SRF-West Priority Infrastructure Works Construction Environmental Management Plan

HMAS Stirling, Garden Island, WA
EPBC Act approval 2024/10031

Department of Defence

Version 2 | 20 February 2026



Details of the Action

EPBC number	2024/10031
Project name	Submarine Rotational Force – West, Priority Infrastructure Works (SRF-West Priority Works)
Approval holder	Department of Defence
Action	To: a) upgrade and install new maritime infrastructure including, pier and wharf improvements, mooring dolphin, new small vessel pontoons and berthing, and associated dredging works and piling, b) construct and operate a Controlled Industrial Facility to store low-level radioactive waste. Associated infrastructure and works include hardstands, roads, buildings, water tanks, utility building, in-ground infrastructure and drainage, vegetation removal and lay down areas. Refer to EPBC Act referral 2024/10031.
Location of Action	HMAS Stirling, Garden Island, Western Australia
Date of preparation of the Construction Environmental Management Plan	13 August 2025
Person accepting responsibility for the Construction Environmental Management Plan	Director Delivery, Fleet Base West Program Management Office (FBW-PMO)

Document version control

Project name	SRF-West Priority Infrastructure Works						
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S4	0	B. Galbraith J. Comery	K. Clulow	On File	17/02/26	S. Orr	On File	17/02/26

Change register

Version	Revision	Date	Reason for revision
1	Rev 1	11/08/25	Published version for establishing approved Action monitoring programs, and for activities required under the early works activities.
2	Rev 0	20/02/26	Updates made to incorporate activities required for enabling works, and construction of landside facilities including the CIF, and the maritime trial piling exercise. Updated sections include Figure 2 and Figure 3, Section 3, Section 10.2, Section 11.1.1 and Appendix G. Updates to working hours in line with the conditions of approval. Updates to address comments from DCCEEW. Section 7 – Restructured to include a breakdown for internal and external incident reporting. Changes made to the incident management process to add an event, as well as an incident Section 12.1 has been restructured to separate compliance checks and audit activities for clarity Section 12.3 add a Change Notice process for tracking changes that occur as a result of adaptive management Glossary, abbreviations and references have all have minor additions All annexures have been renamed as version 2. Note that the Terrestrial Soil and Water Quality Management Annexure (Annexure A3) is now known as the Soil and Water Quality Management Annexure.

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1. Introduction

1.1 SRF-West Priority Infrastructure Works

Australia, the United Kingdom (UK) and the United States (US) have joined together through the AUKUS partnership to support a stable, secure and prosperous Indo-Pacific region. The AUKUS partners have identified an Optimal Pathway that will:

– deliver Australia a conventionally armed, nuclear-powered submarine (SSN) capability
– elevate all 3 nations' industrial capacity to produce and sustain advanced and interoperable SSNs for decades to come
– expand the partner nations' individual and collective presence in the Indo-Pacific and contribute to global security and stability in the region.

The first major initiative of the Optimal Pathway is the increased rotational presence of US and UK SSNs in Australia (Figure 1). This initiative is known as the Submarine Rotational Force – West (SRF-West).

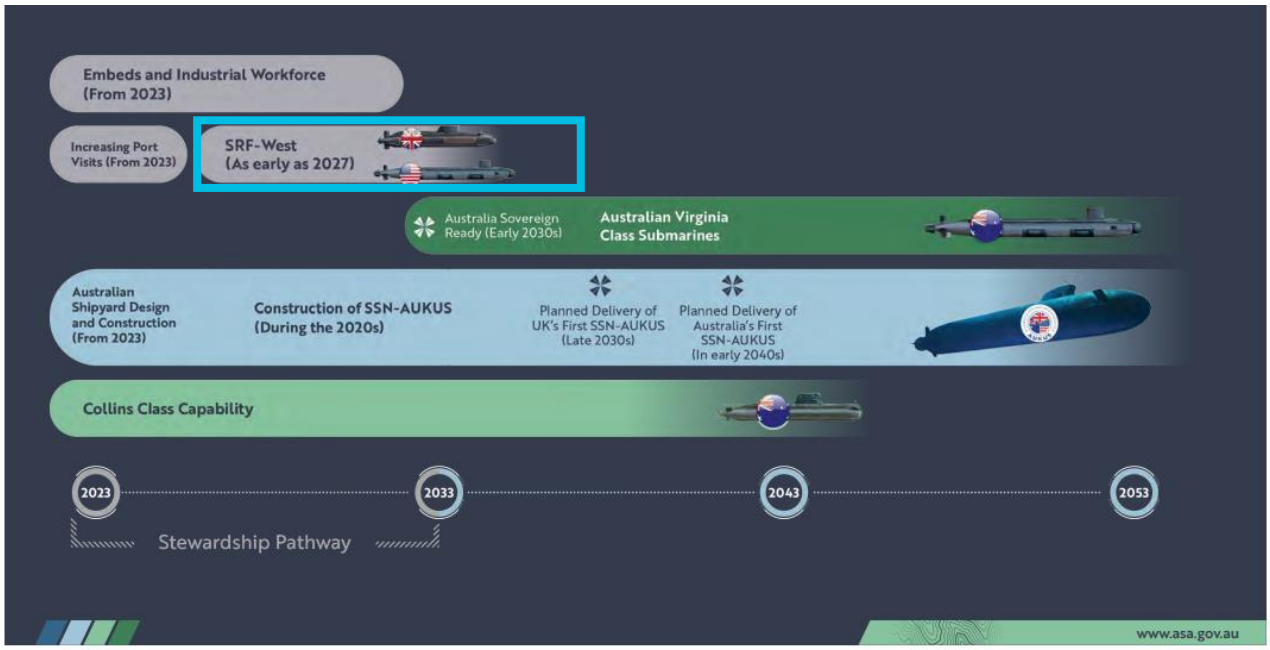


Figure 1 *The AUKUS Optimal Pathway to Australia's Nuclear-Powered Submarine Capability (Source: Australian Submarine Agency)*

From as early as 2027, AUKUS partners will have a rotational presence at HMAS Stirling, which is located on Garden Island/*Meeandip*, south-west of Perth in Western Australia (WA). One UK Astute Class and up to 4 US Virginia Class SSNs are expected to rotate through HMAS Stirling. SRF-West will help Australia build the necessary operational capabilities and skills so that Australia can safely and securely own, operate, maintain and regulate a fleet of SSNs from the early 2030s.

The Department of Defence (Defence) is responsible for delivering the priority infrastructure upgrades and enhancements at HMAS Stirling to accommodate AUKUS SSNs ready for SRF-West by 2027.

1.1.1 Project approval

The approved Action was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and assessed under the 'Preliminary Documentation' pathway.

Defence was granted approval with conditions by DCCEEW for the works on 27 May 2025 (**EPBC Act approval 2024/10031**).

To comply with the conditions of the EPBC Act approval 2024/10031, Defence must prepare and implement a Construction Environmental Management Plan (CEMP) (this document) in accordance with Condition 6 and Condition 8 of the approval and the DCCEEW Environmental Management Plan Guidelines (DCCEEW, 2024a) (hereafter referred to as the DCCEEW EMP Guidelines).

1.2 Purpose of this CEMP

The purpose of this CEMP is to:

- meet the requirement for the preparation of a CEMP as per Condition 6 (and related conditions) of EPBC Act approval 2024/10031
- identify compliance requirements relating to conditions of EPBC Act approval 2024/10031 and commitments identified in the SRF-West Priority Works ***Environment and Heritage Assessment*** (GHD, 2025a) (the EHA) with reference to the activities described in Section 3 of this CEMP
- identify potential environmental impacts and risks to matters protected under the EPBC Act as a result of activities described in Section 3.3 of this CEMP
- document environmental management measures required to avoid, minimise and manage potential environmental impacts and risks to protected matters as a result of activities described in Section 3 of this CEMP
- document environmental monitoring requirements required by EPBC Act approval 2024/10031 with respect to the activities described in Section 3 of this CEMP
- clearly outline roles and responsibilities for environmental management required to implement this CEMP with reference to the activities described in Section 3 of this CEMP
- outline the overall framework of systems, procedures and processes required to implement the CEMP with reference to the activities described in Section 3 of this CEMP
- provide a centralised mechanism through which environmental management measures for all potential environmental impacts and risks with reference to the activities outlined in Section 3 of this CEMP construction are documented, monitored, reviewed and adaptively managed.

1.3 Potential impacts and primary strategies to address impacts

The main potential impacts and strategies required to manage those impacts are outlined in Section 5 of the EHA.

1.4 Scope and structure of this CEMP

As per the EPBC Act approval 2024/10031, to avoid and mitigate potential harm as a result of the Action on protected matters, the approval holder (Department of Defence) must prepare and implement a CEMP (this document) that complies with the EPBC Act approval 2024/10031, is in accordance with commitments made in the referral for EPBC Act approval 2024/10031 and applicable industry best practice guidance.

This CEMP is subject to change and revision as each phase of the approved Action progresses. This will include (but is not limited to) revision of the approved Action description in Section 3, revised application of management measures in accordance with regulatory approvals, incorporation of adaptive management measures and revised or additional environmental management annexures. Table 1.1 summarises approved Action activities added by CEMP revision.

Table 1.1 Summary of approved Action activities by CEMP revision

CEMP revision	Activities covered
1	Early works (landside) construction activities
2	Early works (landside) construction activities

CEMP revision	Activities covered
	Construction of enabling works
	Construction of landside facilities including the Controlled Industrial Facility (CIF)
	Maritime trial piling exercise

Early works comprise initial site establishment works to ready the site for construction works to commence. This includes vegetation clearing, preliminary earthworks and the establishment of site compounds and establishment of any management controls required to be in place prior to commencement of enabling works, such as noise barrier hoarding and temporary construction fencing.

Enabling works comprise additional larger scale civil works and the establishment of site services required to prepare the site for subsequent construction. These include establishment of temporary facilities, service investigations and connections, general earthworks and trenching, retaining walls, stormwater and sewer infrastructure, electrical and water infrastructure, concrete pavements and kerbs, and installation of guard rails and fencing. Enabling works that are confined to the CIF footprint, comprise ground and foundation preparation, including controlled modulus column (CMC) displacement auger piling works. Refer to Section 3.4 for specific details.

Construction of landside facilities including the CIF, involves building construction and completion of all site services such as water networks, drainage systems, sewerage, electrical and communications infrastructure, landscaping, and signage. Refer to Section 3.4 for specific details.

Environmental management controls that must be developed by the Construction Contractor (to be developed as part of the Construction Contractor's CEMP) have been outlined in Section 11.1.1 of this CEMP. Each time a revision of this CEMP or associated environmental management annexures is issued, Construction Contractors undertaking activities managed by the CEMP are expected to review and update their Construction Contractor CEMP for their scope of works to ensure continued compliance with current CEMP requirements.

The environmental management annexures listed in Section 11.1 and attached in Appendix A, include performance criteria, management controls, monitoring requirements and adaptive management measures that comply with EPBC Act approval 2024/10031. Where applicable, these environmental management annexures identify the conditions, commitments and guidance that are relevant for the environmental aspect that is being managed. Table B.1 in Appendix B outlines how each of EPBC Act approval 2024/10031 conditions have been addressed.

This CEMP has been prepared and structured in accordance with the DCCEEW EMP Guidelines. (DCCEEW, 2024a) Appendix D, Table D.1 identifies the DCCEEW EMP Guidelines requirements and where in this CEMP, or associated annexure, it has been addressed.

2. Conditions of approval reference table

Table B.1 in Appendix B outlines how each of the EPBC Act approval 2024/10031 conditions have been addressed within this CEMP and their location. For readability, key commitments for each environmental management annexure have been summarised in this CEMP and referenced in Table B.1 in Appendix B.

3. Project description

3.1 Location

The location of the Action is illustrated in Map 1 of the EPBC Act approval 2024/10031 and is situated within HMAS Stirling on Garden Island/*Meeandip*. The Action area approved in EPBC Act approval 2024/10031 comprises two areas, being the Careening Bay Action area and the Armament Wharf Action area.

This revision of the CEMP implements environmental monitoring programs as per the annexures listed in Section 11.1 and attached at Appendix A, and manages landside activities and the maritime trial piling exercise described in Section 3 of the CEMP. Landside activities are located in part of the Careening Bay Action area only, while the maritime trial piling exercise is located in the Armament Wharf Action area only. The location of activities managed by this CEMP is illustrated in Figure 2 for landside activities and Figure 3 for the maritime trial piling exercise and is termed the CEMP Boundary.

Careening Bay, located on the south-eastern coastline of Garden Island/*Meeandip*, is the main operational centre of HMAS Stirling. The existing maritime infrastructure at Careening Bay includes Diamantina Pier, Parkes and Oxley Wharves, and Moresby Harbour. The landside components of the Action area include existing disturbed areas (i.e. roads, car parks, buildings), existing operational areas of Diamantina Pier, and some areas of native vegetation.

Armament Wharf is located in Sulphur Bay, on the north-eastern shoreline of Garden Island/*Meeandip*. The maritime trial piling exercise at the Armament Wharf is required to be completed prior to the commencement of maritime construction in the Action area. All other activities approved by EPBC Act approval 2024/10031 within the Armament Wharf Action area do not form part of this CEMP.

Refer to Section 3.5 for further context regarding activities excluded from this CEMP.

