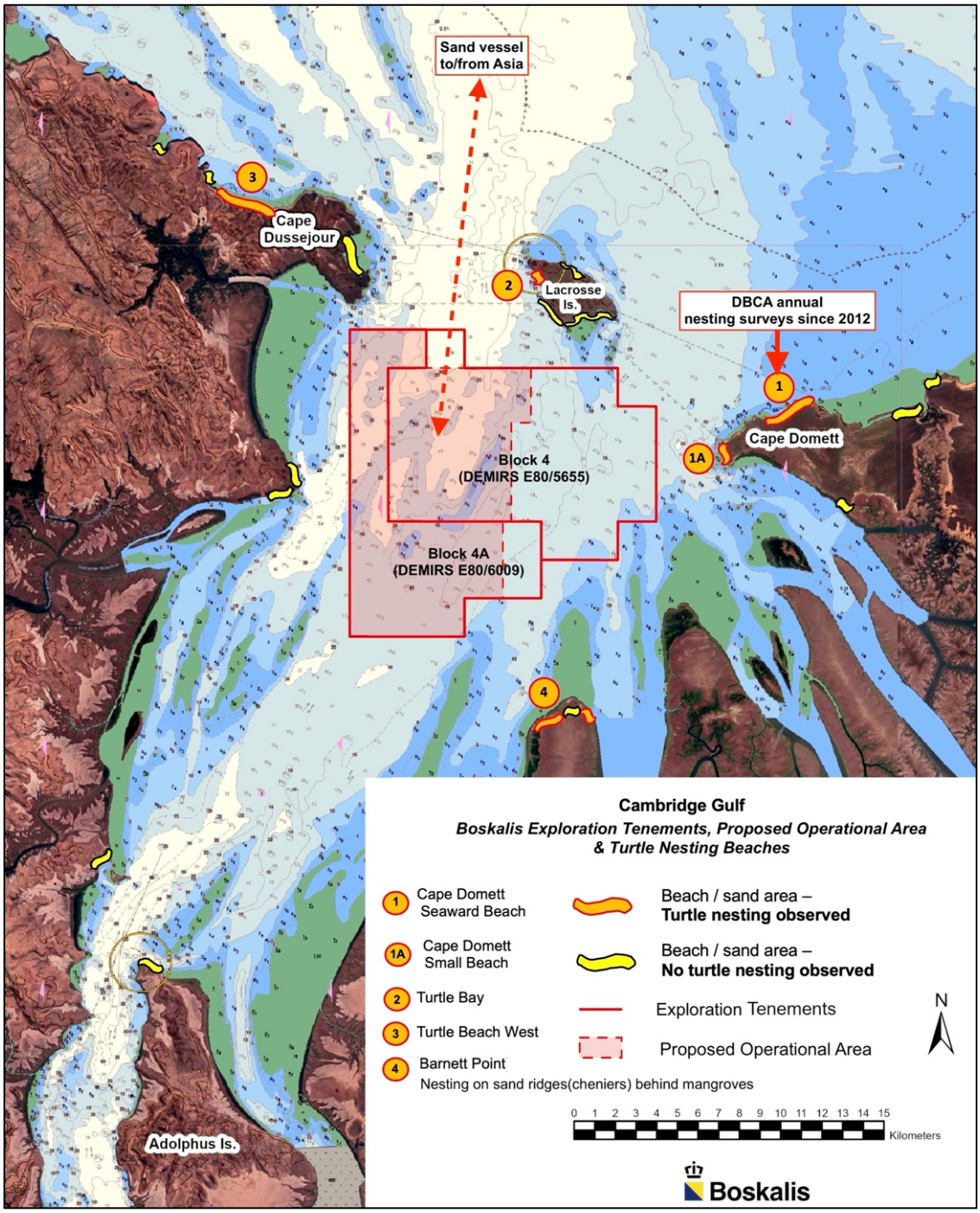


FIGURE 18: *Supra-tidal sand areas surveyed by aerial drone in late July 2023 (BKA 2024b).*

10.2.2 The inter-nesting buffer BIA

1. Inter-nesting BIAs are areas where marine turtles 'rest' between nocturnal nesting events, often being inactive and resting on the seabed to conserve energy for the next nesting event (Hays et al 1999). Studies on the Pilbara Coast of WA indicate that the inter-nesting area for Flatback Turtles in that region can range from 3.4 to 60 km from the nesting beach (Whittock et al 2014), with an average inter-nesting interval of around 13 days (Thums et al 2019). It is understood that the 60 km radius for the inter-nesting buffer around the Cape Domett nesting beach is derived from the range of up to 60 km assessed by Whittock et al (214) for the Pilbara, without considering site conditions and turtle behaviour in the Cape Domett area.

2. The 60 km inter-nesting buffer is likely to be appropriate for the areas to seaward and extending offshore from Cape Domett, Lacrosse Island, Cape Dussijour and CG in general. However, it is assessed that the area within CG is highly unlikely to be significantly used as inter-nesting habitat, due to the hostile environmental conditions, the known inter-nesting behaviour of

Flatbacks and their preference for offshore areas for inter-nesting.

3. As outlined in BKA (2024b) the environmental conditions within CG and especially in the proposed operational area are extremely dynamic, with tidal currents up to 4 knots (>2 m/s), constantly moving seabed sediments and no light at the seabed. These conditions make the area highly unsuitable for marine turtles to use as an inter-nesting resting area – they would have to expend significant energy just to remain there, and would be buffeted around on the seabed in totally dark conditions.

4. The main nesting beaches in the CG area are on the seaward coast and face out to sea. After each nesting event Flatbacks would most likely head straight offshore to the inner waters of Joseph Bonaparte Gulf for their inter-nesting rest, before coming back to the beach again. Flatbacks are known for heading quickly offshore between nesting efforts (McIntyre pers comms. 2024).

5. There is also no feeding habitat for Flatbacks (or other turtle species) within CG. Flatbacks are carnivorous, feeding mostly on soft-bodied prey such as sea cucumbers, soft corals and jellyfish (DCCEEW), which are not found inside CG due the extreme benthic conditions (BKA 2024b).

6. In addition to arial drone surveys of the nesting sites outlined above, BKA commissioned dedicated on-water marine mega-fauna (MMF) surveys in CG over nine-days in February 2024 and eight-days in July 2023, covering over 800 km of transects for each survey. These surveys included observing for marine turtles at sea throughout CG and in the proposed operational area, with the following findings (see also Figures 19 and 20 in section 10.3 – which show the survey tracks and sightings):

    a) February 2024:

        - Two unidentified turtle sightings in CG, one inside the proposed operational area, and no other sightings.

    b) Late July 2023 (near peak nesting period):

        - Five Flatback Turtle sightings (three near Cape Domett where the main nesting beach is, one near Adolphus Island and one on west side of CG).

        - Seven unidentified turtle sightings (one near Cape Domett, one near Adolphus Island, one on west side of CG, one on east side of CG, two near Lacrosse Island and one within the proposed operational area).

7. Only one turtle was observed in the proposed operational area on each survey, both unidentified. It should be noted that different sightings could be the same individual(s), so the actual number of turtles may be less than the number of sightings. These are very low numbers of on-water sightings considering the very large area covered, especially in late July 2023 near the peak nesting season, when hundreds of tracks and nests were observed on the nesting beaches.

8. These low sighting numbers tend to indicate that the area within CG may not be significant as an inter-nesting, resting or foraging area by Flatback Turtles, despite the 60 km radius of the inter-nesting BIA extending inshore over CG. It would be useful to assess this further with satellite tagging of Flatbacks that nest at Cape Domett, to track their inter-nesting movements. This data could be used refine the inter-nesting BIA boundaries based on local-scale data.

9. Never-the-less, despite the above indications, given the large numbers of Flatback Turtles that congregate in the general area around CG each nesting season, there will always be a possibility that individuals could be present within CG, including within the proposed operational area. It is therefore necessary to assess the potential for interactions between the Sand Production Vessel (SPV) and marine turtles and any resulting in impacts. These are addressed in summary in Table 9 below and in detail in Referral Report No. 4 - *Impact Assessments* (BKA 2024d).

10.2.3 Application of impact mitigation hierarchy

1. In accordance with WA EPA guidelines BKA has applied the impact mitigation hierarchy as follows, in order of priority:

    - avoid impacts,
    - minimize impacts,
    - offset impacts; and
    - rehabilitate impacts.

2. Table 9 presents the mitigation hierarchy applied to the assessment of potential impacts from the proposed sand-sourcing operation on Flatback Turtles. The potential impacts are identified as potential changes to beach morphology, potential impacts of vessel lighting, potential vessel strikes, potential entrainment on the SPV's drag-head and potential impacts from underwater noise from the SPV. Table 9 shows that for all potential impact types, the residual impacts after application of the hierarchy are nil to negligible.

TABLE 9: *Mitigation hierarchy & assessment of residual impacts for Flatback Turtles.*

Potential Impact	Impact Avoidance / Prevention	Impact Minimization / Mitigation	Rehabilitation & Offsets	Residual Impacts
Potential changes to nesting beach morphology from potential changes in coastal processes:	Assessed in detail in PCS (2024a) (Referral Report No. 5) – the proposal will not cause changes to beach morphology.	Assessed in detail in PCS (2024a) Impact minimization / mitigation is not required as impacts will be avoided / prevented.	Assessed in detail in PCS (2024a). Rehabilitation or offsets are not required as impacts will be avoided / prevented.	Nil.
Potential impacts of vessel lighting:	SPV will be permanently fitted with turtle safe lighting in accordance with the *National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2020). SPV lighting in the proposed operational area will not be visible to nesting and hatching turtles due to distance, aspect and screening by geographical features.	As an added precaution 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, screened from the seaward nesting beach west of Cape Dussejour, and 22 km from the nesting site at Barnett Point.	None required. Never-the-less, should the proposal proceed, BKA will seek to implement a comprehensive environmental and biodiversity research and monitoring program, in consultation and cooperation with relevant stakeholders. This would further assist protection and conservation of this species both in CG and in other areas.	Nil.
Potential vessel strike by the SPV:	Low presence of these species in the proposed operational area. Low presence of the SPV in CG (zero presence 86% of time during project lifespan).	Low operational speed of the SPV (~2 knots). Implementation of best-practice Marine Mega-fauna (MMF) observation and avoidance systems and procedures, in accordance with relevant guidelines.	None required. Never-the-less, should the proposal proceed, BKA will seek to implement a comprehensive environmental and biodiversity research and monitoring program, as per row above.	Negligible. As with any vessel operating at sea there is always a possibility of an interaction with marine fauna. The measures listed in the columns to left make the likelihood very low.
Potential entrainment in the SPV's drag-head (if turtle is on seabed):	Low presence of these species in the proposed operational area and very low likelihood of being present on the seabed in that area, due to strong currents / extreme environmental conditions. Low presence of the SPV in CG (zero presence 86% of time during project lifespan). The drag-head will be fitted with marine-fauna deterrent / deflector chains ('turtle ticklers').	Low operational speed of the SPV (~2 knots). Implementation of best-practice Marine Mega-fauna (MMF) observation and avoidance systems and procedures, in accordance with relevant guidelines.	None required. Never-the-less, should the proposal proceed, BKA will seek to implement a comprehensive environmental and biodiversity research and monitoring program, as per row above.	Negligible. As with any vessel operating at sea there is always a possibility of an interaction with marine fauna. The measures listed in the columns to left make the likelihood very low.
Potential underwater noise impacts from the SPV:	Low presence of this species in the proposed operational area. Low presence of the SPV in CG (zero presence 85% of time during project lifespan). Naturally very high suspended sediment concentrations in CG which reduces sound	The SPV will be a 'newbuild' vessel and will incorporate relevant best practice noise reduction measures from the design-phase, as per the IMO 2023 Underwater Noise Guidelines (IMO 2023). As the design parameters for the SPV mature (it is still in conceptual phase), modelling of likely noise emissions will be undertaken in accordance with the IMO Guidelines, and used to inform optimum design and incorporation of noise reduction measures. Implementation of best-practice Marine Mega-fauna (MMF) observation and	As above.	Nil.

Potential Impact	Impact Avoidance / Prevention	Impact Minimization / Mitigation	Rehabilitation & Offsets	Residual Impacts
	propagation (WODA 2015). Naturally high sound levels from high tidal range which can mask other sound sources (Marely et al 2017).	avoidance systems and procedures, in accordance with relevant guidelines.		

10.2.4 Assessment against EPBC Act significant impact criteria

1. Because this report is intended to support the assessment of potential significant impacts on Commonwealth MNES, it is necessary to assess the potential for the proposed sand-sourcing operation to cause significant impacts on Flatback Turtles in accordance with the EPBC Act significant impact criteria.

2. Because Flatbacks fall under two MNES categories – threatened (vulnerable) species and migratory species, it is necessary consider the significant impact criteria for both. These assessments are presented in Tables 10 and 11 respectively.

3. The tables show that for all criteria the proposal will not cause significant impacts as defined by the EPBC Act guidelines.