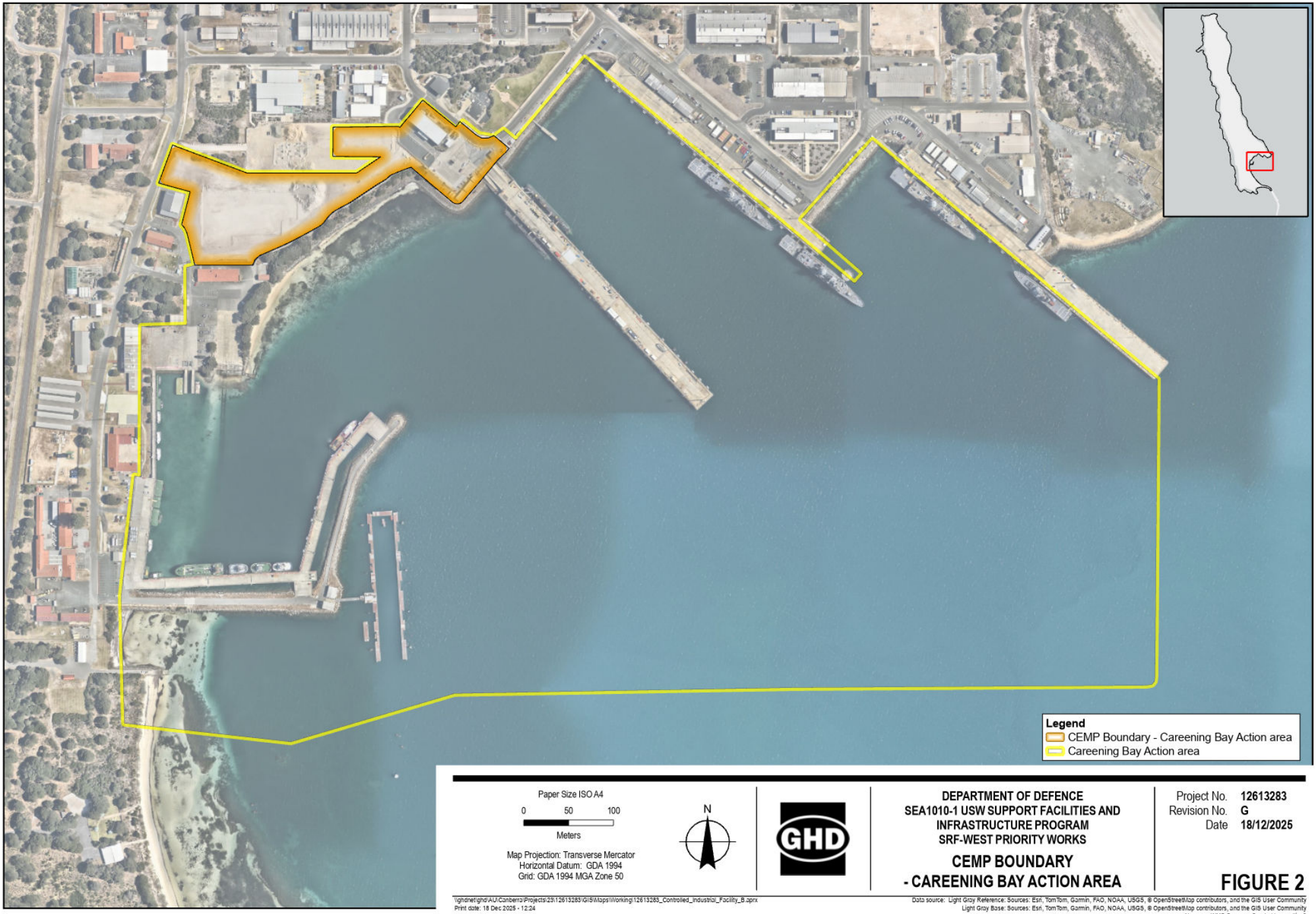


Figure 2 CEMP Boundary – Careening Bay Action area

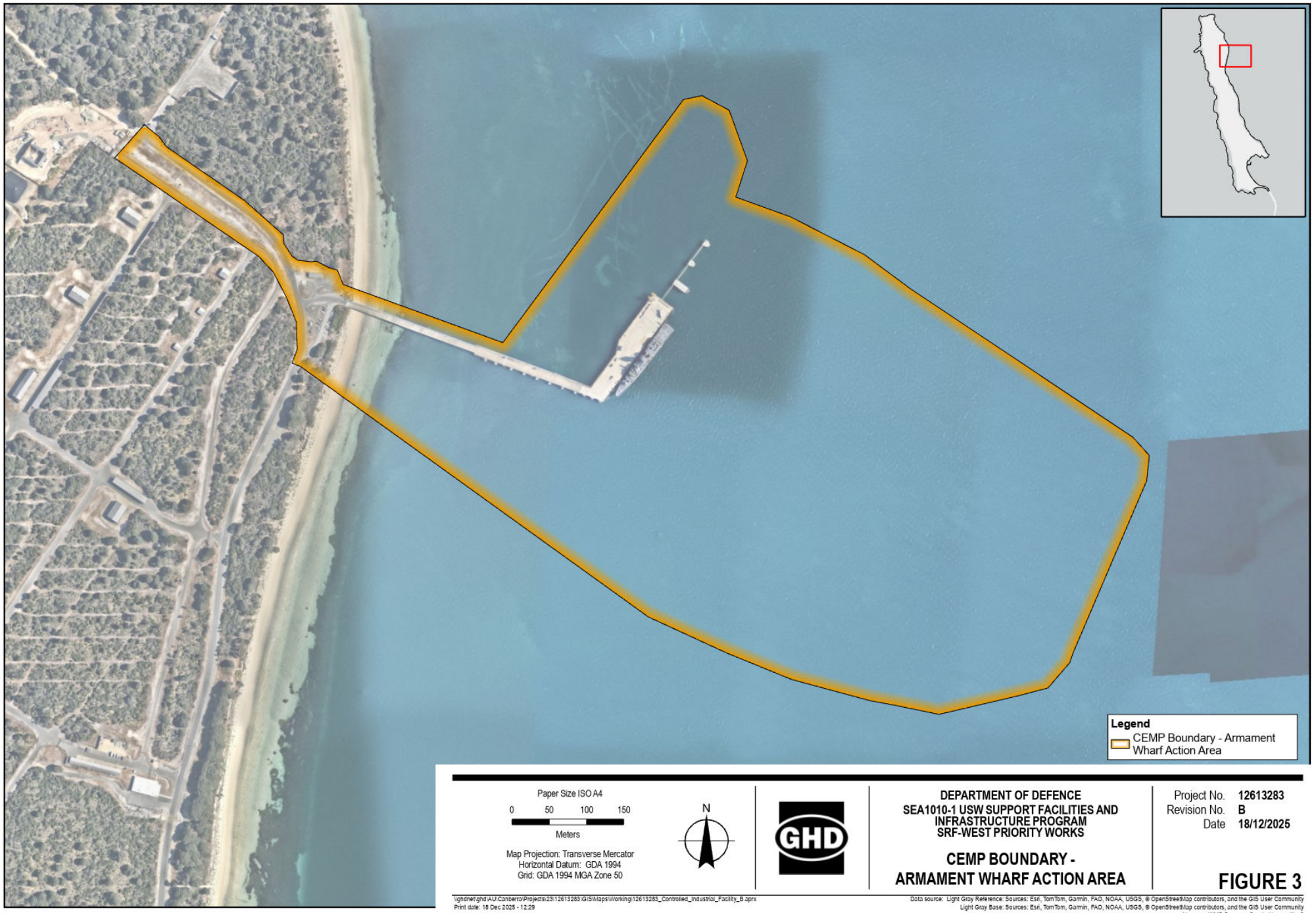


Figure 3 CEMP boundary – Armament Wharf Action area

3.2 Site layout and avoidance areas

Figure identifies the site layout and avoidance areas of the Careening Bay Action area in accordance with EPBC Act approval 2024/10031.

Figure identifies the site layout and avoidance areas for the maritime trial piling exercise at the Armament Wharf Action area.

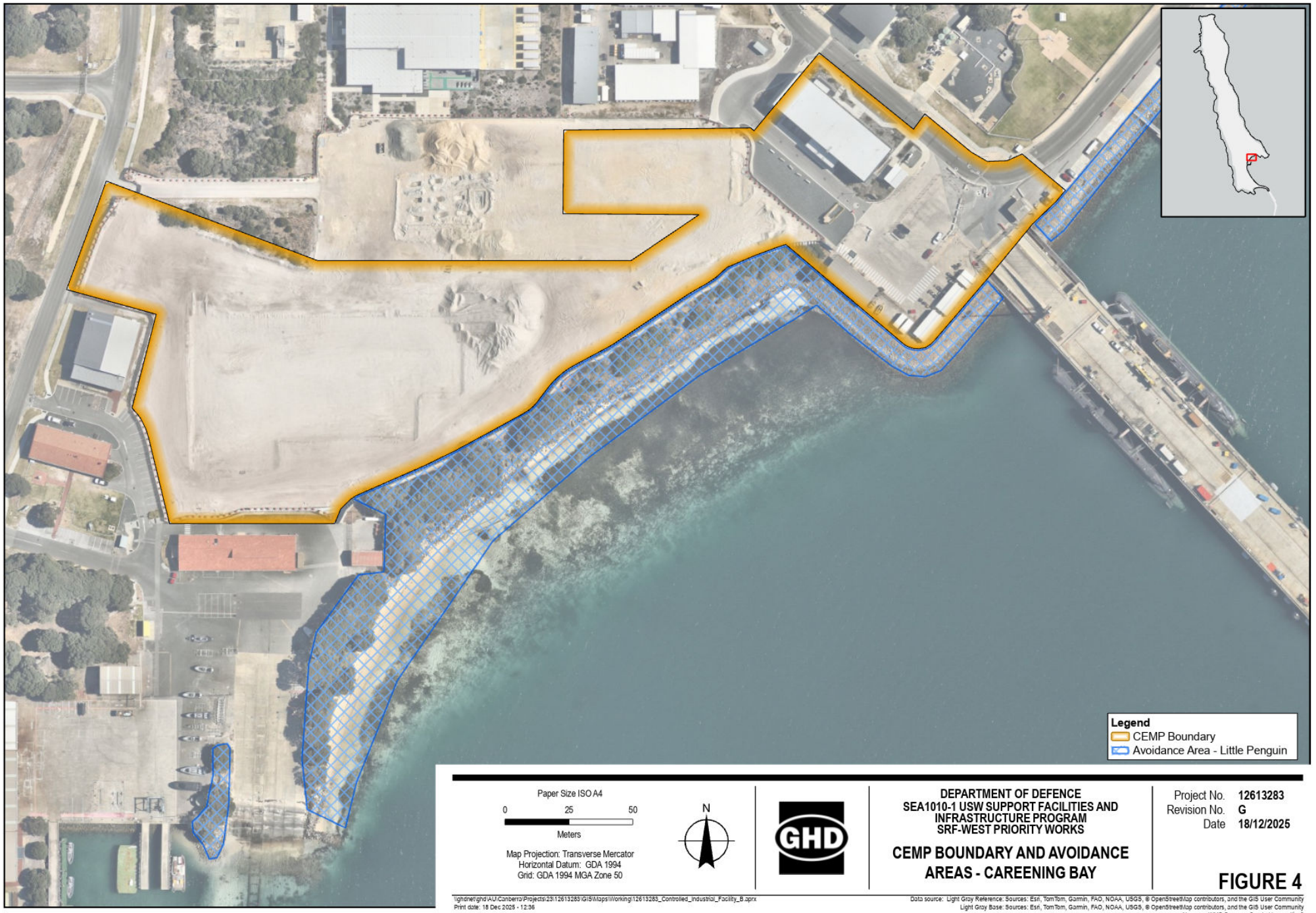


Figure 4 *CEMP boundary and avoidance areas – Careening Bay*

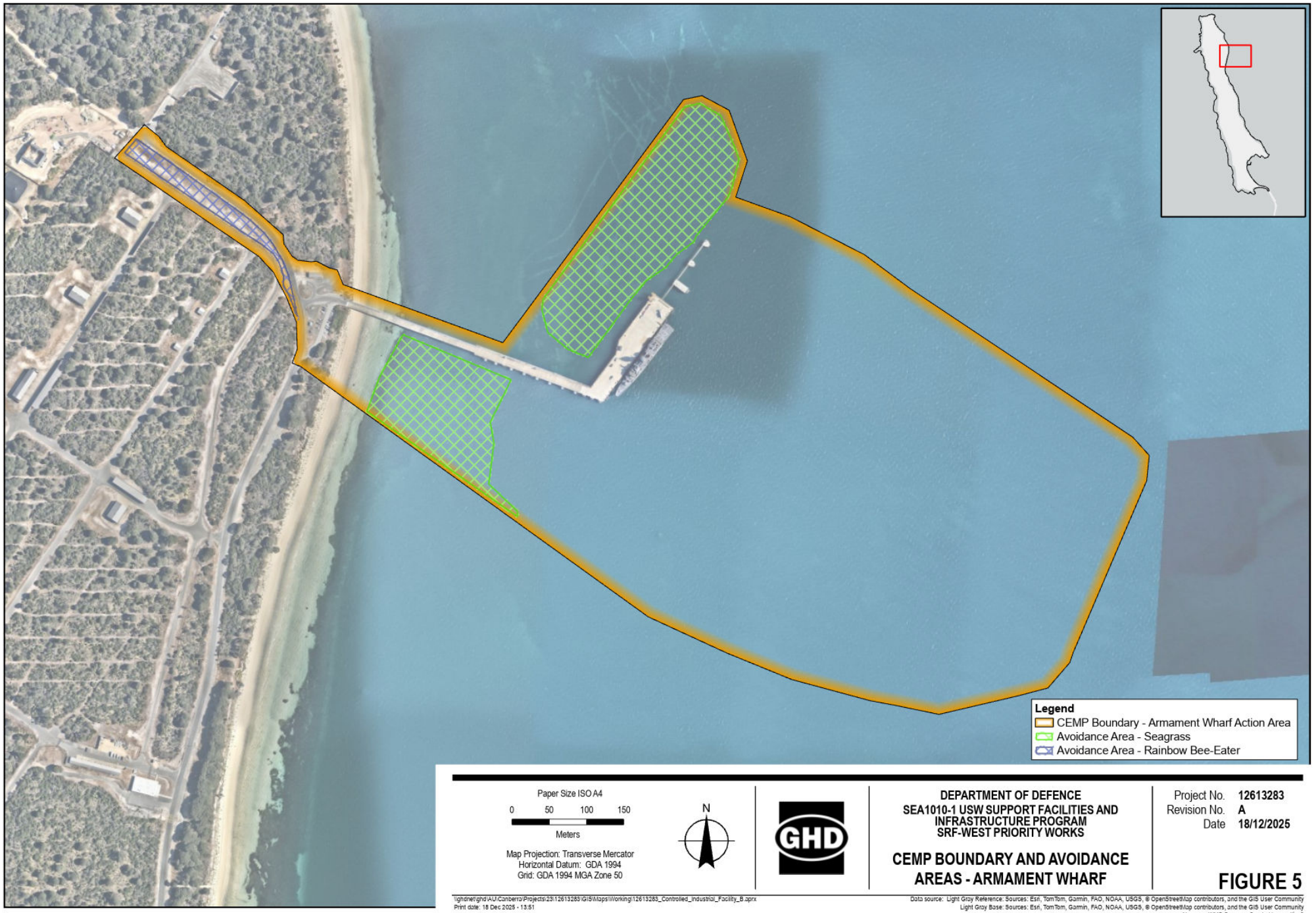


Figure 5 CEMP boundary and avoidance areas – Armament wharf

3.3 Activities managed by this CEMP

This is the second revision of the CEMP that manages the pre-construction and construction activities related to EPBC Act approval 2024/10031, as described in Section 3.4. Table 3.1 summarises activities managed by this CEMP. This revision of the CEMP has been updated to incorporate activities required for enabling works, construction of landside facilities including the Controlled Industrial Facility (CIF) and maritime trial piling exercise. This revision of the CEMP has also been modified, where relevant, to incorporate any adaptive management measures identified since the previous version.

3.4 Project description

3.4.1 Location

The location of activities to which this CEMP applies is defined in Figure 2 and Figure 3 and is termed the CEMP Boundary. Table 3.1 outlines the activities managed by this CEMP. Refer to Section 3.53.5 for activities excluded from this CEMP. As per condition 8 (j) of EPBC Act approval 2024/10031, impact piling will not be used for construction within the CIF.

3.4.2 Working hours

Approved construction working hours are:

– Commence no earlier than sunrise.
– Cease no later than sunset.

Sunrise and sunset are defined according to the Perth Observatory 'Sun Rise and Set Times' web page (**http://www.perthobservatory.com.au/astronomy/sun-and-moon-tables**).

Section 11.1.1.5 includes a provision for requesting permission to undertake noise, vibration or light generating construction activities outside of approved construction hours, under an out-of-hours work permit process.

Any construction activities that are noise generating proposed outside of the construction working hours require review by the SEO and approval from the SEO and PMCA via the out-of-hours work permit process.

Site activities that do not generate noise, vibration or light may occur outside of the construction working hours period.

3.4.3 Activities

Refer to Sections 1 and 2 of the EHA (GHD, 2025a) for a comprehensive outline of approved Action components. A summary of activities managed by this CEMP is provided in Table 3.1 below.

Table 3.1 Activities managed by this CEMP

Phase	Activities
Environmental management annexure activities	
Environmental management annexure implementation	Management controls, performance criteria and monitoring requirements identified in environmental management annexures in Appendix A and summarised in Section 11.1 will be established and implemented by the Site Environment Officer (SEO) on behalf of Defence: The implementation of the environmental management annexures for this CEMP will relate to the management of: – Flora and fauna, including relocation and rescue (Refer Annexure A1) – Biosecurity (Refer Annexure A1) – Tammar wallaby (Refer Annexure A1) – Traditional Owner engagement (Refer Annexure A2) – Heritage (Refer Annexure A2) – Terrestrial water quality (Refer Annexure A3)

Phase	Activities
	– Fuel and oil spills (Refer Annexure A3) – Dust and contamination (Refer Annexure A3) – Noise and vibration (Refer Annexure A4) – Little penguin (Refer Annexures A1 and A5) – Marine impacts from maritime trial piling exercise (Refer Annexure A6) All environmental management annexures have been developed in accordance with EPBC Act approval 2024/10031 and the DCCEEW EMP Guidelines.
Construction activities	
General	Prior to commencing activities, the Construction Contractor is to develop and have approved the Construction Contractor's CEMP, by the SEO on behalf of the Directorate of Environmental Planning, Assessment and Compliance (DEPAC)/ Project Management and Contract Administration (PMCA), in accordance with this CEMP, the EHA, the EPBC Act approval 2024/10031 and the environmental requirements under their contract. In all instances of a new version of the CEMP being published, the Construction Contractor is to update and submit to the SEO for approval, the revised Construction Contractor's CEMP within 10 business days of publication.
Site preparations/ mobilisation	Site preparations and mobilisation activities include: – Implementation of the approved Construction Contractor's CEMP. – Undertake mobilisation activities as per the approved Construction Contractor's CEMP. – Undertake site survey and pegging (including identification of existing services). – Install temporary perimeter fencing and cordon off avoidance areas. – Install temporary signage. – Mobilise heavy machinery and equipment to the site. – Manage storage of materials and waste at designated laydown areas within the Action area or elsewhere within HMAS Stirling as agreed by the Construction Contractor and HMAS Stirling Base management.
Vegetation clearing	Clearing and grubbing of native vegetation present within the disturbance footprint. Mulching of cleared vegetation for re-use in landscaping.
Establishment of temporary construction facilities	Establish a site compound and laydown areas within the Action area. Construction materials acceptance and storage within designated laydown areas of the Action area. Any requirement for installation of temporary construction lighting, will require approval by the SEO, in accordance with environmental management annexure requirements.
Earthworks	Cut-to-fill excavation. Management (reuse or offsite disposal) of contaminated construction spoil. Earthworks and grading to level the area. Compaction in preparation for building foundations. No materials such as soil, sand, gravel or other will be allowed to be imported to the approved Action site unless approved by the SEO.
Enabling works	Trenching for installation of new sub-surface service infrastructure (max depth < 2.0 m bgl). Installation of Controlled Modulus Column (CMC) ground improvement and load transfer platform construction underneath the CIF in preparation for fill required prior to installation of concrete slab for the CIF. Earthworks required to support installation of services infrastructure. Fill to prepare for concrete slab installation.
Construction of the CIF	Construction of buildings and infrastructure as per design specifications approved by Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), including but not limited to: – establishment of concrete foundations (monolithic slab with no joints) – establishment of formwork and structures – existing asset upgrades (roads) – construction of new assets (concrete, asphalt, buildings, roads, fencing) – pavement works to construct hardstands and roads

Phase	Activities
	– sealed hardstand comprised of concrete with bunding – spill detection and collection system – construction, internal fit out and commissioning of the CIF building – construction of the wharf side utility building at Diamantina Pier – installation of fire water tanks and pump – installation of refuelling bays – installation of permanent security fencing and CIF precinct access – installation of permanent operational lighting for the CIF.
Maritime trial piling exercise	The maritime trial piling exercise comprises: – site mobilisation – maritime piling rig establishment (located on wharf) – establishment of Syngnathid translocation site – deployment of marine fauna observers (vessel based) – deployment and retrieval of unattended acoustic loggers at monitoring locations – maritime impact piling with and without noise attenuating measures implemented – demobilisation.
Landscaping	Landscaping, including soil stabilisation controls and planting.
Clean-up/de-mobilisation	Removal of temporary environmental controls and signage. Removal of stockpiles and excess materials. Off-site disposal of construction waste to an appropriately licensed facility. De-mobilisation of construction machinery and plant. Undertake demobilisation activities as per the approved Construction Contractor's CEMP.

3.5 Excluded works

The following works, although approved by EPBC Act approval 2024/10031, are excluded from this revision of the CEMP:

a. Maritime activities (other than the maritime trial piling exercise): the upgrade and installation of new maritime infrastructure including, pier and wharf improvements, mooring dolphin, new small vessel pontoons and berthing, and associated dredging works and piling.
b. All activities (other than the maritime trial piling exercise) within the Armament Wharf Action area.

As detailed in Section 1.4, these works will be included in future revisions of the CEMP which will be updated prior to commencement of these future activities.

3.6 Indicative construction program

Figure 6 has been included within this CEMP to provide a high-level indicative construction program for the SRF-West Priority Works and proposed phases of construction as outlined in Section 2.3.1 of the EHA relating to EPBC Act approval 2024/10031. The indicative construction program has also been developed in receipt of key environmental values and their seasonal considerations.

The timing of construction activities will be planned in consultation with a suitably qualified seabird conservation ecologist (seabird ecologist) to avoid and minimise harm to little penguins, including but not limited to cumulative impacts. This requirement must be implemented for all revisions of this CEMP and must be considered at all stages of construction.

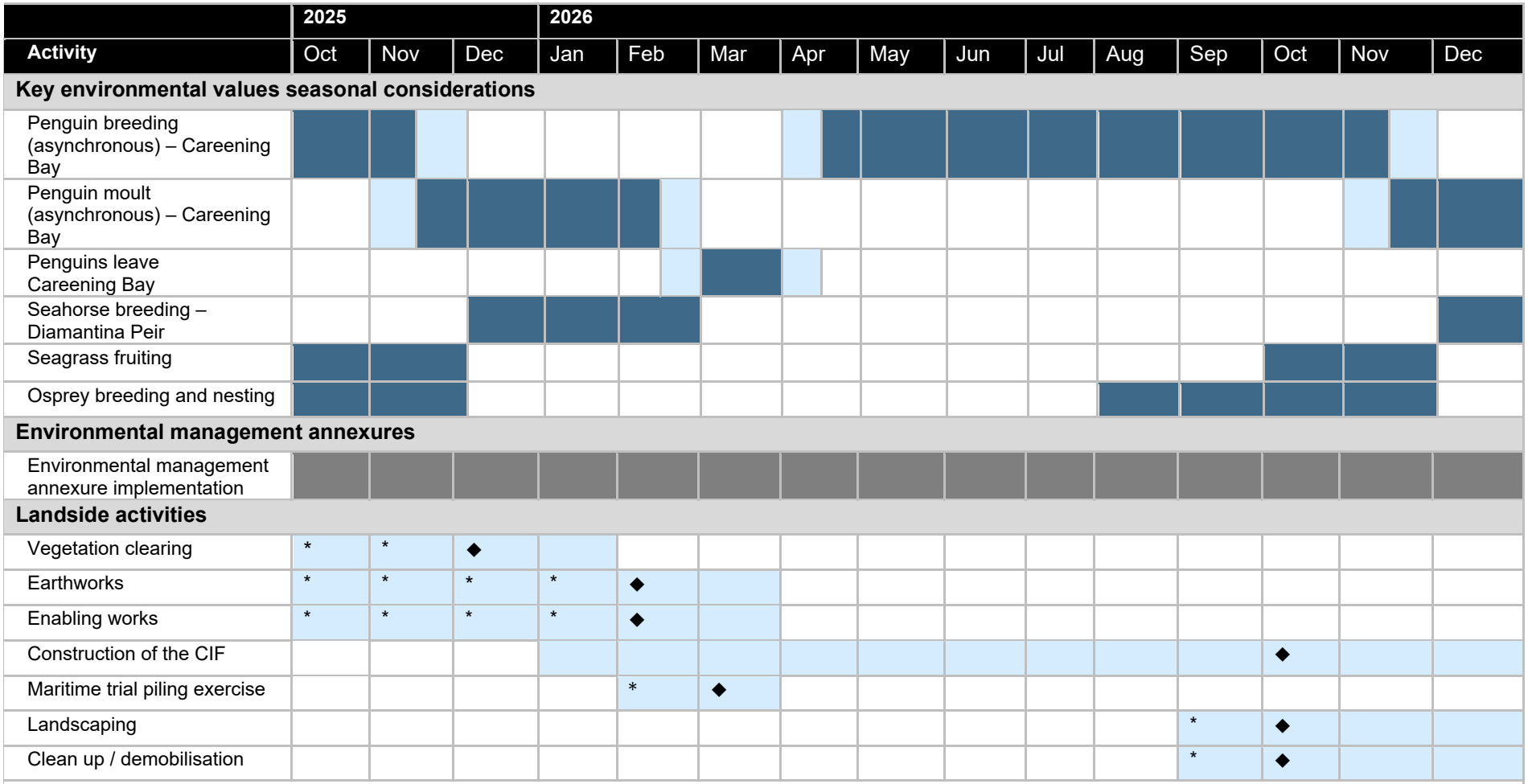


Figure 6 ***Indicative construction program***

4. CEMP objectives

In the context of the activities described in Section 3, the objectives of this CEMP are to:

- comply with the conditions of and implement the commitments identified in the EHA for EPBC Act approval 2024/10031
- implement the Defence Environmental Strategy 2016-2036 (Policy)
- comply with DCCEEW EMP Guidelines
- comply with the EPBC Act and all other relevant legislative and regulatory requirements
- avoid, minimise or manage potential environmental impacts to matters protected under the EPBC Act through implementing environmental management annexures as described in Table 11.1 and Section 11.1
- report and manage all environmental incidents in accordance with the requirements of this CEMP
- continuously improve and adaptively manage potential environmental impacts to matters protected under the EPBC Act.

5. Environmental management framework

5.1 Defence environmental policy, strategy and manuals

The Defence Environment Policy (policy) was signed by Deputy Secretary Security and Estate Group (DEPSEC SEG) on 21 May 2025. This policy describes the agreed unified approach to environment management across Defence and is supported by a range of products available on Defence's Environment and Heritage intranet page.

The Defence Environmental Strategy 2016-2036 was signed by the Secretary of Defence and Chief of the Defence Force in June 2016 and is binding for all of Defence's major infrastructure projects and operations including this Action along with all Action personnel and Construction Contractors. A copy of the Defence Environmental Strategy is located at **Defence Environmental Strategy 2016-2036 | About | Defence**. Copies of the Strategy will be communicated to all construction personnel throughout the implementation of the Action during inductions and awareness training.

The **Defence Environment and Heritage Manual** (DEHM) outlines how Defence manages long-term sustainability of the environment and provides guidance on Defence's legislative obligations and stewardship goals.

The DEHM includes:

– environmental assessments and approvals
– heritage management
– domestic biosecurity
– native species and ecological communities
– soil management
– bushfire management
– pollution prevention
– site contamination management
– water management
– energy management
– waste and recycled materials
– climate adaptation and mitigation
– PFAS investigation and management.

The DEHM empowers a range of manuals available to support the management of environmental aspects and values on the Defence estate, including, but not limited to:

– **Defence Contamination Management Manual**
– **Defence Pollution Prevention Manual**
– **Defence Landscape Management Manual**

Relevant management activities and requirements from these manuals have been included in this CEMP and annexures.

This CEMP provides the overarching mechanism for environmental management relating to the Action. For this iteration of the CEMP, only activities defined in Section 3 are relevant. The environmental management framework and key environmental documents covering management of the Action have been illustrated in Figure 7.