TABLE 10: *Assessment of potential impacts on Flatback Turtles according to vulnerable species significant impact criteria.*

Threatened (vulnerable) species significant impact criteria	Proposed sand-sourcing Operation Impact Assessment	Outcome
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
– lead to a long-term decrease in the size of an important population of a species,	There are no mechanisms whereby the proposed operation could cause impacts of a scope and scale that would cause long term decrease in the population of nesting Flatbacks in the CG area. The impact avoidance and minimization measures outlined in Table 9 result in nil to negligible impacts. Recovery of the population would be supported should the proposal proceed, as outlined in the last row below.	No significant impact
– reduce the area of occupancy of an important population,	The main areas of occupation are the nesting beaches and the waters off the beaches, neither of which will be reduced by the proposed operation.	No significant impact
– fragment an existing important population into two or more populations,	There are no mechanisms whereby the proposed operation could fragment the population of nesting Flatbacks in the CG area.	No significant impact
– adversely affect habitat critical to the survival of a species,	The critical habitats are the nesting beaches and the waters off the beaches, neither of which will be adversely affected by the proposed operation.	No significant impact
– disrupt the breeding cycle of an important population,	The SPV will be permanently fitted with turtle safe lighting in accordance with the *National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2020). In any case SPV lighting in the proposed operational area will not be visible to nesting and hatching turtles due to the distances between the turtle nesting sites and the proposed operational area, their geographical aspect and screening by geographical features. As an added precaution 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 screened from it by Lacrosse Island, also screened from the seaward nesting beach west of Cape Dussejour, and 22 km from the nesting site at Barnett Point.	No significant impact
– modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	PCS (2024a) (Referral Report No. 5) has assessed potential changes to sediment transport and coastal processes from the proposed operation, including potential changes to the morphology of the nesting beaches, and finds that the proposal will not cause changes to beach morphology either during or at the end of the 15-year project timeframe.	No significant impact

Threatened (vulnerable) species significant impact criteria	Proposed sand-sourcing Operation Impact Assessment	Outcome
– result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat,	Potential invasive species introductions will be addressed by the SPV complying in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, being fitted with IMO-compliant ballast water treatment systems, and adhering to a stringent biofouling management regime in compliance with the Biosecurity Act. The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.	No significant impact
– introduce disease that may cause the species to decline; or	As per invasive species. Also, the proposed operational area is geographically distant and separated from the nesting sites (e.g. 12 km to Cape Domett) and there will be zero shore-based facilities or activities that could be potential vectors for diseases.	No significant impact
– interfere substantially with the recovery of the species.	Recovery of the species would be supported should the proposal proceed, as BKA will seek to implement and support a comprehensive environmental and biodiversity research and monitoring program, in consultation and cooperation with relevant stakeholders. This would further assist protection and conservation of this species both in CG and in other areas. BKA is already cooperating with DBCA with a data-sharing agreement, undertaking analysis of Cape Domett turtle nesting data for DBCA and sharing all survey and study results with DBCA.	No significant impact

TABLE 11: *Assessment of potential impacts on Flatback Turtles according to migratory species significant impact criteria.*

Migratory species significant impact criteria	Proposed Sand-sourcing Operation Impact Assessment	Outcome
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
– substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species,	The important habitats are the nesting beaches and the waters off the beaches, neither of which will be substantially modified, destroyed or isolated by the proposed operation. PCS (2024a) (Referral Report No. 5) has assessed potential changes to sediment transport and coastal processes from the proposed operation, including potential changes to the morphology of the nesting beaches, and finds that the proposal will not cause changes to beach morphology either during or at the end of the 15-year project timeframe.	No significant impact
– result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or	Potential invasive species introductions will be addressed by the SPV complying in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, being fitted with IMO-compliant ballast water treatment systems, and adhering to a stringent biofouling management regime. The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.	No significant impact
– seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The SPV will be permanently fitted with turtle safe lighting in accordance with the *National Light Pollution Guidelines for Wildlife* (Commonwealth of Australia, 2020). In any case SPV lighting in the proposed operational area will not be visible to nesting and hatching turtles due to the distances between the turtle nesting sites and the proposed operational area, their geographical aspect and screening by geographical features. As an added precaution 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 screened from it by Lacrosse Island, also screened from the seaward nesting beach west of Cape Dussejour, and 22 km from the nesting site at Barnett Point.	No significant impact

10.3 Specific Assessment for Snubfin Dolphins

10.3.1 Snubfin Dolphin conservation status

1. Snubfin Dolphins are classified as MNES through their listing as a migratory species under the EPBC Act. However, very little is known about the migration patterns of this species (DCCEEW 2024). Movements may only be in local areas (e.g. short seasonal inshore-offshore migrations) 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'*.

2. The Australian Snubfin Dolphin was described as a separate, Australian-specific species in 2005. While they may be found in southern Indonesia and Papua New Guinea, they generally do not leave coastal waters and it is likely that populations are distinct and do not *cyclically and predictably cross one or more national jurisdictional boundaries*.

3. Brown et al (2014) found that even within WA coastal waters the populations of Snubfins associated with different geographical areas are genetically distinct. This species may therefore not actually meet the EPBC definition of 'migratory, which gives them MNES status.

4. The species is not currently listed as threatened under the EPBC Act. However, it is currently being assessed by DCCEEW for possible 'threatened' status, with findings due in October 2024. If it is listed as threatened this would also give the species MNES status.

5. Australian Snubfin Dolphins are also afforded general protection under the EPBC Act as both 'cetaceans' and marine' species. They are also protected by the WA *Biodiversity Conservation Act* under which they are also classified as 'migratory' and 'rare in need of monitoring'.

10.3.2 BIA & population in CG area

1. As outlined in section 7 the Commonwealth has designated a breeding, calving, feeding and resting BIA for Australian Snubfin Dolphins (*Orcaella heinsohni)* in the CG area, which overlaps the proposed operational area, as per Figure 9 in section 7.

2. The presence of a small population of Snubfins in the CG area was reported by Brown et al (2016, 2017), who conducted dedicated dolphin surveys in CG as well as other sites along the Kimberly coast west to Roebuck Bay (Broome). They found that the number of Snubfins in CG was much lower than at the other sites surveyed, and for previous surveys in the Dampier Archipelago. They made 34 sightings over nine days, with repeat sightings possibly being the same individuals. They identified six as distinct individuals. This compared to 140 identified individual Snubfin Dolphins in Roebuck Bay. The significantly lower number of Snubfins in CG could relate to the extreme environmental conditions and food limiting factors in CG compared to other sites (BKA 2024b).

3. Brown et al made no sightings in the proposed operational area itself - they were mostly observed offshore outside of CG, on the western side of CG near Cape Dussejour and a group of 4 to 5 south of Adolphus Island (Brown et al 2016, 2017).

4. As outlined in section 10.2.2, BKA commissioned dedicated on-water MMF surveys in CG over nine-days in February 2024 and eight-days in July 2023, covering over 800 km of transects for each survey (Figure 19). Full details are presented in Referral Report No. 2 (BKA 2024b). These surveys included observing for Snubfins throughout CG and in the proposed operational area, with the following findings (in all sightings the dolphins were swimming purposefully and directionally) (Figure 20):

   - Feb 2024 (wet season): Four sightings, two of which were in the proposed operational area.
   - July 2023 (dry-season): 11 sightings, two of which were in the proposed operational area and one was adjacent.

5. The number of sightings cannot be directly compared to the surveys by Brown et al (2016, 2017), as in addition to CG, they also surveyed a larger area out into Joseph Bonaparte Gulf and 50 kms westward along the coast to the Berkley River and up that river, with most of their sightings being offshore and not in CG.

6. Overall, for all surveys, most of the sightings that occurred within CG were in the southern part of the gulf towards and around Adolphus Island, which is 20 km south of the closest (southern) boundary of the proposed operational area. During consultations with the local commercial fisherman who has over 20-years of experience working in CG, he confirmed that Snubfins are mostly seen near and around Adolphus Island (Douglas pers comms 2024). This may be where their preferred food source is located - small fish, crustaceans and cephalopods (Marsh et al 1989). Douglas (pers. comms 2024) also advised that there is a marked reduction in sightings of Snubfin Dolphins in CG in the wet season, as per the BKA survey

results (11 in dry-season versus four in wet-season, with similar survey effort), as they seem to move to other areas, possibly offshore away from the wet season freshwater and terrestrial sediment inputs.

10. The number and proportion of sightings for all surveys within the proposed operational area were very small (zero for Brown et al, two plus one adjacent for BKA 2023 and two for BKA 2024), and noting that repeat sightings could be the same individual(s), especially over subsequent days. Never-the-less, Snubfin Dolphins were sighted in the proposed operational area, indicating that they do transit through this area. It is therefore necessary to assess the potential for interactions between the Sand Production Vessel (SPV) and Snubfin Dolphins and any resulting impacts. These are addressed in summary in Table 12 below and in detail in Referral Report No. 4 - *Impact Assessments* (BKA 2024d).

10.3.3 Application of impact mitigation hierarchy

1. In accordance with WA EPA guidelines BKA has applied the impact mitigation hierarchy as follows, in order of priority:

   - avoid impacts,
   - minimize impacts,
   - offset impacts; and
   - rehabilitate impacts.

2. Table 12 presents the mitigation hierarchy applied to the assessment of potential impacts from the proposed sand-sourcing operation on Snubfin Dolphins. The potential impacts are identified as potential vessel strike and potential underwater noise impacts from the SPV. Table 12 shows that the residual impacts after application of the hierarchy are nil to negligible.

TABLE 12: *Mitigation hierarchy & assessment of residual impacts for Snubfin Dolphins* (*Orcaella heinshoni*).

Potential Impact of the proposal	Impact Avoidance / Prevention	Impact Minimization / Mitigation	Rehabilitation & Offsets	Residual Impacts
Potential vessel strike by the SPV:	Low presence of these species in the proposed operational area. Naturally shy and elusive behaviour of these species, which unlike other dolphin species avoid vessels. Low presence of the SPV in CG (zero presence 86% of time during project lifespan).	Low operational speed of the SPV (~2knots). Implementation of best-practice Marine Mega-fauna (MMF) observation and avoidance systems and procedures, in accordance with relevant guidelines.	None required. Never-the-less, should the proposal proceed, BKA will seek to implement a comprehensive environmental and biodiversity research and monitoring program, in consultation and cooperation with relevant stakeholders. This would further assist protection and conservation of these species both in CG and in other areas.	Negligible. As with any vessel operating at sea there is always a possibility of an interaction with marine fauna. The measures listed in the columns to left make the likelihood very low.
Potential underwater noise impacts from the SPV:	Low presence of these species in the proposed operational area. Naturally shy and elusive behaviour of these species, which unlike other dolphin species avoid vessels. Low presence of the SPV in CG (zero presence 85% of time during project lifespan). Separation of the sound generation profiles of the SPV and the sound repertoires of the dolphin species. Naturally very high suspended sediment concentrations in CG which reduces sound propagation (WODA 2015). Naturally high sound levels from high tidal range which can mask other sound sources (Marely et al 2017).	The SPV will be a 'newbuild' vessel and will incorporate relevant best practice noise reduction measures from the design-phase, as per the IMO 2023 Underwater Noise Guidelines (IMO 2023). As the design parameters for the SPV mature (it is still in conceptual phase), modelling of likely noise emissions will be undertaken in accordance with the IMO Guidelines, and used to inform optimum design and incorporation of noise reduction measures. Implementation of best-practice Marine Mega-fauna (MMF) observation and avoidance systems and procedures, in accordance with relevant guidelines.	None required. Never-the-less, should the proposal proceed, BKA will seek to support research and monitoring of the acoustic characteristics of the two dolphin species and of the CG environment, in close coordination with relevant stakeholders, including DBCA and the local TO ranger groups. This will provide scientific data to support improved protection, conservation and management of these species, both in CG and in other areas.	Nil

10.3.4 Assessment against EPBC Act significant impact criteria

1. Because this report is intended to support the assessment of potential significant impacts on Commonwealth MNES, it is necessary to assess the potential for the proposed sand-sourcing operation to cause significant impacts on Snubfin Dolphins in accordance with the EPBC Act significant impact criteria.

2. Snubfin Dolphins are classified as MNES because they are listed as a 'migratory' species, although as outlined above it is questionable whether or not they meet the trans-national definition of migratory under the Convention on Migratory Species. Never-the-less, Table 13 assesses potential impacts of the proposed sand-sourcing operation in accordance with the EPBC Act significant impact criteria for migratory species.

3. Table 13 shows that for all criteria the proposal will not cause significant impacts as defined by the EPBC Act guidelines.

TABLE 13: *Assessment of potential impacts on Snubfin Dolphins according to migratory species significant impact criteria.*

Migratory species significant impact criteria	Proposed Sand-sourcing Operation Impact Assessment	Outcome
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
– substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species,	The important habitat are the waters of CG and offshore from CG in Joseph Bonaparte Gulf, which will not be substantially modified, destroyed or isolated by the proposed operation.	No significant impact
– result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or	Potential invasive species introductions will be addressed by the SPV complying in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, being fitted with IMO-compliant ballast water treatment systems, and adhering to a stringent biofouling management regime. The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.	No significant impact
– seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is highly unlikely that the proposed operation would seriously disrupt the lifecycle of an ecologically significant proportion of the population of Snubfin Dolphins in the CG area, given: – the restricted scope and scale of the proposed operation as outlined in section 8, including zero operational presence in CG for 86% of the time, small areal coverage of only 0.5 km^2 during each 1 to 2-day sand loading cycle, and two-week gaps between cycles, – the large scope and scale of the species' lifecycle habitats in the area (1,000s of km^2), – the very low number of sightings in CG and even lower number og sightings in the proposed operational area; and – application of the mitigation hierarchy outlined in Table 12 in section 10.3.3 above. Knowledge and understanding of the lifecycle and population dynamics of Snubfin Dolphins in both the CG area and other areas will be improved if the proposal proceeds, as BKA will seek to implement a comprehensive environmental and biodiversity research and monitoring program, in consultation and cooperation with relevant stakeholders. This would further assist protection and conservation of these species both in CG and in other areas.	No significant impact

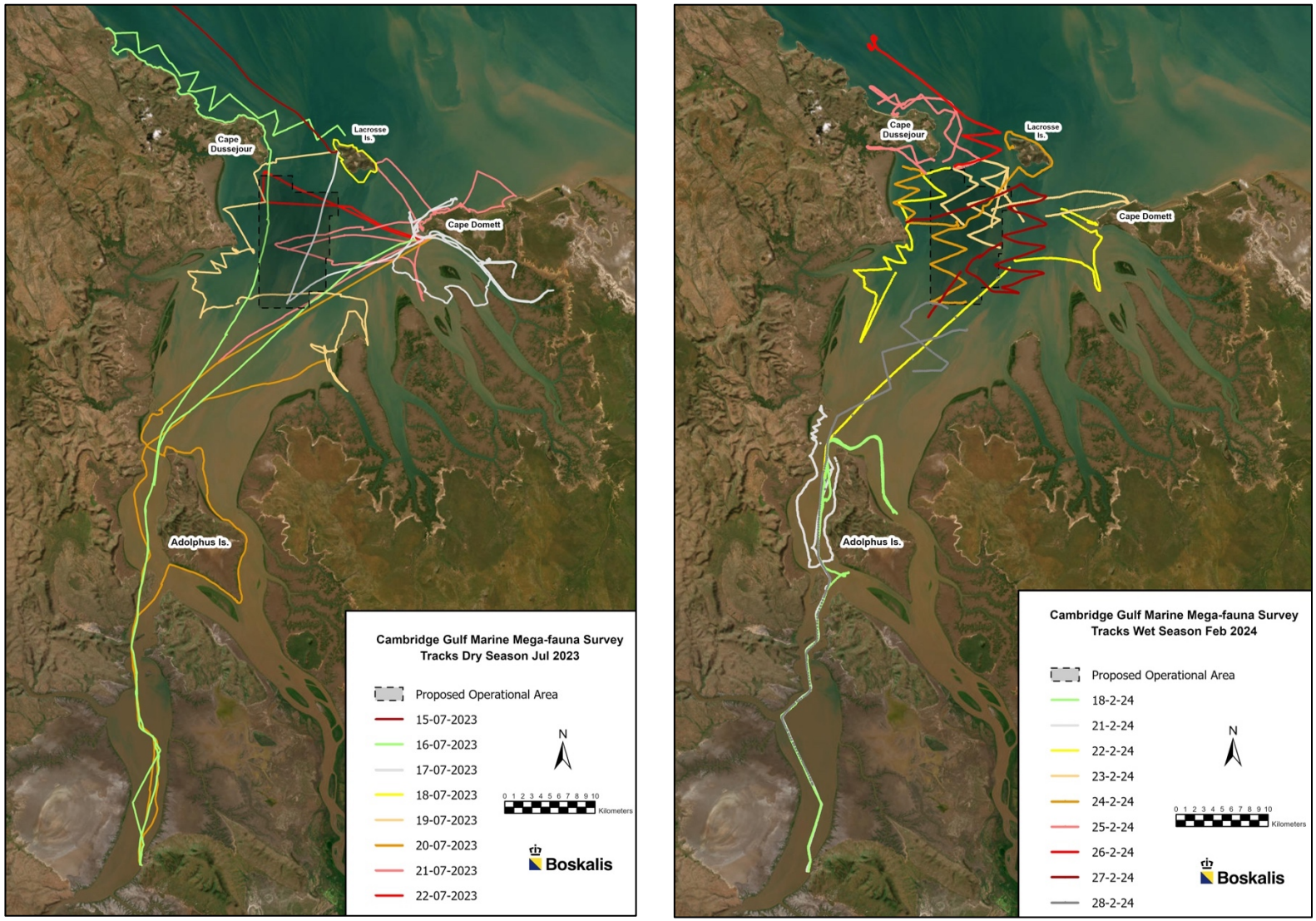


FIGURE 19: *Left: Dry-season MMF survey tracks. Right: Wet-season MMF survey tracks.*

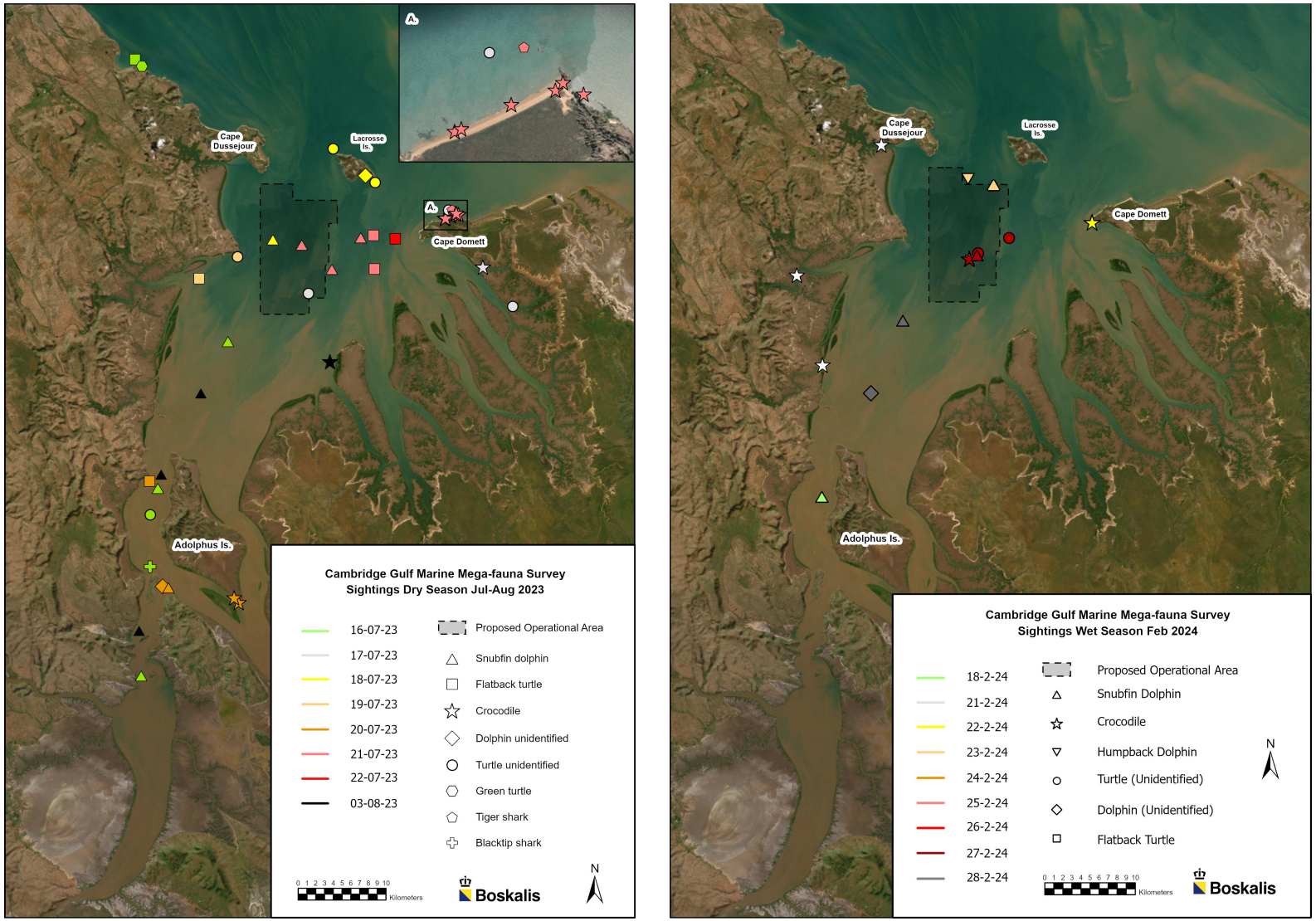


FIGURE 20: *Left: Dry-season MMF sightings. Right: Wet-season MMF sightings.*

10.4 Threatened Species Assessment Tables

TABLE 14: *Assessment of potential for significant impacts on Listed Threatened Species – CRITICALLY ENDANGERED & ENDANGERED* ***BIRDS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Calidris canutus Red Knot Endangered  *Image credit: C Holmer*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in PMST. • The Red Knot is a migratory wader / shorebird that feeds along the shoreline and roosts on sandy beaches. It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of a population, • reduce the area of occupancy of the species, • fragment an existing population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of a population, • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat, • introduce disease that may cause the species to decline; or • interfere with the recovery of the species.	Given that it is highly unlikely that the Red Knot would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Calidris ferruginea Curlew Sandpiper Critically Endangered  *Image credit: eBird*	• The PMST search states that the species or its habitat is known to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Curlow Sandpiper is a migratory wader / shorebird that feeds along the shoreline and roosts above the high tide line. It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	"	Given that it is highly unlikely that the Curlow Sandpiper would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Erythrotriorchis radiatus Red Goshawk Endangered  *Image credit: eBird*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Red Goshawk is a bird of prey that inhabits savannah woodland. It may be present in the coastal areas of CG but it is not a sea hawk and is unlikely to be found in the open-water marine area of the proposed operational area, except perhaps the occasional bird flying over the area from one side of CG to the other.		Given that it is highly unlikely that the Red Goshawk would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Erythrura gouldiae Gouldian Finch Endangered  *Image credit: N Hobgood*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Gouldian Finch is a very small land-based seed-eating bird that nests in tree hollows – so it would only be present on land areas around CG.	"	Given that it is highly unlikely that the Gouldian Finch would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew Critically Endangered  *Image credit: JJ Harrison*	• The PMST search states that the species or its habitat is known to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Eastern Curlow is a large migratory wader that feeds along the shoreline and roosts above the high tide line. It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	"	Given that it is highly unlikely that the Eastern Curlew would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Rostratula australis Australian Painted Snipe Endangered  *Image credit: eBird*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Australian Painted Snipe is a stout shorebird that feeds along the shoreline and nests on the ground. It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	“	Given that it is highly unlikely that the Australian Painted Snipe would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria. Figure 21 below shows the critical ecosystem components and processes that contribute to the survival of the Painted Snipe (from Hale 2008) and how the proposed sand-sourcing operation relates to each, indicating no potential for significant impacts on any of the components and processes. A similar model applies to all of the listed bird species that have similar coastal, wetland and terrestrial habitats.	**No significant impact**