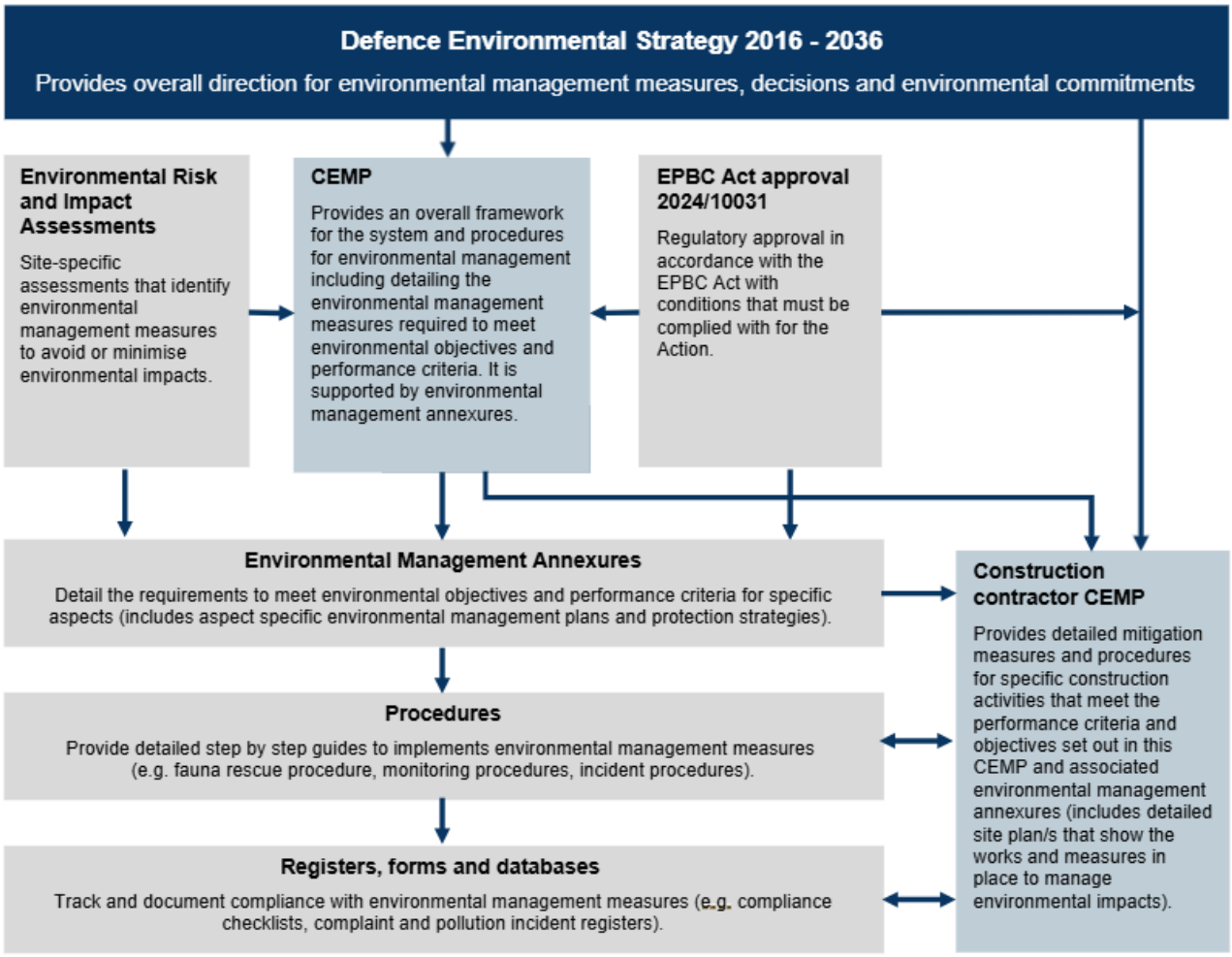


Figure 7 Environmental Management Framework

5.2 Legislative and regulatory framework

Appendix C outlines the Commonwealth and State legislative framework that apply to this CEMP.

6. Environmental management roles and responsibilities

Key environmental management roles and responsibilities for this CEMP has been provided below in Figure 8 with roles detailed in Table 6.1. These environmental management roles and responsibilities pertain to the approved Action description as outlined in Section 3 only.

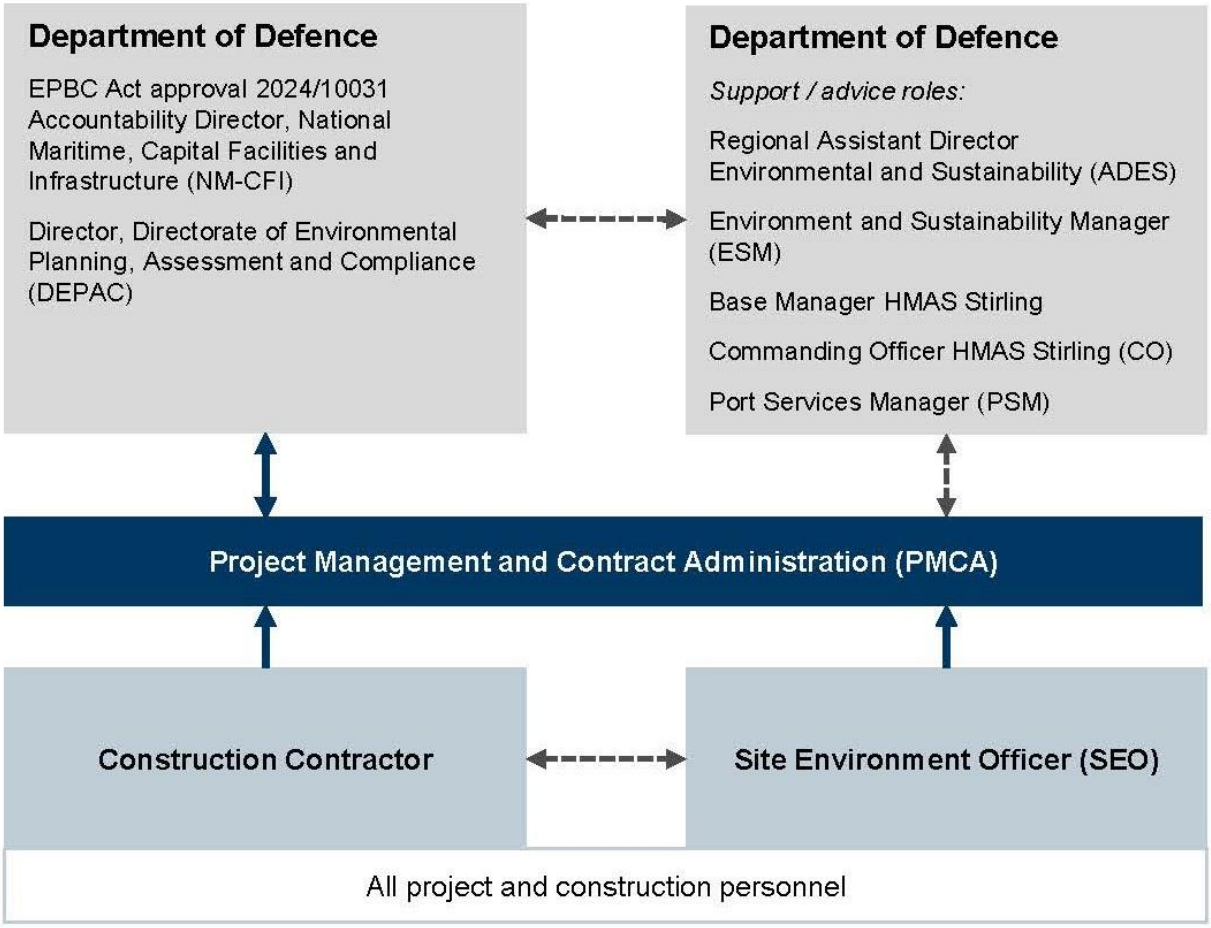


Figure 8 *Environmental management roles and responsibilities for this CEMP*

Table 6.1 Environmental management roles and responsibilities

Role	Responsibilities
Director Delivery, Fleet Base West Project management Office (FBW-PMO), Department of Defence	– As the approval holder on behalf of Defence, manage the joint overall accountability for the preparation, implementation and approval of this CEMP in accordance with EPBC Act approval 2024/10031. – Engage suitably qualified professional/s to prepare this CEMP prior to construction commencing. – Engage suitably qualified professional/s to manage and report on the implementation of this CEMP. – Confirm CEMP is consistent with conditions of EPBC Act approval 2024/10031 and relevant legislation and regulatory requirements. – Approve, and declare accuracy of, this CEMP prior to construction commencing. – Approve and submit any other relevant licences, approvals and permits to undertake the required works. – Publish this CEMP and associated plans (as amended) that are required by EPBC Act approval 2024/10031 (refer to Section 12) on the website within 15 business days prior to implementation and submit to DCCEEW electronically upon request within 5 business days. – Provide information to DEPAC to support notification to DCCEEW electronically of the date of commencement of construction along with completion of construction within 5 business days following the commencement of construction and completion of construction, respectively. Completion of construction in this context is in relation to the permanent cessation and/or completion of all construction activities associated with the whole Action approved by EPBC Act approval 2024/10031. – Direct and undertake management reviews in accordance with Section 12.3.1 of this CEMP. – Engage an independent auditor to undertake an audit every 3 years, or as directed by the Minister, in accordance with Section 12.1.3, including publishing the audit report and request DEPAC notification to DCCEEW within 5 business days of the date the audit report is published. – Provide information to DEPAC to support notification to DCCEEW of an incident within 2 business days and provide an incident report within 12 business days for all incidents (refer to Section 7.1).
Director, Directorate of Environmental Planning, Assessment and Compliance (DEPAC), Department of Defence	– Primary direct point of contact with DCCEEW for Defence. – As the approval holder on behalf of Defence, manage the joint overall accountability for the preparation, implementation and approval of this CEMP in accordance with EPBC Act approval 2024/10031. – Notify DCCEEW electronically of the date of commencement of construction along with completion of construction within 5 business days following the commencement of construction and completion of construction, respectively. Completion of construction in this context is in relation to the permanent cessation and/or completion of all construction activities associated with the whole Action approved by EPBC Act approval 2024/10031. – Participate in and support management reviews undertaken in accordance with Section 12.3 of this CEMP. – Support the engagement of an independent auditor to undertake an audit every 3 years, or as directed by the Minister, in accordance with Section 12.1.3, including publishing the audit report and notifying DCCEEW within 5 business days of the date the audit report is published. – Notify DCCEEW of an incident within 2 business days and provide an incident report within 12 business days for all incidents (refer to Section 7.1). – Review and issue 6-monthly CEMP reporting to DCCEEW. – Review and issue annual compliance reporting to DCCEEW. – Review and issue independent auditor reporting and notify DCCEEW of such within 5 business days of the date the audit report is published.
Regional Assistant Director Environment and Sustainability (ADES) (Defence)	– Be familiar with the requirements of this CEMP and associated environmental management annexures.

Role	Responsibilities
Environment and Sustainability Manager (ESM) (Defence)	– Attend management reviews as required or requested in accordance with Section 12.3.1 of this CEMP. – Confirm they have access to and are using the current version of the CEMP, and related environmental procedures, forms and templates. – Acting in accordance with their general environmental duty, specifically, all construction personnel must not carry out any activity that causes, or is likely to cause, environmental harm, unless that person takes all reasonable care to prevent and minimise the harm. – Provide base specific environment advice, support and approval (where relevant) to construction activities associated with the approved Action. – Participate in incident investigations.
Commanding Officer HMAS Stirling (CO) (Defence) Base Manager HMAS Stirling (Defence) Port Services Manager (PSM) (Defence)	– Be familiar with the requirements of this CEMP and associated environmental management annexures. – Attend management reviews as required or requested in accordance with Section 12.3.1 of this CEMP. – Confirm they have access to and are using the current version of the CEMP, and related environmental procedures, forms and templates. – Acting in accordance with their general environmental duty, specifically all construction personnel must not carry out any activity that causes, or is likely to cause, environmental harm, unless that person takes all reasonable care to prevent and minimise the harm.
Project Management Contract Administrator (PMCA)	– Be familiar with the requirements of this CEMP and associated environmental management annexures. – Ensure there are adequate resources available for the implementation of this CEMP through to the completion of construction of the activities outlined in Section 3.3. – As directed by Defence, undertake management reviews in accordance with Section 12.3.1 of this CEMP. – Authority to cease activities that if allowed to continue would result in a breach or are in breach of the CEMP and associated environmental management annexures. – Ensure they have access to and are using the current version of the CEMP, and related environmental procedures, forms and templates. – Communicate required environmental management and compliance documentation to the Construction Contractor. – Acting in accordance with their general environmental duty, specifically, all construction personnel must not carry out any activity that causes, or is likely to cause, environmental harm, unless that person takes all reasonable care to prevent and minimise the harm.
PMCA – Environment Advisor	– Provide guidance, support and review functions to the SEO and the SEO responsibilities. – Prepare this CEMP prior to construction commencing and submit to Defence for approval. – Facilitate environmental performance requirements, audits, review and continuous improvement activities, including update and/or review of this CEMP through adaptive management or corrective action identification. – Support the SEO in tracking environmental monitoring programs and provide advice, where requested, on environmental incident investigations. – Review environmental reporting as per Section 7 of this CEMP.
PMCA - Site Environment Officer (SEO)	– Oversight and monitoring the implementation of environmental management measures during construction activities and the implementation of this CEMP and the environmental management annexures on behalf of Defence for the approved Action. – Provide site induction and pre-mobilisation briefing materials for this CEMP and environmental management annexures to support the Construction Contractor. – Facilitate Construction Contractor compliance with this CEMP and associated environmental management annexures through supporting the development of a Construction Contractor’s CEMP.

Role	Responsibilities
	– On behalf of Defence and the approved Action, review and accept the Construction Contractor's CEMP, risk assessments, approvals and any other relevant environmental requirements to allow site mobilisation, construction activities and demobilisation. – On behalf of Defence and the approved Action, develop or direct development of relevant environmental licences, approvals and permits to undertake the required works. – Report to the PMCA and Defence on the adequacy and environmental management performance of the approved Action and the Construction Contractor. – Support Defence with external reporting matters where required. – Authority to cease activities through the PMCA that if allowed to continue would result in a breach or are in breach of the CEMP and associated environmental management annexures. – Review, with the Construction Contractor, that appropriate incident response equipment is available on site to combat significant incidents (e.g. oil spill response) and that all construction personnel are familiar with their use. – Undertake emergency response following a reported incident including coordinating with Defence and all construction personnel. – Incident and event reporting (including near misses) responsibilities to the key Project and Defence personnel (PMCA, and where directed, to Defence staff (DEPAC, ADES, ESM, CO and Base Manager HMAS Stirling)). – Report non-conformances to the PMCA and DEPAC, to facilitate DEPAC notification to DCCEEW where required. – Update the CEMP, and associated environmental management annexures, where required, to consider new activities or where incident and event reports recommend revision. – Perform responsibilities outlined for the SEO in the environmental management annexures as per Section 11 of this CEMP. – Undertake inspections, audits and reviews as per Section 12 of this CEMP, and meetings and communication as per Section 11.2 of this CEMP. – Compile the required reporting to be distributed to the Project and Defence personnel as per Section 7 of this CEMP.
Construction Contractor	– Prepare and implement the Construction Contractor's CEMP/s that are consistent with controls in this CEMP and associated environmental management annexures. – During construction, have overall responsibility for environmental performance of the Construction Contractor's CEMP and implementation of environmental management measures that are consistent with this CEMP and associated environmental management annexures during construction. – Be familiar with the requirements of this CEMP, Construction Contractor's CEMP/s, approved environmental management annexures. – Facilitate and manage adequate resources to comply with the requirements of the Construction Contractor's CEMP/s. – Conduct inductions and training for all new and ongoing personnel, including providing evidence that the personnel delivering training or inductions, and those performing the inspections, are suitably experienced or qualified. – Maintain weekly meetings with SEO. – Be responsible for incident and event response and management in liaison with the SEO. – Be responsible for incident and event reporting and ensuring lessons learned are captured and implemented in liaison with the SEO. – Perform responsibilities outlined for the Construction Contractor in environmental management annexures as per Section 11. – Authority to cease activities that if allowed to continue would result in a breach or are in breach of the CEMP and associated environmental management annexures. – Undertake inspections, audits and reviews as per Section 12 of this CEMP, and meetings and communication as per Section 11.2 in conjunction with the SEO.

Role	Responsibilities
	– Compile and review the required reporting to be distributed to the Project, SEO and Defence personnel as per Section 7.
All construction personnel	– Be familiar with the requirements of this CEMP and associated environmental management annexures. – Ensure they have access to and are using the current version of the CEMP, and related environmental procedures, forms and templates. – Act in accordance with their general environmental duty, specifically, all construction personnel must not carry out any activity that causes, or is likely to cause, environmental harm, unless that person takes all reasonable care to prevent and minimise the harm. – Undertake relevant training, competency and induction requirements for work being undertaken. – Undertake works in accordance with the Construction Contractor's CEMP and relevant environmental management annexure documentation for their work. – Report all incidents and events in accordance with Section 7.3. – Authority to cease activities that if allowed to continue would result in a breach or are in breach of the CEMP and associated environmental management annexures.

7. Reporting

The reporting requirements of this CEMP with reference to the EPBC Act approval 2024/10031 have been outlined in Table 7.1 including the type, requirement, frequency and responsibility for reporting. Management of all environmental management annexures and records required by this CEMP is outlined in Section 12.2.

Table 7.1 CEMP internal and external reporting requirements

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
Internal reporting and notification requirements				
Post mobilisation report	Assessment of adherence to the requirements of this CEMP and associated environmental management annexures. (Refer to Section 7.1)	PMCA/ DEPAC	Within **one month** following commencement of construction for each new construction activity	SEO/PMCA
Clearing records	Construction Contractor will provide the PMCA with georeferenced spatial data indicating the actual extent of clearing undertaken.	SEO	Within **2 weeks** of clearing completion	Construction Contractor
Waste classification report (wastewater or spoil)	All data collected for stormwater and/or spoil waste classification will be summarised into a monthly report in accordance with the Soil and Water Quality Management Annexure (Annexure A3)	DEPAC	**Monthly**	SEO
Dust monitoring report	All data collected for dust monitoring (real-time and dust deposition) comparing measured levels against the performance criteria will be summarised into a monthly report in accordance with the Soil and Water Quality Management Annexure (Annexure A3).	DEPAC	**Monthly**	SEO
Noise and vibration monitoring report	Noise and vibration monitoring reports will be prepared to compare measured levels against the performance criteria outlined in the Noise and Vibration Management Annexure (Annexure A4).	DEPAC	**Monthly**	SEO
Little penguin monitoring field reports	These reports will summarise the results of the fortnightly monitoring and include any significant observations or notable events, including changes in little penguin behaviour and predation events, or changes to habitat in accordance with the Little Penguin Monitoring and Management Plan (RPS, 2025) (Annexure A5).	SEO	**Fortnightly**	Seabird ecologist
Little penguin monitoring quarterly reports	These reports will summarise any significant observations, notable events in relation to approved Action activity timing, highlight any potential issues such as abandoned eggs/chicks near the construction areas compared to	SEO	**Quarterly**	Seabird ecologist

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
	other sites further away, significant weather or climatic events, or changes in little penguin behaviour in accordance with the Little Penguin Monitoring and Management Plan (RPS, 2025) (Annexure A5)			
Little penguin monitoring annual reports	These reports will detail data collection and analysis methods, survey effort, results, and discussion. Report to provide information about the current condition of the little penguin population and contextualise monitoring results with historical data. The discussion to include interpretation of results, including against historical data behaviour in accordance with the Little Penguin Monitoring and Management Plan (RPS, 2025) (Annexure A5) as well as assessment of the underlying causes of any decline and provide recommended management measures to mitigate the little penguin population decline. The report will be provided to DEPAC and on to DCCEEW (see below).	SEO	**Annually**	S seabird ecologist
Environmental compliance update	Assessment of adherence to the requirements of this CEMP and associated environmental management annexures, in general accordance with AS/NZS ISO19011:2018 standard for input into management reviews and whole of approved Action reporting. (Refer to Section 7.1)	PMCA / DEPAC	**Monthly**	SEO/PMCA
Environmental compliance update	Assessment of adherence to the requirements of this CEMP, associated annexures and the Construction Contractor's environmental management documents, including evidence of inspections, incidents, corrective actions and adaptive management activities undertaken (if relevant)	SEO	**Monthly**	Construction Contractor
All environmental management records (e.g. records of pests and weeds, site inspection records)	Construction Contractor will provide the PMCA all environmental management records to demonstrate compliance as required by the environmental management annexures reporting requirements.	SEO	Within **2 weeks** of construction completion	Construction Contractor
Maritime trial piling exercise underwater noise monitoring report	Data generated from the range of simulated scenarios completed during the maritime trial piling exercise will be used to inform ongoing management controls and monitoring requirements to be	SEO	A single report, following completion of test piling activities for both monitoring and modelling components	PMCA

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
	implemented during marine piling works (refer to Appendix A).			
Marine fauna observation form	Marine fauna observation forms are required to be completed by suitably qualified marine fauna observers (MFO).	DEPAC	**Monthly**	SEO
External reporting and notification requirements				
Submission and publication of plans	All plans required by Conditions 6, 8, 9, 11, 12, 13, 18, 19, 21 and 25 of EPBC Act approval 2024/10031, including this CEMP, must be published on the website and electronically submitted upon request.	DCCEEW	Within **15 business days** prior to implementation Within **5 business days** of request	DEPAC
Commencement notification	Electronic notification of the date of commencement of construction, commencement of maritime works, commencement of dredging and completion of construction.	DCCEEW	Within **5 business days following commencement** of construction, commencement of maritime works, commencement of dredging and completion of construction, respectively	DEPAC
CEMP implementation report	Submission of a CEMP implementation report that is consistent with Condition 7 of EPBC Act approval 2024/10031. Refer to Section 7.2.1 for further details.	DCCEEW	Every **6 months** from the commencement of the Action until the completion of construction	DEPAC
Annual Compliance Report (ACR)	Submission of an ACR that is consistent with Conditions 42-49 of EPBC Act approval 2024/10031 and the Annual Compliance Report Guidelines (DCCEEW, 2023a). Refer to Section 7.2.2 for further details.	DCCEEW	Within 20 business days following the end of each ACR period, that is every **12 months** from the commencement of the Action until the completion of the Action (or for the components relating to the CEMP until completion of the CEMP)	DEPAC
Independent audit report	Submission of an audit report to DCCEEW to the satisfaction of the Minister and consistent with the Independent Audit and Audit Report Guidelines (DCCEEW, 2019) and Conditions 52-60 of EPBC Act approval 2024/10031. The audit report will be published on the website within 10 business days of the date DCCEEW agrees to the audit report in line with Condition 58. DCCEEW will be notified that the audit report is published on the	DCCEEW	Within 3 months following the end of each audit period, that is every **3 years** from the commencement of the Action until the completion of the Action (or for the components relating to the CEMP until completion of the CEMP)	DEPAC

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
	website in accordance with Condition 59.			
Fauna sightings	Upload to the relevant database, all fauna sightings recorded during the Action in accordance with Condition 41 of the EPBC Act approval 2024/10031.	Atlas of Living Australia or relevant state biodiversity database	At least **annually**	PMCA, via HMAS Stirling ESM
Little penguin monitoring annual reports	Provision of annual little penguin monitoring reports in accordance with Condition 12 of the EPBC Act approval 2024/10031.	DCCEEW	**Annually,** until 6 years post-construction	DEPAC
Plan revision notification (Not relevant for this CEMP revision)	Notification of a plan revision in accordance with Condition 29 of the EPBC Act approval 2024/10031, for plans required by Condition 19 (refer to Appendix BAppendix B).	DCCEEW	At least **30 business days** prior to implementation of the revised plan	DEPAC

7.1 Internal reporting

Within one month of commencing construction for each new construction activity, the SEO will develop and provide a post mobilisation report to DEPAC outlining the status of works, any issues as well as corrective and preventative actions taken, and a summary of conformance to this CEMP and the Construction Contractor's CEMP.

As the approved Action progresses, the SEO will develop and provide monthly environmental compliance updates to DEPAC outlining the status of works, any issues, and a summary of conformance to this CEMP and the Construction Contractor's CEMP for input into management reviews and whole of approved Action reporting.

The monthly environmental compliance updates will include a summary of results from site inspections, external and internal audits, monitoring records, complaints (if any), environmental events, incidents (including 'near miss' incidents) and non-conformance as well as corrective and preventative actions taken.

7.2 External reporting

7.2.1 CEMP implementation report

DEPAC are responsible for engaging a suitably qualified professional to manage and report on the implementation of this CEMP including submission of the CEMP implementation report to DCCEEW every 6 months following the commencement of the Action until completion of the activities as outlined in Section 3.3.

The CEMP implementation report will be developed in accordance with Condition 7 of the EPBC Act approval 2024/10031 and will include an assessment, and supporting evidence, of CEMP implementation made and collected by a suitably qualified professional.

Processes and documentation in place to track compliance for the CEMP implementation report will include:

– site inspection records (refer Section 12.2)
– environmental monitoring reports (refer Section 11.4)
– waste transport certificates (refer to Section 12.2)
– records of environmental complaints and communications (refer to Section 11.2)
– environmental incident and non-conformance reporting (refer to Section 7.1)
– documentation from regular reviews of environmental performance (refer to Section 12.3.1).

7.2.2 Annual Compliance Report (ACR)

Conditions 42-49 of the EPBC Act approval 2024/10031 require that ACRs are prepared by DEPAC every 12 months following the commencement of the Action until the expiry date of the EPBC Act approval 2024/10031 or as otherwise directed by the Minister.

DEPAC will prepare an ACR every 12 months, including:

- publishing the ACR and a shapefile showing all clearing of protected matters, and their habitat, within 20 business days following the end of each 12-month ACR period, in a format that is easily accessible and downloadable
- providing to DCCEEW as an attachment to the ACR, a copy of monitoring and verification reports as required under the EPBC Act approval 2024/10031 (this will include relevant monitoring data, surveys, maps, other spatial and metadata and all species occurrence data (sightings and evidence of presence)
- notifying DCCEEW electronically, within 5 business days of each date of publication, that the ACR has been published on the website, including the web address for where the ACR and related shapefile/s are published
- the ACR and related shapefile/s published on the website or otherwise provided to a member of the public will exclude or redact sensitive biodiversity data
- where sensitive biodiversity data is excluded or redacted from publicly accessible information, including the ACR or a published shapefile:
    - submission of the full un-redacted ACR will be provided to DCCEEW within 5 business days of it being made public
    - DCCEEW will be notified in writing of what exclusions and redactions have been made.

The ACR will be developed in accordance with Conditions 42-49 of EPBC Act approval 2024/10031 and the Annual Compliance Report Guidelines (DCCEEW, 2023a) and will include:

- accurate and complete details of compliance and any non-compliance with each condition attached to the EPBC Act approval 2024/10031 (including the conditions relevant to the CEMP), and all commitments made in each plan required by the EPBC Act approval 2024/10031
- a schedule of all plans in effect in relation to these conditions during the ACR period
- accurate and complete details of how each plan was implemented during the ACR period
- for any incident that occurred, accurate and complete details of each incident.

7.3 Environmental incidents and event reporting

The following sections provide the definitions, response processes, and reporting requirements for environmental incidents and environmental events respectively. A summary of all environmental incident, non-conformance and event notification and reporting requirements is provided in Table 7.3.

7.3.1 Incident definition

Environmental incidents can occur for a range of reasons, including:

- construction environmental controls are not adequately managing environmental risks
- construction environmental controls are not correctly implemented
- changes to construction methods that change environmental risk profiles
- unexpected environmental risks occur, or the scale of risk was underestimated.

What constitutes an environmental incident for this approved Action has been defined in the EPBC Act approval 2024/10031 and with reference to the activities detailed in Section 3 means any:

- event which has the potential to, or does, harm any protected matter, which includes, but is not limited to:
    - vessel strikes to little penguins and Indian Ocean bottlenose dolphins

- leaks and spills of any substance that can cause harm to protected matters
- exceedance of the noise threshold level at little penguin nesting sites
- exceedance of the vibration threshold level at little penguin nesting sites
- a decline in the little penguin population at Garden Island/*Meeandip* below the baseline population or a declining population trend that has the potential to decrease the little penguin population at Garden Island/*Meeandip* below the baseline population

– potential non-compliance with the conditions of EPBC Act approval 2024/10031, including the administrative requirements
– actual non-compliance with the conditions of EPBC Act approval 2024/10031, including the administrative requirements
– potential non-compliance with one or more commitments made in a plan (including this CEMP) required under EPBC Act approval 2024/10031
– actual non-compliance with one or more commitments made in a plan (including this CEMP) required under EPBC Act approval 2024/10031.

7.3.2 Incident response process

Environmental management measures for environmental incident response have been detailed in Section 11. All construction personnel are required to report any environmental incidents or non-compliances to the SEO as soon as practicable and within 4 hours of the incident. The SEO has the responsibility to:

– cease activities that if allowed to continue would result in a breach, or are in breach of this CEMP and associated environmental management annexures
– check appropriate environmental incident response equipment is available on site to combat significant environmental incidents (e.g. oil spill response) and that the required project personnel are familiar with their use
– undertake emergency response following a reported environmental incident including coordinating with Defence, the PMCA, the Construction Contractor, the Construction Contractors' environmental officer (or equivalent) and any other required project personnel
– notification of all environmental incidents (including near misses) to the PMCA, the ESM, DEPAC and where directed, to the Command Team at HMAS Stirling as soon as practicable and within 24 hours of the incident
– update the CEMP and associated environmental management annexures where environmental incident reports recommend revision and submit to Defence for review and approval.

7.3.3 Incident reporting

Reporting of all environmental incidents and non-conformances related to construction activities outlined in Section 3.3 will be in accordance with the Construction Contractor's CEMP, once approved by the SEO. An incident reporting template is provided in Appendix F.

Reporting of all environmental incidents and non-conformances related to the implementation of the environmental management annexures will be documented and submitted to Defence via Defence's Garrison and Estate Management System (GEMS) Incident Report Form within 72 hours of the incident and are to include the following details:

– A short description of the environmental incident.
– The location (if applicable, including co-ordinates), date and time of the environmental incident.
– All corrective measures and investigations which have been undertaken.
– Any recommendations to prevent environmental incidents in the future.

The GEMS incident management process is not currently part of an incident response. Incident records in GEMS document events, investigations and outcomes of an incident, often after all necessary management actions directly related to the incident have been completed. For example, a GEMS record is not a method to

request a spill response, but the form will be used to document a spill that resulted in an environmental incident or near miss after response and “make good” actions have been completed.

Slower elements of incident management such as root cause investigations, lessons learned and external agency interactions, may be managed and documented directly into a GEMS incident record. In general, an incident will be recorded in GEMS as soon as it is practical to do so.

If any person outside the Project would like to report an environmental incident or near miss relevant to this CEMP, they can notify the Defence National Switchboard on 1300 333 362, or via email at srf-west.infrastructureproject@defence.gov.au or to the HMAS Stirling base on +61 8 9553 2222 or via email at fbw.basemanagement@defence.gov.au.