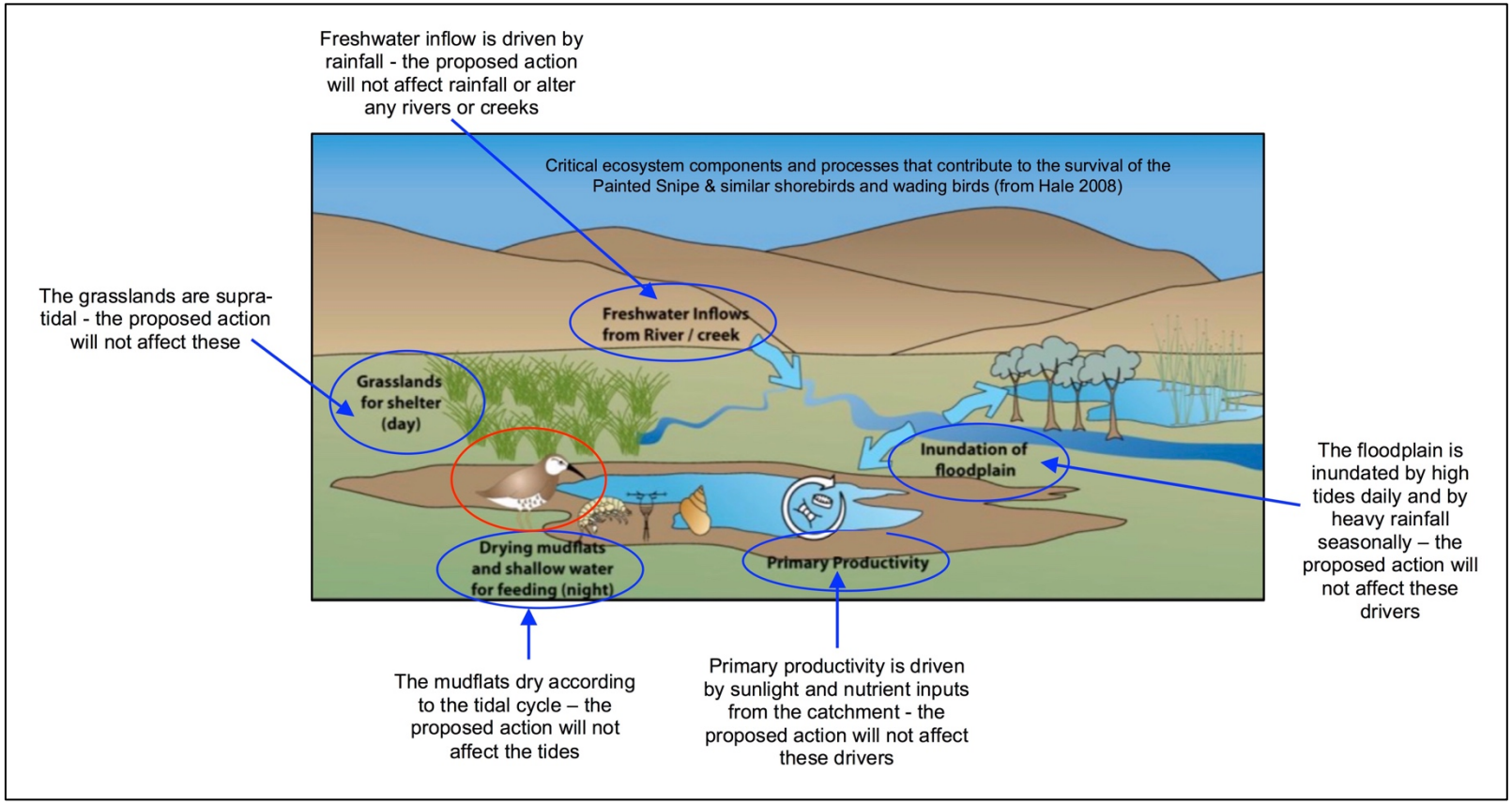


FIGURE 21: *The critical ecosystem components and processes that contribute to the survival of the Painted Snipe (from Hale 2008) and how the proposed sand-sourcing operation relates to each, indicating no potential for significant impacts on any of the components and processes. A similar model applies to all of the listed bird species that have similar coastal, wetland and terrestrial habitats.*

TABLE 15: *Assessment of potential for significant impacts on Listed Threatened Species – VULNERABLE* ***BIRDS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover Vulnerable  *Image credit: eBird*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Greater Sand Plover is a small migratory shorebird that feeds along the shoreline and roosts on sand-spits, sand-banks, beaches and occasionally on rocky points. • It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species, • reduce the area of occupancy of an important population, • fragment an existing important population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of an important population, • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.	Given the wholly marine nature of the proposed action, and that it is highly unlikely that the Greater Sand Plover would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Falco hypoleucos Grey Falcon Vulnerable  *Image credit: Barraimaging*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Grey Falcon is a very rare Australian endemic, usually confined to the arid inland. It inhabits Triodia grassland, Acacia shrubland and lightly timbered arid woodland. It may be present in the coastal areas of CG but it is not a seabird and is unlikely to be found in the open-water marine area of the proposed operational area, except perhaps the occasional bird flying over the area from one side of CG to the other.	"	Given the wholly marine nature of the proposed action, and that it is highly unlikely that the Grey Falcon would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Falcunculus frontatus whitei Crested Shrike-tit (Northern) Vulnerable  *Image credit: eBird*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Crested Shrike-tit is an Australian endemic which inhabits open Eucalypt woodlands and feeds mainly on insects, spiders, seeds and, sometimes, particularly during the breeding season, young birds. • It may be present in the coastal areas of CG but it is not a seabird and is unlikely to be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that it is highly unlikely that the Crested Shrike-tit would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit Vulnerable  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area only. • The Bar-tailed Godwit is a large, highly migratory wader that feeds along the shoreline and roosts above the high tide line. It is therefore highly unlikely that it would be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that it is highly unlikely that the Bar-tailed Godwit would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Tyto novaehollandiae kimberli Masked Owl (northern) Vulnerable  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area only. • The Masked Owl is a bird of prey that inhabits savannah woodland. It may be present in the coastal areas of CG but it is not a seabird and is unlikely to be found in the open-water marine area of the proposed operational area.	"	Given the wholly-marine nature of the proposed action, and that it is highly unlikely that the Masked Owl would be found in the open-water marine area of the proposed operational area, there is almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

TABLE 16: *Assessment of potential for significant impacts on Listed Threatened Species – CRITICALLY ENDANGERED & ENDANGERED* ***MAMMALS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Balaenoptera musculus Blue Whale Endangered  *Image credit: earth.com*	• The PMST search states that the species or its habitat may occur in the operational footprint. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The potential presence of this species relates to the estimated overall bio-geographical range of the species, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG, including shallow water depth (mean 112m LAT), relative to the requirements and preferences of this species make it extremely unlikely that they would enter the CG. • Whales are also generally absent from the adjacent offshore waters of Joseph Bonaparte Gulf, due to their relative shallowness (15 to 75 m LAT) (Galaiduk et al. 2018). • Satellite tagging studies and BIA maps shows that Blue Whales undertake annual migrations along the west coast of WA and north past East Timor to the Banda Sea, and not east to Joseph Bonaparte Gulf and Cambridge Gulf (Figure 22).	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of a population, • reduce the area of occupancy of the species, • fragment an existing population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of a population, • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat, • introduce disease that may cause the species to decline; or • interfere with the recovery of the species.	Given that it is highly unlikely that Blue Whales would be found in the proposed operational area, or even in CGf generally, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**
Dasyurus hallucatus Northern Quoll Endangered  *Image credit: ABC*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Northern Quoll is a terrestrial species that inhabits rocky areas, eucalypt woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. • It may be present in the coastal areas of CG but it would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Northern Quoll would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Mesembriomys gouldii gouldii Black-footed Tree-rat Endangered  *Image credit: AWRC*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area only. • The Black-footed Tree-rat is a terrestrial species that inhabits lowland open forests and woodlands, particularly those dominated by *Eucalyptus miniata* and/or *E. tetrodonta* with well-developed shrubby understoreys. The subspecies is nocturnal and forages in trees and on the ground. • It may be present in the coastal areas of CG but it would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Black-footed Tree-rat would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Petrogale concinna monastria Nabarlek Endangered  *Image credit: ZooChat*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Nabarlek is a small marsupial macropod (related to wallabies and kangaroos) that is shy and nocturnal and restricted to granite and sandstone rocky cliffs, hills and gorges. Its diet is grasses, sedges and ferns found in and around their scrub-covered refuges. • It may be present in the coastal areas of CG but it would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Nabarlek would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**

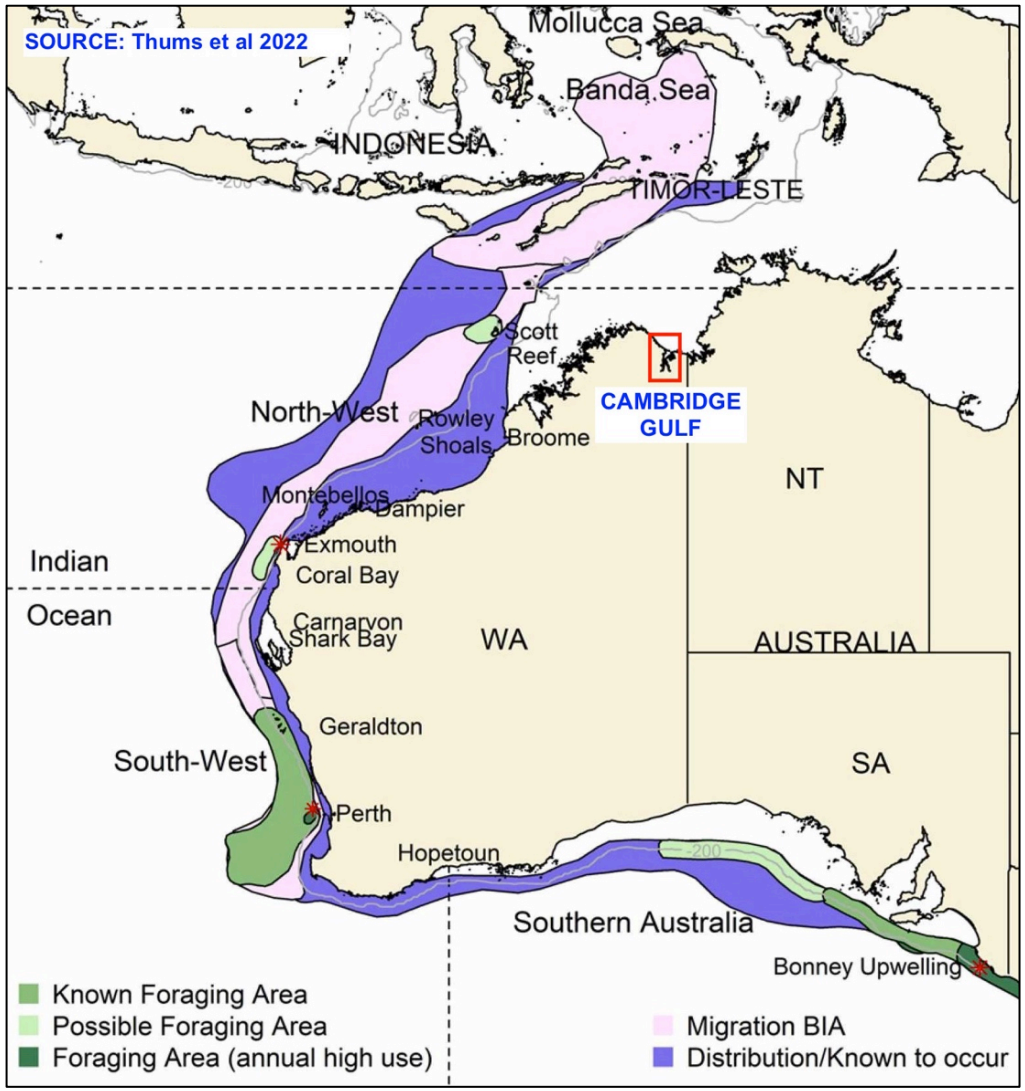


FIGURE 22: *Satellite tagging studies show that Blue Whales undertake annual migrations along the west coast of WA north past Timor Leste to the Banda Sea, and not east to Joseph Bonaparte Gulf and Cambridge Gulf (Thums et al 2022).*

TABLE 17: *Assessment of potential for significant impacts on Listed Threatened Species – VULNERABLE **MAMMALS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Macroderma gigas Ghost Bat Vulnerable  *Image credit: D MacKenzie*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST – the Ghost Bat is not a marine species. • The Ghost Bat is the only Australian bat that preys on large vertebrates – birds, reptiles and other mammals – which it detects using acute sight and hearing, combined with echolocation, while waiting in ambush at a perch. It roosts in caves, old mine tunnels and in deep cracks in rocks. It does not normally fly over the sea. • It may be present in the coastal areas of CG but it would not be found in the open-water marine area of the operational footprint.	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species, • reduce the area of occupancy of an important population, • fragment an existing important population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of an important population, • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.	Given the wholly marine nature of the proposed action, and that the Ghost Bat would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat Vulnerable  *Image credit: Aus Museum*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Bare-rumped Sheathtail Bat is an insectivorous bat that occurs primarily in tropical eucalypt woodland and possibly rainforest, in the coastal lowlands of north-eastern Queensland and the Top End of the Northern Territory. It 'may' occur in tropical WA. • It could potentially be present in the coastal areas of CG but it would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Bare-rumped Sheath-tailed Bat would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Trichosurus vulpecula arnhemensis Northern Brushtail Possum Vulnerable  *Image credit: Open source*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area only. • The Northern Brushtail Possum is a nocturnal semi-arboreal marsupial. It occurs mainly in tall eucalypt open forests with large hollow-bearing trees, particularly where the understorey includes some shrubs that bear fleshy fruits, which they feed on. • It could potentially be present in the coastal areas of CG but it would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Northern Brushtail Possum would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Xeromys myoides Water Mouse /False Water Rat Vulnerable  *Image credit: iNaturalist*	• The PMST search states that the species or its habitat is likely to occur in the 10 km buffer area only. • The Water Mouse is a small native rodent recorded from coastal saltmarsh including samphire shrublands, saline reed-beds and saline grasslands, mangroves and coastal freshwater wetlands. • It is almost certainly present in the wetland habitats along the coastal areas of CG, but would not be found in the open-water marine area of the proposed operational area.	"	Given the wholly marine nature of the proposed action, and that the Water Mouse would not be found in the open-water marine area of the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**

TABLE 18: *Assessment of potential for significant impacts on Listed Threatened Species – CRITICALLY ENDANGERED & ENDANGERED* ***REPTILES***

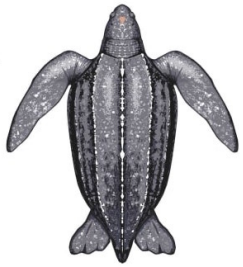
Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**

Aipysurus apraefrontalis Short-nosed Seasnake
 	
Critically Endangered
 	
 
Image credit: V Udyawar
	• The PMST search states that the species or its habitat may occur in the 10 km buffer area.
	
	• The general geographical range of this species includes the CG area and it could thus potentially be present.
	
	• While CG is within the general geographic range of many of the seasnake species found in northern Australian waters, no published records of sightings in CG were identified through literature search. A local commercial fisherman with over 20-years of experience in CG advised that seasnakes are not seen in CG (Douglas pers. comms. 2024).
	
	• Seasnakes were not observed during BKA's three environmental survey campaigns in CG, either in the systematic MMF surveys or incidental observations. Several seasnakes were observed on the sea surface in Joseph Bonaparte Gulf offshore from CG (see Referral Report No. 2 (BKA 2024b)).
	
	• The environmental conditions and general lack of food sources discussed in Referral Report No. 2 may be the reason why seasnakes are not seen in CG.
		An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
		• lead to a long-term decrease in the size of a population,
		• reduce the area of occupancy of the species,
		• fragment an existing population into two or more populations,
		• adversely affect habitat critical to the survival of a species,
		• disrupt the breeding cycle of a population,
		• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,
		• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat,
		• introduce disease that may cause the species to decline; or
		• interfere with the recovery of the species.
			• There is potential for interaction between the SPV and any seasnakes that might be present in the operational area during the short 24 to 48-hour periods when the SPV will be present every 2 weeks.
			
			• Potential for collision is very low due to:
			  • The low likelihood of seasnakes actually being present, based on surveys to date.
			  • The short duration (24-48 hours) of each cycle of presence of the SPV – with 10 to 14-day gaps between cycles.
			  • SPV will operate at very low speed (~2 knots).
			  • SPV will have marine mega-fauna observation and avoidance measures.
			  • SPV will have marine mega-fauna deterrence /exclusion device on the sand uptake drag head.
			
			• The potential for noise disturbance is low as seasnakes are amongst the least noise sensitive marine species (Chapius et al 2019), the SPV will only be present for short periods each cycle with gaps in between, it will operate at very low speeds (2 knots) and will be a new-build vessel with noise reduction measures as per IMO Guidelines (IMO 2023).
			
			• Overall, even in the highly unlikely event of an interaction between the SPV and the occasional seasnake, significant impacts as outlined in the Significant Impact Criteria would not be caused.
				No significant impact

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Aipysurus foliosquama Leaf-scaled Seasnake Critically Endangered  *Image credit: Aus Geographic*	• As per Short-nosed Seasnake above.	"	• As per Short-nosed Seasnake above.	**No significant impact**

Caretta caretta Loggerhead Turtle
 	
Endangered
 
 	
	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area.
	
	• The global geographical range of this species includes the CG area and thus it could potentially occur, although it does not seem 'likely'.
	
	• However, the main rookeries (nesting sites) for Loggerheads are in the southern Great Barrier Reef and along the WA coast from Shark Bay to North West Cape (1,600 km from Cambridge Gulf) (DCCEEW).
	
	• Loggerhead Turtles are carnivorous, feeding primarily on benthic invertebrates. Given the lack of benthic invertebrates in CG (due to aphotic conditions and high current velocities near the seabed) (Referral Report No. 2 (BKA 2024b)) it seems unlikely that Loggerheads would be found in the Gulf – it is not suitable feeding habitat.
	
	• No previous records of Loggerheads in CG were identified by literature search. Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe any Loggerheads. The main turtle species observed were Flatbacks *(Natator depressus),* associated with nearby nesting
		"	• The most significant marine turtle species in the CG area is the Flatback Turtle (*Natator depressus*), and a separate, specific assessment for that species is presented in section 10.2.
			
			• There is potential for interaction between the SPV and any Loggerhead Turtles that might be present in the operational area during the short 24 to 48-hour periods when the SPV will be present every 2 weeks.
			
			• Potential interactions include physical collision and low-level noise disturbance.
			
			• The potential for physical collision is very low due to:
			
			  • The low likelihood of Loggerheads actually being present, based on the lack of suitable habitat and food sources and lack of observations of Loggerheads in CG to date.
			
			  • The short duration (24-48 hours) of each cycle of presence of the SPV – with 10 to 14-day gaps between cycles.
				No significant impact

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
	beaches, and one Green *(Chelonoa mydas)* (BKA 2024b).		• SPC will operate at very low speed (~2 knots). • SPV will have marine mega-fauna observation and avoidance measures. • SPV will have marine mega-fauna deterrence /exclusion device on the sand uptake drag head. • SPV will be fitted with turtle safe lighting (although this is not relevant to Loggerheads as they do not nest in the area). • The potential for noise disturbance is low as the SPV will only be present for short periods each cycle with gaps in between, it will operate at very low speeds (2 knots) and will be a new-build vessel with relevant noise reduction measures as per IMO Guidelines (IMO 2023). • Overall, even in the highly unlikely event of an interaction between the SPV and the occasional Loggerhead Turtle that might enter Cambridge Gulf, significant impacts as outlined in the Significant Impact Criteria would not be caused.	
Dermochelys coriacea Leatherback Turtle Endangered	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • The global geographical range includes the CG area and it could thus it could potentially occur, although it does not seem 'likely'. • No large rookeries for Leatherbacks have been recorded in Australia and the nearest rookeries are in Indonesia. In Australia they are commonly reported feeding in coastal waters from southern Queensland to central New South Wales, in Tasmania, Victoria and eastern South Australia and in south-western Western Australia (DCCEEW).	"	• As per Loggerhead Turtles above. • The most significant marine turtle species in the CG area is the Flatback Turtle (*Natator depressus*), and a separate, specific assessment for that species is presented in section 10.2.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
	• Leatherback Turtles are carnivorous, feeding primarily in the open ocean on jellyfish and other soft-bodied invertebrates. Given the very high turbidity and lack of benthic invertebrates in CG (due to aphotic conditions and high current velocities near the seabed) (BKA 2024b) it seems unlikely that Leatherbacks would be found in CG – it is not suitable oceanic feeding habitat. • No previous records of Leatherbacks in CG were identified by literature search. Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe any Leatherbacks. The main turtle species observed were Flatbacks *(Natator depressus),* associated with nearby nesting beaches, and one Green *(Chelonoa mydas)* (BKA 2024b).			
Lepidochelys olivacea Olive Ridley Turtle Endangered 	• The PMST search states that foraging, feeding or related behavior of this species is known to occur in the proposed operational area. • The PMST does not provide a reference for the basis of 'known to occur'. • The global geographical range of this species includes the CG area and it could thus potentially occur. • No large rookeries (nesting sites) for Olive Ridleys have been recorded in Australia and the nearest (small) rookeries are in northwest Arnhem Land in the Northern Territory (1,000 km by sea from Cambridge Gulf) (DCCEEW). • Olive Ridleys are carnivorous, feeding mostly on shellfish and small crabs. Given the lack of benthic invertebrates in Cambridge Gulf (due to aphotic conditions and high current velocities near the seabed) (BKA 2024b) it seems unlikely that Olive Ridleys would be found in CG.	"	• As per Loggerhead Turtles above. • The most significant marine turtle species in the CG area is the Flatback Turtle (*Natator depressus*), and a separate, specific assessment for that species is presented in section 10.2	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
	• As outlined in section 7 the Commonwealth has designated a foraging BIA for this species in waters offshore from CG, in Joseph Bonaparte Gulf, which provides much more suitable foraging habitat than inside CG. • No previous records of Olive Ridley's in CG were identified by literature search. Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe any Olive Ridley's. The main turtle species observed were Flatbacks *(Natator depressus),* associated with nearby nesting beaches, and one Green *(Chelonoa mydas)* (BKA 2024b).			

TABLE 19: *Assessment of potential for significant impacts on Listed Threatened Species – VULNERABLE* ***REPTILES***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria**	**Assessment**	**Finding**
Acanthophis hawkei Plains Death Adder Vulnerable  *Image credit: Venomland*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area. • It could potentially be present in the coastal areas of CG but it would not be found in the open-water area of the proposed operational area.	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species, • reduce the area of occupancy of an important population, • fragment an existing important population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of an important population, • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.	• Given the wholly marine nature of the proposed action, and that the Plains Death Adder would not be found in the proposed operational area, there is no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Chelonia mydas Green Turtle Vulnerable  	• The PMST search states that foraging, feeding or related behavior of this species is known to occur in the proposed operational area. • The PMST does not provide a reference for the basis of 'known to occur'. • The global geographical range of this species includes the CG area and it could thus potentially occur. • 12 years (2012 to 2022) of monitoring nesting Flatback Turtles at Cape Domett seaward beach outside of CG by DBCA observed less than four Greens in any year amongst hundreds of Flatbacks. • In WA the major rookeries are in the North West Shelf region from the Ningaloo coast to the Lacepede Islands (900 km by sea west of Cambridge Gulf) (DCCEEW). Nesting in the Cambridge Gulf area is incidental.	"	• As per Loggerhead Turtles above. • The most significant marine turtle species in the CG area is the Flatback Turtle (*Natator depressus*), and a separate, specific assessment for that species is presented in section 10.2.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria**	**Assessment**	**Finding**
	• Adult green turtles feed mostly on seagrasses and algae, which are not present in CG. • As outlined in section 7 the Commonwealth has designated a foraging BIA for this species in waters offshore from CG, in Joseph Bonaparte Gulf, which provides much more suitable foraging habitat than inside CG. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 observed a single Green Turtle in waters outside of CG.			
Eretmochelys imbricate Hawksbill Turtle Vulnerable  **Hawksbill** *Eretmochelys imbricata*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • • The general geographical range of this species includes the CG area and it could thus potentially be present. • However, the key nesting and inter-nesting areas for Hawksbill Turtles in WA are the Dampier Archipelago, the Ningaloo and Jurabi Coasts and Thevenard, Barrow, Lowendal and Montebello Islands (the closest being over 1,500 km by sea from CG) (DCCEEW). • Hawksbill Turtles spend their first five to ten years drifting on ocean currents). During this pelagic (ocean-going) phase, they are often found in association with rafts of *Sargassum* weed. Once Hawksbill Turtles reach 30 to 40 cm curved carapace length, they settle and forage in tropical tidal and sub-tidal coral and rocky reef habitat. They primarily feed on sponges and algae (DCCEEW). • Given the lack of sponges and algae in CG (due to aphotic conditions and high current velocities near the seabed) (BKA 2024b) it seems unlikely that Hawksbills would be found in CG – it is not suitable feeding habitat. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe any Hawksbills in CG.	“	• As per Loggerhead Turtles above. • The most significant marine turtle species in the CG area is the Flatback Turtle (*Natator depressus*), and a separate, specific assessment for that species is presented in section 10.2.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria**	**Assessment**	**Finding**

Natator depressus
Flatback Turtle
 	
Vulnerable
 	
 
Flatback
Natator depressus
	• The PMST search states that foraging, feeding or related behavior of this species is known to occur in the proposed operational area.
	
	• The Flatback Turtle is carnivorous, feeding mostly on soft-bodied prey such as sea cucumbers, soft corals and jellyfish (DCCEEW). It therefore seems unlikely that they would feed in CG, as suggested by the PMST search, due to lack of food resources, as outlined for the other turtle species above.
	
	• There is a globally significant nesting beach for Flatback Turtles on the seaward side of Cape Domett on the eastern side of Cambridge Gulf (12 km from the nearest point of the proposed operational area). Thousands of nests per year are estimated. Peak nesting is in Aug-Sept (Whiting et al 2008).
	
	• There is lower intensity of Flatback nesting on a seaward beach west of Cape Dussejour, at Turtle Bay on Lacrosse Island, and on sand areas behind mangroves at East Bank Point inside Cambridge Gulf.
	
	• Turtle surveys commissioned by BKA in July 2023 (using both boat- and aerial-drone based surveys) observed the following (BKA 2024b):
	  • Cape Domett: 456 track pairs / 197 nests.
	  • West of Cape Dussejour: 34 track pairs / 28 nests.
	  • Turtle Bay on Lacrosse Is.: 6 track pairs / 6 nests.
	  • Barnett Point: 82 track pairs / 13 nests.
	
	• WA-DBCA has been undertaking annual nest monitoring at Cape Domett since 2012 and the data from these surveys has been analysed by BKA under agreement with DBCA. The resulting report is attached as an Annex to Referral Report No. 2 (BKA 2024b).
	
	• As outlined in section 7 the Commonwealth has designated an inter-nesting buffer BIA for this species within a 60 km radius around Cape Domett. This covers CG and the proposed operational area.
		“	• **Given the significance of this marine turtle species in the CG area, a separate, specific assessment of potential impacts from the proposed sand-sourcing operation is presented in section 10.2.**
			
			• It finds ‘no significant impact’ in relation to the significant impact criteria.
				No significant impact

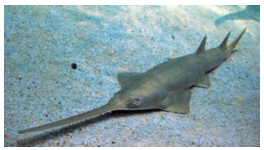
TABLE 20: *Assessment of potential for significant impacts on Listed Threatened Species – CRITICALLY ENDANGERED & ENDANGERED **SHARKS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria**	**Assessment**	**Finding**

Glyphis garricki
Northern River Shark
 	
Endangered
 	
 
Image credit: Sam Lyne
	• The PMST search states that the species or its habitat is known to occur in the proposed operational area, however supporting data is for upstream inlets and the Ord River – not in the project area itself (another example of the geo-resolution issues with PMST).
	