In accordance with the requirements of Conditions 50 and 51 of EPBC Act approval 2024/10031 on behalf of Defence, DEPAC is responsible for:

– determining that an environmental incident as defined in the EPBC Act approval 2024/10031 has occurred and notifying DCCEEW as required
– notifying DCCEEW electronically, within 2 business days of becoming aware of any environmental incident
– providing to DCCEEW in writing, within 12 business days of becoming aware of an environmental incident, the details of that environmental incident.

The notification to DCCEEW from DEPAC will include:

– any condition or commitment made in a plan required by the EPBC Act approval 2024/10031 which has not been, or may have not been, complied with
– a short description of the environmental incident
– the location (if applicable, including co-ordinates), date and time of the environmental incident.

The details provided to DCCEEW from DEPAC within 12 business days will include:

– all corrective measures and investigations which the approval holder has already taken in respect of the environmental incident
– the potential impacts of the environmental incident
– the method and timing of any corrective measures that the approval holder proposes to undertake to address the environmental incident
– any variation of these conditions or revision of a plan that will be required to prevent recurrence of the environmental incident and/or to address its consequences.

Table 7.2 CEMP environmental incident reporting requirements

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
Internal reporting and notification requirements				
Internal environmental incident and non-conformance notification	All construction personnel must report all environmental incidents and non-conformances in accordance with Section 7.3.2 to the SEO. The SEO is responsible for notifying PMCA, DEPAC, ESM and others as directed, of all environmental incidents within 24 hours. Refer to Section 7.3.2 for further details.	SEO/ESM	Within **4 hours** of the incident occurring	All construction personnel
		PMCA/ DEPAC/ ESM	Within **24 hours** of the incident occurring	SEO
Internal environmental incident and non-conformance report	The PMCA is responsible for reporting all environmental incidents and non-conformances to Defence via GEMS Incident Report Form within 72 hours of the incident. Refer to Section 7.3.3 for further details.	DEPAC	Within **72 hours** of the incident	PMCA
Fuel or oil spill notification	All construction personnel must notify the Construction Contractor and SEO of any fuel or oil spill incidents immediately. The SEO is responsible for enacting the HMAS Stirling Oil Spill Contingency Manual notification process. Refer to the Soil and Water Quality Management Annexure (Annexure A3).	SEO	**Immediately** (as soon as discovered)	All construction personnel
		Fleet Base West (FBW) Emergency Operations Centre (EOC)	**Immediately** (within 30 minutes) if the spill is unable to be fully contained by Construction Contractor	SEO
		FBW EOC PMCA/ESM	Within **4 hours** of the incident occurring	SEO
		DEPAC	Within **24 hours** of the incident occurring	SEO/PMCA
External reporting and notification requirements				
Incident notification	Electronic notification to DCCEEW of an incident in accordance with Condition 50 of the EPBC Act approval 2024/10031 (refer to Section 7.3.3).	DCCEEW	Within **2 business days** of becoming aware of an incident (refer to Section 7.1)	DEPAC
Incident report	Provision of an incident report to DCCEEW in accordance with Condition 51 of the EPBC Act approval 2024/10031 (refer to Section 7.3.3).	DCCEEW	Within **12 business days** of becoming aware of an incident (refer to Section 7.1).	DEPAC

7.3.4 Event definition

Environmental events are occurrences that do not meet the definition of an incident under the EPBC Act approval 2024/10031 but are relevant to the ongoing environmental performance of the approved Action.

Environmental events may include, but are not limited to:

– Exceedance of ‘review’ trigger levels of noise, vibration or dust that remain within acceptable limits and do not result in harm to protected matter.
– Evidence of minor habitat degradation (e.g. burrow collapse or rock wall instability) where following assessment by seabird ecologist, there is no attributable site-related cause.
– Discovery of minor nest or burrow damage where seabird ecologist has noted no injury or mortality to protected fauna has occurred.

– Observations of environmental conditions that, while not causing harm, indicate a potential weakness in environmental controls.

7.3.5 Event response process

Environmental management measures for environmental events response have been developed to ensure consistent recording, review and management of minor or low-risk occurrences that do not meet the definition of an environmental incident but are relevant to environmental performance or risk management. All construction personnel are encouraged to report any potential environmental events or behaviours that may elevate the risk to environmental conditions to the SEO as soon as practicable. The SEO has the responsibility to:

– record all reported environmental events in an environmental event register, including details of location, date of occurrence, description and immediate actions taken
– verify that the event does not meet the definition of an environmental incident (as per Section 7.3.1)
– initiate corrective or preventive actions to address contributing factors and prevent recurrence
– review environmental event trends to identify emerging risks or areas for improvement in environmental controls
– include a summary of environmental events and associated management actions in the monthly environmental compliance updates
– reclassify, escalate and appropriately manage any environmental event as an environmental incident where subsequent information identifies potential or actual harm to a protected matter, or a potential or actual non-compliance with EPBC Act approval conditions or management plan commitments.

7.3.6 Event reporting

Environmental events are recorded for the purposes of internal reporting, review and continual improvement. These events are used to identify emerging risks, verify the effectiveness of control measures, and inform monthly environmental compliance reporting.

The SEO will record all environmental events in environmental event register. All environmental events are reviewed during routine SEO meetings, as well as discussed at Construction Contractor prestart and prestart meetings. A summary of environmental events and associated adaptive management measures will be included in monthly environmental compliance updates. Where an environmental event is subsequently determined to meet the criteria of an incident (e.g. due to new information or an escalation of impact), it must be reclassified and managed in accordance with the incident response process and incident reporting procedure (Sections 7.3.2 and 7.3.3).

Table 7.3 CEMP environmental event reporting requirements

Report Type	Content requirements	Who to	Frequency/trigger	Responsibility
Internal reporting and notification requirements				
Internal environmental event notification	All construction personnel are encouraged to report any potential environmental events or behaviours that may elevate the risk to environmental conditions in accordance with Section 7.3.4 to the SEO as soon as practicable.	SEO	As soon as practical	All construction personnel
Internal environmental event report	The SEO is responsible for reporting all environmental events in the monthly environmental compliance updates. Refer to Section 7.3.6 for more details.	PMCA / DEPAC	**Monthly**	SEO

8. Environmental training

All construction personnel working on the approved Action (including Construction Contractors and sub-contractors) are required to complete environmental training and awareness, commensurate with their responsibilities, in accordance with this CEMP, and to generally act in a manner that minimises environmental harm. Environmental training and awareness can be achieved through a variety of forms, such as site inductions, daily prestart and weekly toolbox talks, or formal training.

The Construction Contractor is responsible for providing evidence that the personnel delivering training or inductions, and those performing the inspections, are suitably experienced or qualified.

8.1 Competency and record keeping

All construction personnel, including Construction Contractor and sub-contractor personnel, will hold the necessary approvals, permits, certificates, tickets and licenses relevant to their duties and as required by law. Training and licence/permit records will be maintained on site in readily available, auditable files.

The Construction Contractor and their sub-contractors will maintain a training and awareness matrix. The matrix will record that relevant personnel hold or receive the necessary training and understanding to implement the requirements of this CEMP, and the environmental requirements of the Construction Contractor's approved CEMP. A copy of the Construction Contractor's and/or the Construction Contractor's sub-contractor training and awareness matrix is to be made available upon request by the SEO during audits. It is to have details on:

- records of acceptance of CEMP roles and responsibilities (refer to Section 6)
- each training and awareness activity (site induction, daily prestart and weekly toolbox talks, formal training):
  - activity undertaken (e.g. site induction, daily prestart or weekly toolbox talk, first aid training, etc.)
  - attendance list of personnel with competency attained / participation during the activity
  - acknowledgement signed by all personnel that they understand and will comply with the requirements of this CEMP and all annexures.
- copies of training materials
- competency assessments (where relevant to the training provided)
- register of construction personnel holding permits, certificates, tickets and licences relevant to their duties and as required by law.

Specific training may be required for particular construction activities, where identified in this CEMP and/or Construction Contractor's CEMP. Where competence is to be acquired through training, including site inductions, training records will be stored and kept in accordance with Section 12.2.

Training activities will be audited in accordance with Section 12.1 and any non-conformance will be reported as per Section 7.1.

8.2 Training and awareness activities

The following training and awareness activities will be undertaken for the approved Action. All personnel involved in the approved Action will be expected to participate in training and awareness activities.

8.2.1 Pre-mobilisation briefing

Before mobilisation and dependent on the type and size of the scope of works, the Construction Contractor is responsible for conducting an environmental awareness briefing with environmental representative/s of each sub-contractor.

The SEO is to support the Construction Contractor with the material development for the briefing. The briefing will outline the requirements of this CEMP and the supporting documentation for consideration in their mobilisation planning and execution, including but not limited to:

– ground disturbance work requirements
– environmental monitoring and data reporting requirements in the environmental management annexures (Section 11)
– noise management requirements
– inspection and audit requirements (Section 12)
– environmental emergency/spill response and incident management and reporting (Section 7.1).

8.2.2 Site induction

All construction personnel working on site will complete a project site induction. The site induction will be prepared by the SEO, with a placeholder section for the Construction Contractor and their sub-contractors to input additional specific requirements and information.

The SEO prepared material will outline:

– formal environmental requirements for the Action
– construction personnel environmental training and awareness expectations for the duration of the construction works, i.e. attendance at daily prestart and weekly toolbox talks, formal training as required, and holding the necessary qualifications for the role being performed
– the environmental and heritage risks and potential impacts of the construction work, as highlighted in Section 10 of this CEMP. Specialist input or review may be sought from the SEO to appropriately address the included risks, such as review from an ecologist or heritage specialist
– the approved Action environmental control measures and monitoring programs specified in this CEMP (refer to Section 11.1), including associated environmental management annexures, including specifics on:
    - site layout and access plans
    - hours of operation
    - marine safety zones (for the maritime trial piling exercise only), sensitive areas and/or no-go zones
    - triggers for additional environmental management
    - emergency and incident response and investigation procedures, location and use of spill kits, fire extinguishers, and other on-site emergency response equipment.
– reinforcing a positive attitude towards heritage management, dust, water, and spoil management and to address any issues that arise during the construction process.

The induction will be provided to the Construction Contractor. The Construction Contractor will input additional detail relevant to the Construction Contractor or sub-contractor scope of work, including traffic and waste management controls and procedures (wash-down requirements, access and route plans, laydown areas, segregation of waste, etc.).

The Construction Contractor is responsible for delivering the site induction to all site personnel upon mobilisation, prior to construction works commencing. All new personnel throughout the duration of the construction work are to be provided the site induction by the Construction Contractor. Records of attendees are to be kept per Section 8.1.

8.2.3 Daily prestart talks

The Construction Contractor and sub-contractors will hold prestart talks daily, with records kept in the training and awareness matrix. The purpose of the daily prestart talk is to outline the environmental hazards relevant to the daily construction-related activities, control measures and responsibilities for the works.

Daily prestart talks will include:

- a summary of the daily construction activities, and details on traffic, access, waste, plant and machinery movements or other scope-specific considerations
- the environment, health and safety hazards associated with the activities
- identification of any additional controls required to manage the associated hazards, as necessary
- set expectations for environmental management and communicate these to personnel
- responsibility for the implementation of additional controls, or adaptive management measures
- capture of any lessons learned or improvements from previous activities
- opportunity for construction personnel to ask questions related to the environmental management of the site or activities
- gain an understanding from personnel on unusual events (environment related)
- discuss work area audits and inspections.

Where additional controls, adaptive management measures, or lessons learned are identified and captured during the daily prestart talks, these are to be communicated to the SEO for consideration in any CEMP updates or reviews.

8.2.4 Weekly toolbox talks

The Construction Contractor and sub-contractors will hold toolbox talks on a weekly basis, with records kept in the training and awareness matrix. The purpose of the weekly toolbox talk is to outline the environmental hazards relevant to the daily construction-related activities, control measures and responsibilities for the works. Weekly toolbox talks will:

- convey legislative requirements and consequences of non-compliance
- reinforce roles and responsibilities regarding environmental management
- convey the outcomes of higher-level meetings to ensure all construction personnel are familiar with CEMP environmental requirements
- provide feedback on environmental performance
- communicate previous incidents and corrective actions
- communicate emergency response procedures.

Where additional controls, adaptive management measures, or lessons learned are identified and captured during the weekly toolbox talks, these are to be communicated to the SEO for consideration in any CEMP updates or reviews.

9. Emergency contacts and procedures

Defence maintains an Emergency Response Plan (October 2024) for HMAS Stirling. The Plan has been developed to assist with the coordination of emergency response (including environmental incidents), which must be followed for all emergencies at HMAS Stirling. The Emergency Response Plan is updated annually and published on the Defence intranet. The Emergency Response Plan will be followed by the Construction Contractor and all project personnel in the event of an environmental emergency.

In the event of an emergency, or other unforeseen environmental event within the CEMP boundary, the measures in this CEMP and annexures will be followed, to the extent reasonable under the circumstances.

Basic procedure for an emergency or unforeseen environmental incident is:

– cease work immediately
– ensure safety of all construction personnel
– identify the cause of the emergency or environmental incident, and act immediately to contain if this is possible and appropriate
– notify the ESM and the SEO as soon as practicable and within 4 hours of the incident in accordance with Section 7.1 of the CEMP.

Initial environmental incident response will be undertaken by the Construction Contractor's personnel, if they have been trained and authorised to do so. If this is not possible, or the environmental incident response is beyond their resources, the incident is to be reported immediately to the PMCA, or representative available 24 hours a day, 7 days a week.

The SEO, with the PMCA, is to undertake liaison with the required approved Action personnel and coordinate response to the environmental incident in accordance with this CEMP (refer to Section 7.1). Specific environmental incident response procedures have been detailed within the annexures identified in Table 9.1 below.

Table 9.1 Specific environmental incident procedures

Incident type	Annexure reference
Terrestrial fuel and oil spills	Soil and Water Quality Management Annexure (Annexure Appendix A3)
Fauna presence, death or injury	Flora and Fauna Management Annexure, including the Relocation and Rescue Annexure and Stop Work Procedure – Injured and Dead Fauna (Appendix A1) Maritime Trial Piling Exercise Management Annexure (Annexure A6)
Little penguin behaviour change	Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure Appendix A5)
Noise or vibration exceedance	Noise and Vibration Management Annexure (Annexure Appendix A4)
Marine fauna observation	Maritime Trial Piling Exercise Management Annexure (Annexure A6) Flora and Fauna Management Annexure (Annexure A1)Appendix A, including Stop Work Procedure
Marine fuel and oil spills	Maritime Trial Piling Exercise Management Annexure (Annexure A6) HMAS Stirling Oil Spill Contingency Manual (RAN, 2026).

The Construction Contractor will keep a record of all incidents, including the investigation outcomes and corrective actions taken and implemented.

The SEO will report on environment incidents in relevant reporting activities (refer to Section 7).

Further detail on environmental incident and non-conformance management reporting is provided in Section 7.1.

The emergency contact details required to be provided in the Construction Contractor's CEMP are identified in Table 9.2.