	• P. Kyne of Charles Darwin University reports this species in the Lower Ord River in online news articles, but no published reports or papers found.
	
	• The eDNA sampling commissioned by BKA in 2024 did not detect DNA evidence of river sharks at any sites in CG itself or in upstream areas on both the west and east side of CG (Referral Report No. 2, BKA 2024b).
	
	• Population numbers throughout its range in northern Australia and PNG are currently unknown but are assumed to be low due to lack of returns from shark surveys – however this may also relate to the distribution and behaviour of the species vs survey methods, not necessarily low numbers.
	
	• Throughout its range the Northern River Shark inhabits large rivers, estuaries, and coastal bays, all of which are characterized by high turbidity, silty or muddy bottoms and large tides.
	
	• Young and juvenile sharks are found in fresh, brackish, and salt water (salinity ranging from 2 to 36 ppt), whereas adults have only been found in marine environments, indicating that juveniles use fresher upstream areas as nurseries and migrate to more saline waters as they mature to adulthood (fish.gov.au).
	
	• Any Northern River Sharks in CG may therefore pass through the proposed operational area during such movements.
		An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
		• lead to a long-term decrease in the size of a population,
		• reduce the area of occupancy of the species,
		• fragment an existing population into two or more populations,
		• adversely affect habitat critical to the survival of a species,
		• disrupt the breeding cycle of a population,
		• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,
		• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat,
		• introduce disease that may cause the species to decline; or
		• interfere with the recovery of the species.
			• There is potential for interaction between the SPV and any Northern River Shark that might be present in the operational area during the short 24 to 48-hour periods when the SPV will be present every 2 weeks.
			
			• Potential for physical impact is very low due to:
			  • The low likelihood of Northern River Shark actually being present in the operational area.
			  • The short duration (24-48 hours) of each cycle of presence – with 10 to 14 -day gaps between cycles.
			  • SPV will operate at very low speed (~2 knots).
			  • SPV will have marine mega-fauna observation and avoidance measures.
			  • SPV will have marine mega-fauna deterrence/exclusion device on the sand uptake drag head.
			
			• Overall, even in the highly unlikely event of an interaction between the SPV and an individual Northern River Shark, significant impacts as outlined in the Significant Impact Criteria would not be caused.
			
			• BKA is prepared to support long-term research and monitoring of River Sharks in CG should the project be approved, and this is included in the proposed Environmental Plan in Annex 1.
				No significant impact

TABLE 21: *Assessment of potential for significant impacts on Listed Threatened Species – VULNERABLE* ***SHARKS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Carcharodon carcharias Great White Shark Vulnerable  *Image credit: Wikipedia*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The potential presence of this species relates to its estimated overall bio-geographical range, which has very occasionally been found in tropical waters. However, it does not automatically mean that this species is actually or is likely to be present. • Great White Sharks are mainly found in colder temperate waters and the environmental and food conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf.	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species, • reduce the area of occupancy of an important population, • fragment an existing important population into two or more populations, • adversely affect habitat critical to the survival of a species, • disrupt the breeding cycle of an important population, • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.	• Given that it is highly unlikely that Great White Sharks would be found in the proposed operational area, or even in CG generally, and given the nature of the proposed operation, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**
Pristis clavata Dwarf Sawfish Vulnerable  *Image credit: R Kuiter*	• The PMST search states that the species or its habitat is known to occur in the proposed operational area, however there is no supporting data in the project area itself (another example of the geo-resolution issues with PMST). • Literature search did not find any record of this species in CG and the eDNA sampling commissioned by BKA in 2024 did not detect DNA evidence of this species at any sites in CG itself or in upstream areas on both the west and east side of CG (Referral Report No. 2, BKA 2024b). • The Dwarf Sawfish usually inhabits shallow (2–3 m) coastal waters and upstream estuarine habitats (DCCEEW), not deeper open waters such as the proposed operational area	"	• Given the unlikely presence of Dwarf Sawfish in the proposed operational area and the short 24 to 48-hour periods when the SPV will be present every 2 weeks there is a low likelihood of interaction with the SPV. • Additionally: – SPV will operate at very low speed (~2 knots). – SPV will have marine mega-fauna observation and avoidance measures. – SPV will have marine mega-fauna deterrence/exclusion device on the sand uptake drag head.	**No significant impact**

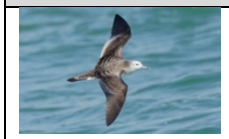
Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
	(>20m deep LAT) with strong tidal currents and permanent aphotic zone near the seabed. • Dwarf Sawfish may move into shallow coastal waters after the wet season, and during the wet season enter estuarine and more-fresh waters to breed (Peverell 2005). • Stevens et al (2008) reported that Dwarf Sawfish appear to move only small distances and occupy restricted areas.		• Overall, even in the highly unlikely event of an interaction between the SPV and an individual Sawfish, significant impacts as outlined in the Significant Impact Criteria would not be caused. • BKA is prepared to support long-term research and monitoring of Sawfish in CG should the project be approved, and this is included in the proposed Environmental Plan in Annex 1.	
Pristis pristis Freshwater Sawfish Vulnerable  *Image credit: Fishes of Aus*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • Despite its name, the Freshwater Sawfish is not restricted to freshwater. Juveniles and sub-adults predominantly occur in rivers and estuaries, while large mature animals tend to occur more often in coastal and offshore waters up to 25 m depth (Giles et al. 2006; Stevens et al. 2005). • In northern Australia, this species appears to be confined to freshwater drainages and the upper reaches of estuaries, occasionally being found as far as 400 km upstream from the sea (Thorburn et al. 2007; Whitty et al. 2008). In the CG area it probably only occurs in the Durack; Lower Ord and Pentecost Rivers (DCCEEW). • Literature search did not find any record of this species in CG and the eDNA sampling commissioned by BKA in 2024 did not detect DNA evidence of this species at any sites in CG itself or in upstream areas on both the west and east side of CG (Referral Report No. 2, BKA 2024b).	"	• As per Dwarf Sawfish above.	**No significant impact**
Pristis zijsron Green Sawfish Vulnerable  *Image credit: R Pion*	• The PMST search states that the species or its habitat is known to occur in the proposed operational area, however there is no supporting data in the project area itself (another example of the geo-resolution issues with PMST). • The Green Sawfish is the most marine of the Sawfish species. They mainly inhabit coastal marine waters and while individuals have been recorded in estuaries the species does not penetrate into freshwater. There are records of Green Sawfish hundreds of kilometres offshore in relatively deep water (Stevens et al., 2005). • They could therefore potentially be present in the proposed operational area, however they generally feed on shoaling	"	• As per Dwarf Sawfish above.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
	fish such as mullet, baitfish and prawns, in shallow waters, stunning them with by sideswipes of the saw, and molluscs and small crustaceans can be swept out of seabed sediments by the saw (Allen 1982; Cliff & Wilson 1994) (Poganoski et al. 2002). • Such foods resources are not present in the proposed operational area, due to water depth (~20m LAT), aphotic conditions and high current velocities near the seabed, so any Green Sawfish in the area would likely only be passing through. • Literature search did not find any record of this species in CG and the eDNA sampling commissioned by BKA in 2024 did not detect DNA evidence of this species at any sites in CG itself or in upstream areas on both the west and east side of CG (Referral Report No. 2, BKA 2024b).			
Rhincodon typus Whale Shark Vulnerable  *Image credit: Pacific Aquarium*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The global geographical range of this species includes the CG area and it could thus potentially be present. • However, Whale Sharks are plankton filter feeders and generally inhabit coastal and open-ocean marine waters, and would be very unlikely to be found in the highly turbid and low-productivity inshore waters of CG, which does not match their environmental and foods requirements. There are no recorded sightings in the area.	"	• Given that it is highly unlikely that Whale Sharks would be found in the proposed operational area., or even in CG generally, and given the nature of the proposed operation, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures, and this large, surface-dwelling, slow-moving species would be easily spotted and avoided.	**No significant impact**

10.5 Migratory Species Assessment Tables

TABLE 22: *Assessment of potential for significant impacts on Listed Migratory Species – MIGRATORY* ***MARINE BIRDS***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Anous stolidus Common Noddy Not listed as threatened  *Image credit: Qld Govt.*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The Common Noddy is a migratory seabird that feeds on fish, squid and other marine animals, and roosts and nests on islands and coastal areas. It is widespread throughout tropical and subtropical seas, islands and coasts globally. • There are no major populations known in the CG area but its broad range means that it could potentially be present in the area. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG.	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**
Apus pacificus Fork-tailed Swift Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • The Fork-tailed Swift is a highly migratory bird that breeds in Siberia in the northern summer August-Sept, and feeds in Australia from October to April. • Although listed in PMST as a 'marine bird' they are mainly insectivorous and therefore spend most of their time over land. They are widespread in WA including scattered along the coast in the CG region (DCCEEW). • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG.	"	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**
Calonectris leucomelas Streaked Shearwater Not listed as threatened	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The Streaked Shearwater is a pelagic seabird that hunts for fish over the open sea. It breeds in north Asia in the northern summer and migrates to southern waters	"	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
 *Image credit: eBird*	including off Australia in the northern winter / southern summer. • Its very broad geographical range means that it could potentially be present in CG, although being pelagic it is more likely to be found offshore. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG.			
Fregata ariel Lesser Frigatebird Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The Lesser Frigatebird is common in tropical seas globally, and is the most common and widespread frigatebird in Australian seas, which breeds mainly on offshore islands (Lindsey, 1986). • The very broad geographical range of this species means that it could potentially be present in CG, although there are no formal records of this. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG.	“	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**
Fregata minor Great Frigatebird Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • Similar to *F. ariel* but much less common in Australia coastal waters – a more offshore/oceanic species. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG.	“	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Phaethon lepturus White-tailed Tropicbird Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The White-tailed Tropicbird is common in tropical seas globally, which breeds on tropical islands and disperses widely across the oceans when not breeding. It feeds on fish and squid, caught by surface plunging. • The very broad geographical range of this species means that it could potentially be present in CG, although there are no formal records of this. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG (BKA 2024b).	"	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**
Sternula albifrons Little Tern Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat may occur in the 10 km buffer area. • The species is widespread both globally and also in Australia, with breeding sites widely distributed from north-western Western Australia, around the northern and eastern Australian coasts to south-eastern Australia. • They inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches (DCCEEW). • They feed mainly on small fish by plunging in shallow water of channels and estuaries and also eat crustaceans, insects, annelids and molluscs along the shoreline (DCCEEW). • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 observed small numbers of this species in CG.	"	• There are no mechanisms whereby the proposed operation would cause any of the significant impacts listed on the criteria.	**No significant impact**

TABLE 23: *Assessment of potential for significant impacts on Listed Migratory Species – MIGRATORY* ***MARINE SPECIES***

NOTE: Some species that are Migratory Marine Species are also Critically Endangered, Endangered or Vulnerable species and are therefore listed in the tables above as relevant. Assessment of these is not repeated here – they are listed at the end of Table 17 with a reference to the relevant MNES table above where they are assessed.

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**

Anoxypristis cuspidate Narrow Sawfish
 	
Not listed as threatened
 	
 
Image credit: M Dando
	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area, although conditions in the area would seem to make this unlikely.
	
	• The Narrow Sawfish is found across a broad swathe of the Indo-Pacific. Like most Sawfish it prefers soft bottom-substrate. It can tolerate low salinity levels and is found in inshore waters, including bays and estuaries.
	
	• Like most Sawfish, they undergo an ontogenetic shift in habitat, with smaller juveniles usually found in upstream areas while larger adults are usually found in deeper waters offshore.
	
	• Narrow Sawfish that might therefore occasionally pass through the operational area as part of this inter-habitat movement.
	
	• Like most Sawfish, the Narrow Sawfish feeds on small fish, squid and invertebrates on and near the seabed. It uses its rostrum in a side-to-side thrashing action to stir up the sediment and uncover prey. It can also use its rostrum among schools of fish to incapacitate fish.
	
	• Given the very strong currents, aphotic conditions, dynamic seabed and lack of benthic biota in the proposed operational area (BKA 2024a), they are unlikely to remain and feed there. Feeding areas are likely to be upstream in estuarine inlets for the juveniles and offshore for larger adults.
	
	• Literature search did not find any record of this species in CG. The eDNA sampling commissioned by BKA in 2024 did detect ed low traces of DNA evidence of this species at one site located 8 km upstream in the Lyne River on the west side of CG (Referral Report No. 2, BKA 2024b).
		An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:
		• substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species,
		• result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
		• seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
			• The proposed operation will not substantially modify, destroy or isolate an area of important habitat for this species.
			• Potential invasive species introductions will be addressed by the SPV complying in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, being fitted with IMO-compliant ballast water treatment systems, and adhering to a stringent biofouling management regime.
			• The DCCEEW Significant Impact Guidelines explicitly state that implementation of these measures would be expected to prevent significant impact.
			• The proposed operation will not seriously disrupt the lifecycle of this species.
			
			• Given the low-likelihood of Narrow Sawfish occuring in the operational area and the short 24 to 48-hour periods when the SPV will be present every 2 weeks there is a low likelihood of interaction with the SPV.
			
			• Additionally:
			  • SPV will operate at very low speed (~2 knots).
			  • SPV will have marine mega-fauna observation and avoidance measures.
			  • SPV will have marine mega-fauna deterrence/exclusion device on the sand uptake drag head.
				No significant impact

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
			• Overall, even in the highly unlikely event of an interaction between the SPV and an individual Sawfish, significant impacts as outlined in the Significant Impact Criteria would not be caused. • BKA is prepared to support long-term research and monitoring of Sawfish in Cambridge Gulf should the project be approved, and this is included in the proposed Environmental Plan in Annex 1.	
Balaenoptera edeni Bryde's Whale Not listed as threatened  *Image credit: Wikipedia*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The potential presence of this species relates to the estimated overall bio-geographical range of the species, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • In coastal areas they are resident in waters containing suitable prey stocks of pelagic shoaling fishes, out to the 200 m depth isobar, often exploiting 'boils' of fish herded by other predator species (Best 1977) (Kato 2002). Such food resources are not present in CG (BKA 2024a). • Whales are also generally absent from the adjacent offshore waters of Joseph Bonaparte Gulf, due to their relative shallowness (15 to 75 m LAT) (Galaiduk et al. 2018).	“	• Given that it is highly unlikely that Brydes Whales would be found in the proposed operational area, or even in CG generally, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Carcharhinus longimanus Oceanic Whitetip Shark Not listed as threatened  *Image credit: sail-world.com*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The potential presence of this species relates to the estimated overall bio-geographical range of the species, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • As its names suggests, the Oceanic Whitetip is a pelagic species that prefers offshore, deep-ocean areas. It is only found close to land around oceanic islands and areas with narrow continental shelves dropping quickly to very deep water (which do not exist in CG or even in Joseph Bonaparte Gulf – the shallow continental shelve extends way offshore towards Indonesia).	"	• Given the offshore pelagic nature of this species and the environmental conditions in CG there is almost no chance that it would be found in the Gulf.	**No significant impact**
Crocodylus porosus Salt-water Crocodile Not listed as threatened  *Image credit: BKA*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • There are significant numbers of crocodiles present throughout CG, however they mainly inhabit shoreline areas and up the mangrove-lined inlets, with most being found well upstream in the Ord River (Kay 2004). • The occasional crocodile might transit through the proposed operational area – located in open water in the centre of the Gulf – for example if moving from one side of the Gulf to the other – but this is likely to be a very low frequency occurrence. Generally, there is a very low probability of crocodiles being present in the open-water marine area of proposed operational area - it is not their preferred habitat.	"	• Given that it is highly unlikely that Salt-water Crocodiles would be found in the operational footprint, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Dugong dugon Dugong Not listed as threatened  *Image credit: F Kennedy*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The potential presence of this species relates to the estimated overall bio-geographical range of the species, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • Most importantly, Dugong feed on certain species of seagrass. No seagrass meadows are not found in CG, due to the high current velocities and high turbidity levels (BKA 2024b) (McMahon et al 2017) (Walker et al 1996). • Environmental surveys in Cambridge Gulf to date have never observed Dugong (BKA 2024b, Brown et al 2016, 2017) and commercial fishermen with decades of experience in the area report that Dugong are never seen in the Gulf (Douglas pers. comms. 2023).	“	• Given the absence of this species in CG there is almost no chance that any of the significant impacts listed could occur.	**No significant impact**
Megaptera novaeangliae Humpback Whale Not listed as threatened  *Image credit: WWF*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The environmental conditions in Cambridge Gulf relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • Humpback Whales undertake annual migrations along the west coast of WA north to core calving grounds off the West Kimberly coast, but not east to Joseph Bonaparte Gulf and CG (Figure 23).	“	• Given that it is highly unlikely that Humpback Whales would be found in the proposed operational area, or even in CG generally, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**

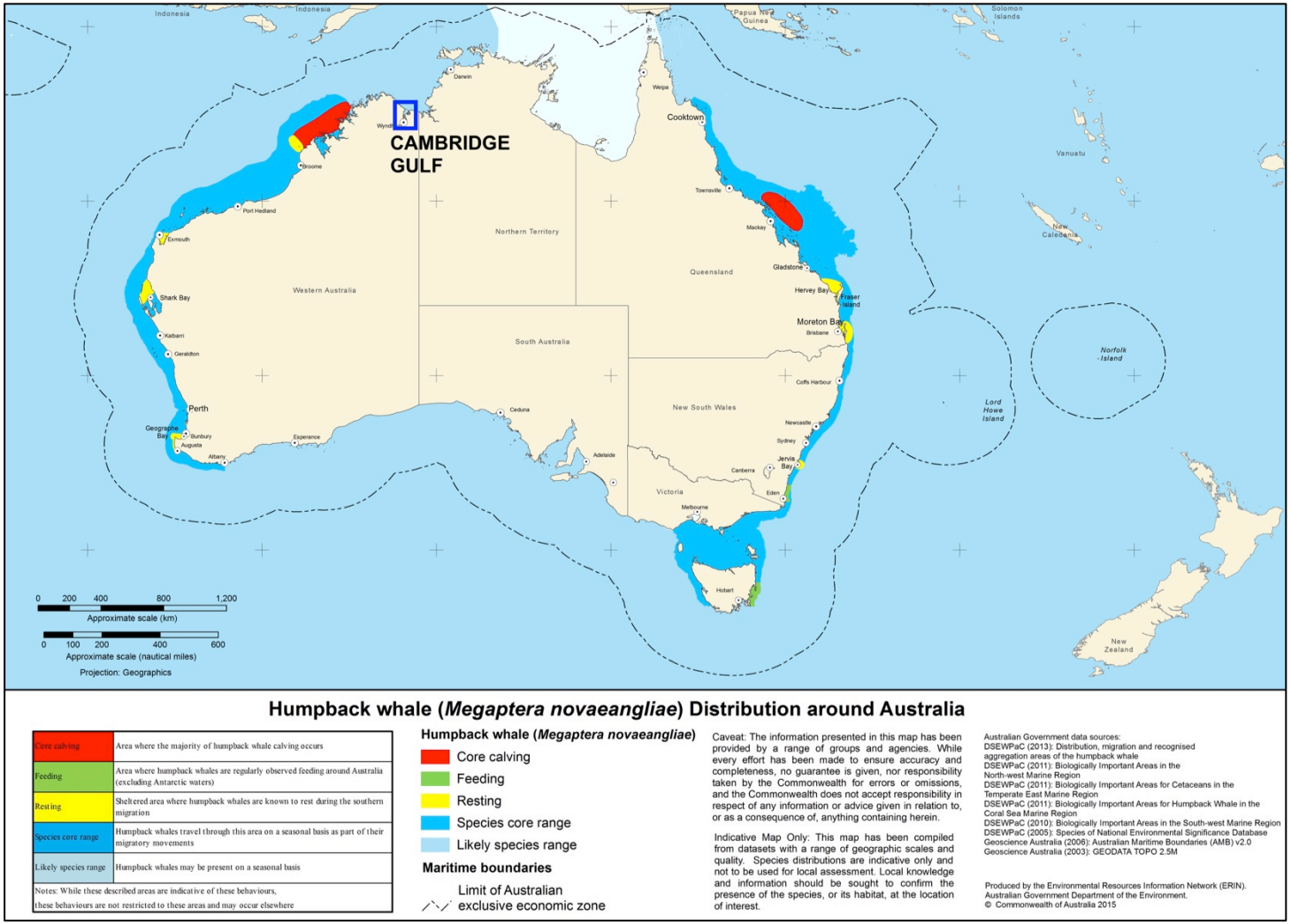
Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Mobula alfredi Reef Manta Ray Not listed as threatened  *Image credit: Aus Museum*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The potential presence of this species relates to the estimated overall bio-geographical range of the species, which could extend over the general area of CGf. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • As its name suggests, the Reef Manta is often found in coral reef areas, although it is widely distributed in tropical marine waters. They are pelagic and feed by filtering seawater for zooplankton. They have fairly small territorial ranges centred on local upwelling sites where plankton concentrations occur. The strong tidal currents and high turbidity of CG are not aligned with their preferred habitat. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG (BKA 2024b).	“	• Given that it is highly unlikely that Reef Mantas would be found in the proposed operational area, or even in CG generally, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**
Mobula birostris Giant Manta Ray Not listed as threatened  *Image credit: G Stevens*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • As per *M. alfredi* except more oceanic and thus even less likely to be found in the highly turbid waters of Cambridge Gulf. • Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG (BKA 2024b).	“	• As per *M. alfredi*	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Orcaella heinsohni Australian Snubfin Dolphin Not listed as threatened Currently being assessed by DCCEEW for possible 'threatened' status – findings due Oct 2024.  *Image credit: I Beasley*	• NOTE: Although listed as a 'migratory species' – there is very little known about the migration patterns of this species – and movements may only be in local areas (e.g. short offshore-inshore movements) (DCCEEW). • The PMST search states that breeding of this species is known to occur within in the proposed operational area. • A small population of Australian Snubfin Dolphins *(Orvaella heinsohni)* is present in CG (BKA 2024b) (Brown et al 2017, 2016). • As outlined in section 7 the Commonwealth has designated a breeding, calving, feeding and resting BIA for this species over CG.	"	• **Given the significance of this species in the CG area, a separate, specific assessment of potential impacts from the proposed sand-sourcing operation is presented in section 10.3.** • It finds 'no significant impact' in relation to the significant impact criteria.	**No significant impact**
Orcinus orca Killer Whale Not listed as threatened  *Image credit: mindenpictures.com*	• The PMST search states that the species or its habitat may occur in the proposed operational area. • The potential presence of this species relates to its estimated overall bio-geographical range, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • Killer Whales are pelagic species than can also be found in coastal waters. They prey upon a very wide range of species from small fish to the largest whales. The main Killer Whale populations in WA are centred on the seasonal presence of Humpback Whales from the West Kimberly southwards, and around Bremmer Bay in the very south of WA (Kampf 2021).	"	• Given that it is highly unlikely that Orcas would be found in the proposed operational area, or even in CG generally, and given the nature of the proposed action, there is no potential for any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Sousa sahulensis Australian Humpback Dolphin Not listed as threatened  *Image credit: A Brown*	• NOTE: Although listed as a 'migratory species' – there is very little known about the migration patterns of this species They do not appear to undergo large-scale seasonal migrations, although seasonal shifts in abundance have been observed (Parra & Cagnazzi 2016). • The PMST search states that the species or its habitat is known to occur in the proposed operational area. • A small population of Australian Humpback Dolphins *(Sousa sahulensis)* has been observed in Cambridge Gulf, and their presence may be seasonal (Brown et al 2017, 2016).	"	• **Refer the assessment for Snubfin Dolphins in section 10.3, the same factors and measures apply.** • It finds 'no significant impact' in relation to the significant impact criteria.	**No significant impact**
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin Not listed as threatened  *Image credit: KML*	• The PMST search states that the species or its habitat is likely to occur in the proposed operational area. • The potential presence of this species relates to its estimated overall bio-geographical range, which could extend over the general area of CG. However, it does not automatically mean that this species is actually or is likely to be present. • The environmental conditions in CG relative to the requirements and preferences of this species make it extremely unlikely that they would enter the Gulf. • Surveys by Brown et al (2016. 2017) also did not observe any in CG. Environmental surveys in March 2023, July-Aug 2023 and Feb 2024 did not observe this species in CG (BKA 2024b).	"	• Given that it is highly unlikely that Bottlenose Dolphins would be found in the operational footprint, or even in Cambridge Gulf generally, and given the nature of the proposed action, there is no potential or any of the significant impacts listed in the criteria. • The SPV will have marine mega-fauna observation and avoidance measures. • The occasional presence of the SPV in Cambridge Gulf will not be dissimilar to the cargo vessels that already transit the Gulf.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Migratory Marine Species that are also Critically Endangered, Endangered or Vulnerable species and are therefore listed in the Tables above as identified.				
Balaenoptera musculus Blue Whale Endangered	Refer Table 16 where this species is also listed.	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Refer Table 16	**No significant impact**
Carcharodon carcharias Great White Shark Vulnerable	Refer Table 21 where this species is also listed.	"	Refer Table 21	**No significant impact**
MARINE TURTLES ***Caretta caretta*** Loggerhead Turtle Endangered ***Chelonia mydas*** Green Turtle Vulnerable ***Dermochelys coriacea*** Leatherback Turtle Endangered ***Eretmochelys imbricate*** Hawksbill Turtle Vulnerable ***Lepidochelys olivacea*** Olive Ridley Turtle Endangered	Refer Tables 18 and 19 where these species are also listed, as relevant.	"	Refer Tables 18 and 19	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Natator depressus Flatback Turtle Vulnerable				
SAWFISH (in addition to *A. cuspidate* at top of this table) ***Pristis clavata*** Dwarf Sawfish Vulnerable ***Pristis pristis*** Freshwater Sawfish Vulnerable ***Pristis zijsron*** Green Sawfish Vulnerable	Refer Table 21 where these species are also listed, as relevant.	"	Refer Table 21	**No significant impact**
Rhincodon typus Whale Shark Vulnerable	Refer Table 21 where this species is also listed.	"	Refer Table 21	**No significant impact**



FIGUE 23: *Humpback Whales undertake annual migrations along the coast of WA north to core calving grounds off the West Kimberley coast, but not east to Joseph Bonaparte Gulf and Cambridge Gulf (DCCEEW).*

TABLE 24: *Assessment of potential for significant impacts on Listed Migratory Species – MIGRATORY* ***WETLAND SPECIES***

NOTE: Some species that are Migratory Wetland Species are also Critically Endangered, Endangered or Vulnerable species and are therefore listed in the tables above as relevant. Assessment of these is not repeated here – they are simply listed at the end of Table 18 with a reference to the relevant MNES table above where they are assessed.