Table 9.2 Emergency contact details required in the Construction Contractor's CEMP

Name	Contact
Director, Fleet Base West Program Management Office (FBW-PMO)	Name, email and phone number
Director, DEPAC	Name, email and phone number
PMCA delegate	Name, email and phone number
SEO	Name, email and phone number
ESM	Name, email and phone number
Subject Matter Experts (SME)	Name, email and phone number
Construction Contractor’s representative/s	Name and phone number
Emergency	08 9553 2222
Fleet Base West Switchboard	08 9553 3333
Fleet Base West Fire Station	08 9553 2528 or 08 9553 2408
Police	000
Rockingham General Hospital	Elanora Drive, Cooloongup, WA

10. Potential environmental impacts and risks

A risk assessment was undertaken during the EHA development, regarding potential environmental risks posed by activities associated with SRF-West Priority Works. The risk assessment process is described in the EHA at Section 5 and outcomes are described in detail in Appendix K.

10.1 Threats to matters protected under the EPBC Act

The key environmental values for the Action area were identified through desktop reviews and technical studies undertaken for the EHA and have been summarised below.

The EPBC Act covers nine Matters of National Environmental Significance (MNES):

– world heritage areas
– national heritage places
– wetlands of international importance (listed under the Ramsar Convention)
– listed threatened species and ecological communities
– listed migratory species (protected under international agreements)
– Commonwealth marine areas
– the Great Barrier Reef Marine Park
– nuclear actions (including uranium mines)
– water resources (that relate to unconventional gas development and large coal mining development).

Based on desktop review and technical studies undertaken for the EHA, the MNES identified for the Action area include:

– known or potential habitat for threatened fauna species listed under the EPBC Act as discussed in Section 4.3.5 of the EHA
– known or potential habitat for listed migratory birds listed under the EPBC Act as discussed in Section 4.3.6 of the EHA.

The EPBC Act also protects the whole of environment when approved actions are taken on Commonwealth land, or impact upon Commonwealth land, or are undertaken by an Australian Government agency. Additional important environmental and heritage values that were identified for the Action area include:

– seagrass communities providing critical ecosystem functions and services including the provision of habitat for important fisheries species
– the little penguin (*Eudyptula minor*) is known to occur on Garden Island/*Meeandip*, with a permanent colony nesting on Garden Island/*Meeandip* representing the northern and western-most extent of the species range. Despite not being listed as threatened in the EPBC Act, the species represents iconic social, cultural and economic value to the community
– intangible Indigenous heritage values related to Garden Island/*Meeandip* including:
    - Garden Island/*Meeandip* is part of the Crocodile and Waugal Dreaming and is the metamorphosed part of the Crocodile's tail, with nearby Rottnest Island forming the other part
    - Garden Island/*Meeandip* is part of a Dolphin Dreaming
    - Garden Island/*Meeandip* is a Winnaitch (forbidden) place associated with the passage of the dead – a stop on the way to the land of the dead, *Kooranup*.
– Garden Island/*Meeandip* is listed on the Commonwealth Heritage List (ID 105274) and the non-statutory Register of the National Estate (ID 19544) for its parabolic sand dunes with well-preserved vegetation, and unique natural heritage values associated with its physical separation from the mainland, including:
    - providing refuge for native species from predation from exotic species

- isolation of animal populations for thousands of years
- limited disturbance from fire resulting in a unique vegetation structure and composition, as well as greater age and density compared to the mainland.

The EPBC Act approval 2024/10031 identified Commonwealth Actions (section 28) as the controlling provision under the EPBC Act for the approved Action, with particular consideration of the following:

– animals (Perth slider, Indian bottlenose dolphins, little penguins)
– natural heritage
– people and communities.

10.2 Threats, potential impacts and environmental risk assessment

Table 5.1 within the EHA identifies the activities and potential impacts as a result of the Action to matters protected under the EPBC Act, together with the environmental management approach. The risk assessment methodology in the EHA reflects risk evaluation requirements in the DCCEEW EMP Guidelines (DCCEEW, 2024a).

The risk assessment provided in Table 10.1 identifies the aspects and potential consequences associated with construction activities for the Action and the environmental management measures to minimise or mitigate the consequences. An inherent risk rating, and a residual risk rating, after application of the environmental management measures, were assigned.

The risk assessment is based on that provided in the EHA. Risks relevant to activities outlined in Section 3 that were rated medium or above are provided in Table 10.1. This includes where the environmental management measures have been specified.

Further details on how the potential environmental impacts of the Action will be managed have been provided in Section 6 of the EHA.

Additional aspect specific risk assessments (e.g. contamination risk assessments, dust risk assessment) have been undertaken where required to identify management controls and are summarised in the relevant annexure.

Table 10.1 Environmental risk assessment for activities covered by this CEMP within the approved Action area

Aspect	Associated construction activities (threat)	Consequences	Risk rating	Where environmental management measures are identified	Residual risk rating
Onshore wildlife disturbance and displacement	Land clearing and site preparation. Machinery and plant noise. Personnel movements.	Disturbance, injury or death of wildlife.	High	Flora and Fauna Management Annexure (Annexure A1) Construction Contractor's CEMP	Medium
Impact to nesting little penguins	Earthworks and other construction activities.	Direct impact to nesting little penguins, secondary disturbance.	High	Flora and Fauna Management Annexure (Annexure A1) Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) Construction Contractor's CEMP	Medium
Terrestrial noise and vibration	Equipment and engine noise.	Hearing damage or disturbance of terrestrial and marine fauna.	High	Noise and Vibration Management Annexure (Annexure A4) Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) Construction Contractor's CEMP	Medium
Dust generation	Ground disturbance activities including vegetation clearance, soil remediation, earthworks, excavations.	Inhalation or ingestion by terrestrial fauna, human health, light attenuation affecting photosynthesis of terrestrial flora.	High	Soil and Water Quality Management Annexure (Annexure A3) Flora and Fauna Management Annexure (Annexure 1) Construction Contractor's CEMP	Medium
Light Pollution	Temporary construction lighting (night security lighting, or night	Disturbance to terrestrial and marine fauna.	High	Construction Contractor's CEMP	Medium

Aspect	Associated construction activities (threat)	Consequences	Risk rating	Where environmental management measures are identified	Residual risk rating
	construction works).				
Vehicle movements	Construction equipment and personal movements by vehicle.	Injury to terrestrial fauna from vehicle collision. Resident inconvenience, causing reputation impacts on Defence and Construction Contractors.	High	Construction Contractor's CEMP	Medium
Sedimentation	Surface water runoff from adjacent land works.	Light attenuation affecting photosynthesis, smothering of sessile organisms, reduced water quality affecting marine fauna behaviours (little penguin).	Medium	Soil and Water Quality Management Annexure (Annexure A3) Construction Contractor's CEMP including a site drainage plan	Low
Oil pollution	Fuel spills from vehicles, hydraulic oil spill from earthmoving equipment.	Injury to diving birds and marine animals, ingestion hazard.	High	Soil and Water Quality Management Annexure (Annexure A3) Maritime Trial Piling Exercise Management Annexure (Annexure A6) Construction Contractor's CEMP	Medium
Mobilisation of existing contaminants	Runoff from earthworks.	Ingestion and injury to marine animals, spread of contaminants across Cockburn Sound/*Derbal Nara*, reduced water quality.	Medium	Soil and Water Quality Management Annexure (Annexure A3) Construction Contractor's CEMP	Low
Pest establishment	Earthworks and general construction work. Maritime trial piling exercise	Establishment of new or spread of existing weeds, pests and/or diseases, causing displacement/loss of native species.	Medium	Flora and Fauna Management Annexure (Annexure A1) Maritime Trial Piling Exercise Management Annexure (Annexure A6) Construction Contractor's CEMP	Low
Heritage	Earthworks and general construction work.	Damage to or loss of cultural heritage items.	Medium	Heritage Management Annexure (Annexure A1)	Low

Aspect	Associated construction activities (threat)	Consequences	Risk rating	Where environmental management measures are identified	Residual risk rating
Mobilisation of contaminants to groundwater, impacting groundwater quality	Excavations > 3 mbgl (low risk CMC installation)[1].	Migration of contaminants to shallow groundwater, indirectly impacting groundwater quality (noting baseline groundwater quality has detectable contaminants).	Low	Soil and Water Quality Management Annexure (Annexure A3)	Low
Change to groundwater levels or flows	Dewatering excavations > 3 mbgl (low risk CMC installation)[3].	Direct impact of dewatering on: – groundwater levels – groundwater quality.	Low	Soil and Water Quality Management Annexure (Annexure A3)	Low

[1] Low inherent risk based on groundwater risk assessment undertaken by GHD for CMC installation works (refer to Soil and Water Management Annexure)

11. Environmental management measures

EPBC Act approval 2024/10031 and the environmental risk assessment summarised in Section 10, requires the inclusion of specific environmental management measures and the preparation and implementation of environmental management annexures to manage construction risks within the Action area, as detailed in Section 3.

Additionally, the technical studies and EHA identified a number of specific management controls and monitoring requirements to be adopted within these environmental management annexures. The environmental management annexures identified in the EPBC Act approval 2024/10031, or the technical studies and assessments that supported the EPBC Act referral, have been identified in the conditions of approval table in Appendix B, Table B.1.

11.1 Environmental management activities, controls and performance targets

The environmental management annexures that include specific management measures and monitoring requirements relevant for this CEMP together with aspects covered by each annexure are outlined in Table 11.1 and attached in Appendix A. This section must be read in conjunction with Section 3 of this CEMP. The environmental management annexures will be implemented by the SEO and outlined within the Construction Contractor's CEMP.

The environmental management annexures have been developed to avoid, minimise and manage key environmental risks from potential impacts on protected matters.

Table 11.1 Environmental management annexures required for this CEMP

Annexure number	Environmental management annexure	Environmental aspects managed
A1	Flora and Fauna Management Annexure	– Biosecurity – Flora and fauna management, including relocation and rescue – Osprey – Tammar wallaby – Little penguin.
A2	Heritage Management Annexure	– Traditional Owner engagement – Heritage.
A3	Soil and Water Quality Management Annexure	– Terrestrial water quality – Air quality – Dust and contamination – Fuel and oil spills.
A4	Noise and Vibration Management Annexure	– Noise and vibration.
A1 and A5	Little Penguin Monitoring and Management Plan (RPS, 2026)	– Little penguin.
A6	Maritime Trial Piling Exercise Management Annexure	– Marine impacts from the maritime trial piling exercise.

The Construction Contractor's CEMP will also include management of traffic and access, waste, construction lighting, and out of hours work that will meet the conditions of EPBC Act approval 2024/20031. The requirements for these aspects are outlined in Section 11.1.1.

As required by Condition 8aa of the EPBC Act approval 2024/10031, the CEMP must include a commitment that the schedule and timing of construction activities will be planned in consultation with a seabird ecologist to avoid and minimise harm to little penguins, including but not limited to cumulative impacts. This requirement must be implemented for all revisions of this CEMP and must be considered at all stages of construction.

As required by Condition 21 of the EPBC Act approval 2024/10031, the Garden Island Fox and Cat Management Plan (GHD, 2026a) has been prepared within 6 months of commencing the Action and will be published separate to this CEMP.

In accordance with Condition 18 of the EPBC Act approval 2024/10031, the existing Port Services HMAS Stirling Oil Spill Contingency Manual has been revised prior to commencement of the Action and will be published separate to this CEMP.

Noting the project description for this CEMP in Section 3, there are a number of environmental aspects not requiring an environmental management annexure for this phase of the Action. These are outlined in Section 3.5 and will be incorporated into updated revisions of the CEMP.

Each environmental management annexure includes, at a minimum, the following content:

– Environmental objectives of the management annexure.
– Reference documents (including any applicable conditions of approval, guidance documents or associated reports) for accessibility on site.
– Specific items for inclusion in the site induction, and/or formal training requirements.
– Responsibilities for the implementation of environmental controls, monitoring environmental performance, and any specialist activities.
– Performance criteria for environmental performance management.
– Management controls to be planned and implemented by the Construction Contractor and sub-contractors.
– Monitoring program requirements, including frequency, duration, locations and data management.
– Adaptive management measures (including non-conformance requirements) that may trigger additional controls or corrective actions, and record keeping.
– Reporting and documentation requirements (frequency and format).
– Continual improvement and review.

Construction Contractor and sub-contractor CEMPs will be reviewed and approved by the SEO, Base Management and the ESM prior to any commencement of works.

11.1.1 Construction Contractor environmental site controls

As outlined in the scope of this CEMP (Section 1.4) the Construction Contractor will also develop a Construction Contractor CEMP to document the procedures and approach to management controls the Construction Contractor is responsible for implementing under their scope. The Construction Contractor CEMP will be prepared in accordance with this CEMP as a minimum and will be submitted to the PMCA and SEO for review and approval prior to mobilisation to site.

The Construction Contractor will not be permitted to mobilise to site until the CEMP and all associated environmental procedures, plans and/or environmental documentation are accepted by the PMCA and SEO. The Construction Contractor will be required to amend their CEMP at the direction of the PMCA and SEO if and when required, including but not limited after each new version is published, for the duration of their scope of works as outlined in Section 1.4.

The Construction Contractor’s CEMP will also incorporate the above along with their own Environmental Policy and show a commitment to continual improvement, prevention of pollution and comply with all relevant environmental legislation and regulations and other approved Action requirements to which the Construction Contractor will need to abide by.

Sections 11.1.1.1 and 11.1.1.2 outline specific requirements related to conditions for EPBC Act approval 2024/10031 for traffic and access, waste management and construction lighting management, that must be included in the Construction Contractor's CEMP.

11.1.1.1 Traffic and access

A traffic management plan (or section within the Contractor CEMP) for the site will be prepared by the Construction Contractor, for review and approval by the PMCA, SEO, and base management.

Traffic management controls are required to minimise disruption to the surrounding area, community, and reduce incident likelihood on site. The controls that will be in place include:

– base entry requirements
– designated traffic routes, including for oversized loads, and timing through residential areas
– strategies to encourage car share opportunities for construction/operational workforce commuting to Garden Island/*Meeandip*
– specifying that night-time driving must be avoided where possible and the requirements for night-time driving and interaction with fauna, if it is necessary
– demarcation of vehicle zones, including designated site parking, on site plan/s
– speed limits onsite, in line with base and CEMP requirements, and actions to enforce the speed limits, including traffic controls
– measures to check and record vehicle and transporter licences
– measures to check and record site security fencing integrity and condition
– traffic incident and unauthorised access response processes.

The implementation of these controls will be monitored by the Construction Contractor and SEO, according to the monitoring and audit requirements of the CEMP. Any corrective action following incidents, adaptive management measures, or continuous improvements relevant to traffic and access management will be recorded and implemented through the processes outlined in Section 11.4.1, Section 12.1, and Section 12.3.2, by the Construction Contractor and SEO.