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Acrocephalus orientalis Oriental Reed-Warbler Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This species' preferred habitat is amongst reeds / grasses in wetland areas and it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	• Any individuals of this species near CG would be found in the wetland habitats around the shores and upstream and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Actitis hypoleucos Common Sandpiper Not listed as threatened  *Image credit: M Szczepanek*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This species' preferred habitat is along shorelines and intertidal areas where in browses for prey in shallow water and it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational footprint.	"	• Any individuals of this species near CG would be found around the shores and intertidal areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

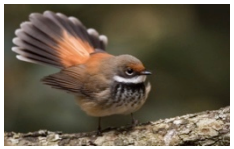
Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Calidris acuminate Sharp-tailed Sandpiper Not listed as threatened  *Image credit: Wikimedia*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This species' preferred habitat is along shorelines and intertidal areas where in browses for prey in shallow water and it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	"	• Any individuals of this species near CG would be found around the shores and intertidal areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Calidris melanotos Pectoral Sandpiper Not listed as threatened  *Image credit: A Trepte*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This species' preferred habitat is along shorelines and intertidal areas where in browses for prey in shallow water and it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	"	• Any individuals of this species near CG would be found around the shores and intertidal areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Charadrius veredus Oriental Plover Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Oriental Plover is mostly found inland; in open grasslands in arid and semi-arid zones. It is less often found in estuarine or littoral environments, where it forages along shorelines and supra-tidal areas. It is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	"	• Any individuals of this species near CG would be found around the shores and supra-tidal areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Glareola maldivarum Oriental Pratincole Not listed as threatened  *Image credit: G Kinard*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • The Oriental Pratincole is mostly found inland in open grasslands often recently burnt, and around freshwater wetlands where they hunt insects (DCCEEW). It is less often found in estuarine or littoral environments. It is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	"	• Any individuals of this species near CG would be found inland on open grassy areas and possibly around the wetlands inshore from the Gulf, and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Limnodromus semipalmatus Asian Dowitcher Not listed as threatened  *Image credit: eBird*	• The PMST search states that the species or its habitat is may occur in the 10 km buffer zone. • This species preferred habitat is along shorelines and intertidal areas where in browses for prey in shallow water. While they may be found in the 10 km buffer it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	"	• Any individuals of this species near CG would be found around the shores and intertidal areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Pandion haliaetus Osprey Not listed as threatened  *Image credit: Birds of the World*	• The PMST search states that the species or its habitat is may occur in the 10 km buffer zone. • The Osprey is a Sea Eagle that is definitely present in the CG area (BKA 2023) – roosting and nesting in large, often-dead trees (for enhanced views) around the coast and hunting for fish over marine areas – including potentially over the proposed operational area.	"	• While individual Ospreys may occasionally hunt for fish over the proposed operational area, including at times when the SPV might be present, there are no mechanisms whereby the proposed action would cause any of the significant impacts listed in the criteria.	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Migratory Wetland Species that are also Critically Endangered, Endangered or Vulnerable species and are therefore listed in the Tables above as identified.				
Calidris canutus Red Knot Endangered	Refer Table 14 where these species is also listed.	"	Refer Table 14.	**No significant impact**
Calidris ferruginea Curlew Sandpiper Critically Endangered	Refer Table 14 where these species is also listed.	"	Refer Table 14.	**No significant impact**
Charadrius leschenaultia Greater Sand Plover Vulnerable	Refer Table 15 where these species is also listed.	"	Refer Table 15.	**No significant impact**
Limosa lapponica Bar-tailed Godwit Vulnerable	Refer Table 15 where these species is also listed.	"	Refer Table 15.	**No significant impact**
Numenius madagascariensis Eastern Curlew Critically Endangered	Refer Table 14 where these species is also listed.	"	Refer Table 14.	**No significant impact**

TABLE 25: *Assessment of potential for significant impacts on Listed Migratory Species – MIGRATORY **TERRESTRIAL SPECIES***

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Cecropis daurica Red-rumped Swallow Not listed as threatened  *Image credit: D Hastings*	• The PMST search states that the species or its habitat is may occur in the proposed operational area. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This is a wholly terrestrial species that might be found in land areas around CG but it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational area.	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	• Any individuals of this species near CG would be found in land areas and not in the open-water marine area of the central Gulf where the proposed operational area is located. • There is therefore almost no potential for any of the significant impacts listed in the criteria.	**No significant impact**
Cuculus optatus Oriental Cuckoo Not listed as threatened  *Image credit: eBird*	"	"	"	**No significant impact**
Hirundo rustica Barn Swallow Not listed as threatened  *Image credit: eBird*	"	"	"	**No significant impact**

Species (Alphabetical order)	**Occurrence / Proximity**	**Significant Impact Criteria** (From the DCCEEW Guidelines)	**Assessment**	**Finding**
Motacilla cinerea Grey Wagtail Not listed as threatened  *Image credit: C Crespo*	"	"	"	**No significant impact**
Motacilla flava Yellow Wagtail Not listed as threatened  *Image credit: eBird*	"	"	"	**No significant impact**
Rhipidura rufifrons Rufous Fantail Not listed as threatened  *Image credit: iNaturalist*	• The PMST search states that the species or its habitat is may occur in the 10 km buffer zone. • This seems to be an error caused by the lack of geographical resolution in the PMST. • This is a wholly terrestrial species that might be found in land areas around Cambridge Gulf but it is highly unlikely that it would be found in the deep open-water marine area of the proposed operational footprint.	"	"	**No significant impact**

11. POTENTIAL IMPACTS ON OPMs

1. It should be noted that potential impacts on other matters protected under the EPBC Act (Other Protected Matters or OPMs) are NOT triggers for the EPBC Act assessment and approval process and do not have associated Significant Impact Criteria. However, they are still protected under the EPBC Act and assessing and avoiding potential impacts on OPMs needs to be taken into account in any proposed development.

2. The Protected Matters search for the 10 km buffer lists a number of marine bird, fish, mammal and reptile species as OPMs that may be present in the area. The majority of these are also MNES and are therefore already addressed in section 10 above as relevant to each species. Those that are not MNES include a few additional bird species, seasnake species and cetacean species, who's board geographic ranges generally include the CG area, but which are not likely to actually be present in Cambridge Gulf for the same reason as presented for the MNES-species. Potential impacts of the proposed action on these species are the same as for the similar MNES species as assessed in section 10 – and all are assessed as 'No Significant Impact' according to the DCCEEW Significant Impact Criteria.

3. The Protected Matters search lists the Commonwealth Joseph Bonaparte Gulf Marine Park as being an OPM located within the 10 km buffer. The Joseph Bonaparte Gulf Marine Park is part of the Commonwealth Marine Area and is therefore also an MNES, and has been assessed in section 9 – showing 'No Significant Impact' from the proposed action according to the DCCEEW Significant Impact Criteria.

4. The Protected Matters search lists the area as being 'Habitat Critical to the Survival of Marine Turtles' during the months of August-September. This relates to the Flatback Turtle *(N. depressus)* nesting beach on the seaward side of Cape Domett, 12 km from the nearest point of the proposed operational footprint. Given the significance of Flatback Turtle in the CG area, a separate, specific assessment of potential impacts from the proposed sand-sourcing operation is presented in section 10.2. It finds 'no significant impact' in relation to the significant impact criteria.

12. POTENTIAL IMPACTS ON BIAs

1. As outlined in section 7 there are two BIAs that encompass CG, an inter-nesting buffer BIA for Flatback Turtles and a breeding, calving, feeding and resting BIA for Snubfin Dolphins.

2. Given the significance of both Flatback Turtles and Snubfin Dolphins in the CG area, separate, specific assessments of potential impacts on these two species, including the biologically important behaviours specified in the BIA designations, is presented in sections 10.2 and 10.3 respectively. They find 'no significant impact' in relation to the significant impact criteria for both species.

3. As outlined in section 7 there are also foraging BIAs for both Green and Olive Ridley Turtles in Joseph Bonaparte Gulf offshore from GC. There is no overlap with the proposed sand-sourcing operation and no mechanisms whereby the proposed operation might impact on foraging behavior by turtles in those areas.

13. SPECIFIC CRITERIA ON MARINE ACTIVITES

The DCCEEW Significant Impact Guidelines provide some specific criteria relating to marine activities. As the proposed sand-sourcing operation is a wholly marine activity it has been assessed against these criteria as shown in Table 26, with a finding of 'No Significant Impact' for each criterion.

TABLE 26*: Assessment of the proposed action against specific DCCEEW criteria relating to marine activities.*

Marine Criteria (From the DCCEEW Guidelines)	**Assessment**	**Finding**
1. Otherwise lawful recreational fishing and recreational boating would not normally be expected to have a significant impact on NMES.	Not relevant to the proposed action.	N/a
2. Routine ship transits where appropriate precautions have been taken against translocating potential pest species would not normally be expected to have a significant impact on NMES.	The occasional presence of the SPV in Cambridge Gulf (24-48 hrs every 2 weeks) will not be dissimilar to the cargo vessels that already routinely transit the Gulf when entering and exiting the upstream port of Wyndham. The SPV will comply in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, will be fitted with IMO-compliant ballast water treatment systems, and adhere to a stringent biofouling management regime and dry-space biosecurity regime.	No significant impact
3. Ballast water operations from vessels in Australian waters, undertaken in accordance with an approved Australian Government arrangement for the management of ballast water, would not normally be expected to have a significant impact on the Commonwealth marine environment.	The SPV will comply in full with the IMO BWM Convention and IMO Biofouling Guidelines, and with the Australian Biosecurity Act & Regulations, will be fitted with IMO-compliant ballast water treatment systems, and adhere to a stringent biofouling management regime.	No significant impact
4. Small-scale infrastructure projects such as new jetties within an existing port would not normally be expected to have a significant impact on NMES.	The proposed action does not involve the construction of any infrastructure in Cambridge Gulf or anywhere else.	No significant impact
5. Large-scale infrastructure projects such as a large pontoon, new aquaculture proposals, construction of a jetty, or a tourist facility (for example, a marina) in the Great Barrier Reef Marine Park may have a significant impact on the environment of the Great Barrier Reef Marine Park and should be referred to the minister.	The proposed action does not involve the construction of large-scale infrastructure in the Great Barrier Reef Marine Park, in Cambridge Gulf or anywhere else.	No significant impact
6. Expansion of an existing port which requires land reclamation or spoil disposal in a World Heritage property, a National Heritage place, in or adjacent to the Great Barrier Reef Marine Park, a Ramsar wetland or an area containing nationally listed threatened species or ecological communities, or which involves modifying an area of important habitat for a nationally listed migratory species, is likely to have a significant impact on NMES.	The proposed action does not involve expansion of an existing port, land reclamation or spoil disposal in or adjacent to any of these areas, or any other area, and does not involve modifying an area of important habitat for a nationally listed migratory species.	No significant impact
7. Construction of a new port in a Commonwealth marine area, in or adjacent to the Great Barrier Reef Marine Park, a World Heritage property, or a National Heritage place is likely to have a significant impact on NMES.	The proposed action does not involve construction of a new port in or adjacent to any of these areas, or any other area.	No significant impact

Marine Criteria (From the DCCEEW Guidelines)	**Assessment**	**Finding**
8. Dredging of a new shipping channel through a World Heritage property, a National Heritage place, through or next to the Great Barrier Reef Marine Park, a Ramsar wetland, or an area containing nationally listed threatened species or ecological communities, or which involves modifying an area of important habitat for a nationally listed migratory species, is likely to have a significant impact on NMES.	The proposed action does not involve dredging of a new shipping channel through or adjacent to any of these areas.	No significant impact
9. Dredging to maintain existing navigational channels would not normally be expected to have a significant impact on the environment where the activity is undertaken as part of normal operations and the disposal of spoil does not have a significant impact.	While the proposed action does not involve dredging to maintain existing navigational channels, the operation is not dissimilar to routine maintenance dredging, except that it will have even less impact, as follows: • The SPV will only operate on site for 24 to 48 hours for each cycle, followed by either a 10 to 14-day break, compared to normal maintenance dredging where the dredge operates continuously 24/7 until the campaign is completed. • The SPV will target sand without fine silts, thus significantly minimizing turbidity generation, compared to normal maintenance dredging where all sediment types present in the channel are dredged including fine silts. • The SPV will not undertake any disposal of spoil – the sand will be exported to market. If the DCCEEW Guidelines consider that routine maintenance dredging is not expected to have significant impact, then given the above, the proposed action has even less impact.	No significant impact

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