11.1.1.2 Waste

A waste management plan (or section within the Construction Contractor CEMP) for the site will be prepared by the Construction Contractor, for review and approval by the PMCA, SEO, and Base management. Waste management controls are required to facilitate appropriate segregation and containment of waste streams, meet jurisdictional disposal requirements, and reduce incident likelihood on site. The controls that will be in place include:

– strategies to prevent, minimise, reuse, recover or manage waste generated by the Action
– locations of lidded general waste and recycling bins and skips on site
– putrescible waste management to avoid attracting feral fauna (i.e. foxes)
– responsibility for contacting the nominated disposal or management facility to confirm acceptance of the waste spoil and any specific requirements prior to transport of spoil material
– management measures to segregate, categorise, transport and dispose of waste in accordance with the Environmental Protection (Controlled Waste) Regulations 2004, including, but not limited to:
    - chemical and fuel containers
    - oily rags
    - contaminated soil (refer to the Soil and Water Quality Management Annexure (Appendix A3)
– site inspection requirements for waste practices to monitor controls and/or identify adaptive management measures.

The implementation of these controls will be monitored by the Construction Contractor and SEO, according to the monitoring and audit requirements of the CEMP. Any corrective action following incidents, adaptive management measures, or continuous improvements relevant to waste management will be recorded and

implemented through the processes outlined in Section 11.4.1, Section 12.1, and Section 12.3.2, by the Construction Contractor and SEO.

11.1.1.3 Construction lighting

A construction lighting management plan will be prepared by the Construction Contractor, for review and approval by the PMCA, SEO, and Base management. Although night works are not foreseen as a standard practice, short-term night work may be implemented in accordance with the requirements set out in Section 11.1.1.5. Light management controls are required when artificial lighting (provided via mobile light towers) is used during night works, in low natural light environment, and/or for night security lighting, to minimise disruption to penguin nesting sites and potential impacts to native fauna. The controls that will be in place include the following:

– Specifying normal daytime working hours wherever possible including adherence to procedure for approval of any out-of-hours work outlined in Section 11.1.1.5 and Appendix G of the CEMP.
– Siting and positioning of all construction lighting to focus on the works area and to avoid or minimise light shed onto the nesting avoidance area, rafting avoidance area, little penguin arrival area and the seagrass avoidance area.
– Measures to minimise illumination extent and intensity of construction lighting (e.g. utilise warmer colour temperature luminaires <3000K), red or sodium (yellow orange) lighting used preferentially and keep light levels as low as practical for safe operation, with task-specific illumination) installation of temporary screening where light from construction vehicles or other construction lighting is likely to spill onto. Screening must prevent or minimise light spill, allow adequate penguin access, restrict little penguins from accessing construction areas and prevent little penguins from going further inland.
– Lighting control, such as motion sensors and timers to modulate both the intensity and colour temperature, at different times of the day, different operational requirements and/or on presence operation types to ensure illumination is only “what is required when it is required”.
– All fixtures will be full cut-off luminaries, with downward light distribution only. Design will reference the Luminaire Classification System for Outdoor Luminaires ANSI/IES TM-15. Illuminating Engineering Society (IES, 2020) for backlight, uplight and glare (BUG) ratings, selecting products with ‘U0’ rating - no uplight and minimal glare.
– Design of lighting in accordance with best practice lighting design principles (Appendix A of the National Light Pollution Guidelines for Wildlife (DBCA and DCCEEW, 2023):
    - Start with natural darkness and only add light for specific purposes.
    - Use adaptive light controls to manage light timing, intensity and colour.
    - Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill (facing away from the rock wall and avoid light spill on waters within 100 m of the low tide edge of the rock wall).
    - Use the lowest intensity lighting appropriate for the task.
    - Use non-reflective, dark-coloured surfaces.
    - Use long-wavelength lights (yellow/orange) or use filters to reduce blue, violet, and ultra-violet wavelengths.
– Undertake daily monitoring of external construction lighting throughout construction activities.

11.1.1.4 Surface water

A construction water quality management plan (or section within the Construction Contractor CEMP) for the site will be prepared by the Construction Contractor, for review and approval by the PMCA, SEO, and Base management. Surface water management controls are required to minimise impacts on the marine environment from surface water runoff. The controls that will be in place include:

– Measures to minimise erosion and mobilisation of sediments in runoff from the landside area

- Measures to minimise turbidity/sedimentation in the marine environment from runoff (such as use of silt fences and/or absorbent socks or hay bales to be placed around stormwater drains adjacent to the site, and sediment curtains at ocean outfalls or potential overland flow discharge locations)
- Measures to minimise the entry of any surface water from hydraulically up-gradient off-site areas by diverting this via drains around the site
- Measures for surface water containment within the CEMP boundary including temporary holding structures such as storm traps/ infiltration basins (for activities expected to generate excess surface water)
- Measures to maintain hardstand surfaces and Ethylene Propylene Diene Monomer liners to avoid contamination of surface water run-off from contaminated soils
- Measures to divert all surface water generated on the site away from any areas of soil disturbance to limit any works-generated contamination entering the runoff
- Measures to avoid excess construction-related water use.

11.1.1.5 Out-of-hours work permit

Working hours for the project are defined in Section 3.4.2.

Condition 8 (I) of the EPBC Act approval sets out the considerations applicable if construction is necessary outside the approved construction hours. This condition requires that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will:

i) only occur under exceptional circumstances and be minimised,

ii) be particularly avoided or minimised during the little penguin arrival period and little penguin departure period,

iii) not exceed the relevant noise threshold levels and vibration threshold levels specified in condition 8i, and

iv) only involve the use of the quietest available equipment that is capable of doing the task.

To facilitate the approval of construction works being undertaken outside of the construction working hours for the approved Action as in Section 3.4.2., the following out-of-hours work permit process will be followed.

Prior to commencement of any construction outside the approved working hours, the Construction Contractor must prepare an application for an out-of-hours work permit form (refer to Appendix G) for review and approval by the PMCA, SEO, and Base management. If construction lighting is proposed, an approved lighting management plan relating to the works must accompany the out-of-hours work permit form.

The out-of-hours permit form and accompanying supporting documentation will be submitted to the SEO at least 3 business days prior to the proposed works. The SEO will review and respond within 2 business days.

Construction outside of approved working hours must not occur unless an out-of-hours work permit has been issued by the SEO. The process for the out-of-hours work permit application, including the out-of-hours work permit form template included in Appendix G will be included in the Construction Contractor's CEMP.

11.2 Communication

Ongoing communication will occur during activities to ensure effective implementation of the CEMP. As a minimum, communication of environmental issues on the approved Action within the project team and between the Construction Contractor and its sub-contractors will include:

- site induction material
- daily prestart meetings
- weekly toolbox meetings
- progress meetings
- post-shift debrief meetings

– posting of meeting minutes, results of monitoring, performance standards, incident alerts and Defence notices on noticeboards in crib rooms and offices.

As a minimum, communication of environmental issues on the approved Action between construction personnel will include:

– environment and heritage progress meetings
– management/contract meetings.

All relevant environmental and heritage information will be discussed. Records of communication topics, personnel in attendance and presenters will be maintained on site for auditing purposes. The project team will discuss environmental issues, and the Construction Contractor will provide environment-related information as and when requested, at any progress meetings, contract meetings or any other meetings with the SEO, PMCA, DEPAC, or FBW-PMO.

11.2.1 Internal communications

Internal communication will include, as a minimum, the requirements as outlined in Table 11.2 below. Notice records and minutes of meetings will be displayed on notice boards and distributed to attendees and affected parties by internal email. Records of all environmental related communications will be maintained on site in a readily available, auditable file and made available to the SEO, PMCA, DEPAC or FBW-PMO upon request.

The SEO, PMCA, DEPAC and FBW-PMO will be forwarded invites to attend the following internal communication types as required, as outlined below in Table 11.2.

Defence and the PMCA will also be provided with a forward-looking monthly communication/meeting schedule as part of the Construction Contractor's monthly environmental reporting requirements.

Table 11.2 Project communication requirements

Communication Type	Responsibility	Frequency	Example Environmental Content
Construction Contractor and their sub-contractors site inductions	Construction Contractor and Construction Contractor's sub-contractors	Prior to starting work and refreshers as required	Information to be utilised from the Construction Contractor's Project and environmental awareness induction materials.
Construction Contractor and Construction Contractor's sub-contractor's weekly toolbox meetings	Construction Contractor and Construction Contractor's sub-contractors	Weekly	Convey legislative requirements and consequences of non-compliance. Reinforce roles and responsibilities with regard to environmental management. Convey the outcomes of higher-level meetings to ensure all construction personnel are familiar with CEMP environmental requirements. Provide feedback on environmental performance. Communicate previous incidents and corrective actions. Communicate recent events and relevant outcomes / lessons learned. Communicate emergency response procedures.
Construction Contractor and Construction Contractor's sub-	Construction Contractor and Construction Contractor's sub-contractors	Daily or if conditions change during the day (i.e. new work front or activity)	Identify risks to the environment from the day's scheduled activities.

Communication Type	Responsibility	Frequency	Example Environmental Content
contractors' daily prestart meetings			Set expectations for environmental management and communicate these to personnel. Delegate task-specific environmental management actions to appropriate personnel. Communicate previous incidents and corrective actions. Communicate recent events and relevant outcomes / lessons learned. Gain an understanding from personnel on unusual events (environment related). Discuss work area audits and inspections.
Construction Contractor and Construction Contractor's sub-contractors Work Method Statements and Job Safety Hazard Analysis	Construction Contractor and Construction Contractor's sub-contractors	Task specific (as required)	Undertake environmental risk assessment. Describe task-specific environmental hazards. Define task-specific environmental management actions. Identify training/qualification/experience requirements. Identify relevant legislation and standards. Identify plant/equipment requirements. Define checks, site/workplace inspections.
Construction Contractor and Construction Contractor's sub-contractors post-shift debrief meeting	Construction Contractor and Construction Contractor's sub-contractors	Daily	Define checks, site/workplace inspections. Communicate previous incidents and corrective actions and capture of reporting. Communicate recent events and relevant outcomes / lessons learned. Provide feedback on previous shifts environmental concerns raised (if any). Gain an understanding from personnel on unusual events (environment related) for the next work crew.

Where appropriate, additional internal communication regarding environmental matters will occur in the form of written correspondence, contract instructions and variation orders in accordance with the conditions of contract.

11.2.2 External communications

No project personnel, including the Construction Contractor's site personnel, will directly engage with DCCEEW, WA State government authorities or any other member outside of the approved Action unless expressly directed to do so by the PMCA. Unless otherwise agreed, all construction personnel will notify and

obtain approval from the PMCA prior to any communication with external agencies. This includes all communication with external agencies for project-specific purposes such as obtaining approvals.

Defence personnel are responsible for all liaison with external agencies, including the external reporting requirements of this CEMP outlined in Table 7.1.

Other than the communication approved by the PMCA, all construction personnel will not communicate with any external stakeholders (i.e. including media, community and government agencies) in relation to the approved Action.

The PMCA and SEO will keep a written record of all contact with members of the project team, public agency or authority representatives and members of the community and direct their enquiries to Defence personnel where required.

11.2.3 Project engagement

With well-established relationships with key stakeholders, Defence is committed to maintaining open and transparent communication throughout the duration of the approved Action. Regular updates will be provided as the approved Action progresses. Engagement with Traditional Owners will be an ongoing priority, conducted in close partnership with the HMAS Stirling Indigenous Liaison team.

In addition to direct communications, updates about the approved Action's progress will be made via the **Project website**, including the publication of environmental reports and relevant documentation.

Enquiries about the project can be made via the project email address **srf-west.infrastructureproject@defence.gov.au**.

11.3 Environmental management maps and diagrams

To support the implementation of the CEMP, the Construction Contractor will prepare additional detailed site layout and access plan/s that include, at a minimum:

- construction area covered by the Construction Contractor CEMP
- boundaries for avoidance areas and no-go zones
- entry and exit points and vehicle/machinery routes
- location of bunded areas for chemical storage/refuelling and emergency spill kits
- location of waste disposal areas, including lidded general waste and recycling bins and skips
- laydown and stockpile areas
- temporary structures (i.e. fencing and signage) and lighting.

The SEO will prepare additional maps and figures, as required, in implementing the requirements of the environmental management annexures.

These plans, maps and figures will be included in the Construction Contractor or sub-contractors CEMP and reviewed by SEO and PMCA.

11.4 Environmental monitoring

The EPBC Act approval 2024/10031 and the environmental management annexures include specific environmental monitoring requirements to be implemented and undertaken during construction as per the approved Action description outlined in Section 3. Table 11.3 outlines the required environmental monitoring programs for this phase of works, and the ultimate responsibility for directing or undertaking the activity.

Further details are provided in the relevant environmental management annexures, including the monitoring methods, and where review or 'stop work' is to occur based on monitoring data, triggering corrective action.

For all environmental monitoring:

- suitably qualified and experienced professionals or trained staff will be used as outlined within the environmental management annexures
- only calibrated or verified monitoring and measurement equipment will be used and maintained. Records to be reviewed and maintained by the SEO
- calibration records will be kept available for auditing purposes by the SEO and the Construction Contractor
- monitoring data, surveys, maps, and other spatial and metadata required under the conditions of EPBC Act approval 2024/10031 will be prepared in accordance with the Guidelines for biological survey and mapped data (DCCEEW, 2018) and Guide to providing maps and boundary data for EPBC Act projects (DAWE, 2021) or as otherwise specified by the Minister in writing
- monitoring reports and records will be stored and kept in accordance with Section 12.2 and be made available when requested for management review and audits in accordance with Section 12.

Table 11.3 Environmental management annexures - monitoring programs for this CEMP

Monitoring program	Frequency and duration	Responsibility	Reference
General inspections			
Construction Contractor CEMP site inspections	As specified in environmental management annexures for the duration of construction.	Construction Contractor	All environmental management annexures
Construction Contractor CEMP compliance audits	As specified in environmental management annexures for the duration of construction.	SEO	All environmental management annexures
Flora and Fauna			
Terrestrial Pre-clearing fauna surveys	Within 2 weeks of prior to and immediately prior to the commencement of vegetation clearance for Tammar wallaby and Perth Slider	Suitably qualified field ecologist (field ecologist)	Flora and Fauna Management Annexure (Appendix A1)
Marine pre-clearing fauna surveys	Immediately prior to the maritime trial piling exercise for Syngnathids.	Suitably qualified marine field ecologist (Marine ecologist)	Maritime Trial Piling Exercise Management Annexure (Appendix A6)
Terrestrial flora and fauna monitoring during clearing and construction	Visual inspection daily. Georeferenced spatial data indicating the actual extent of clearing undertaken to be recorded every 2 weeks during vegetation clearance, and within 2 weeks of the completion of the clearing within the Action area or prior to the end of the financial year (whichever is sooner).	SEO/Construction Contractor	Flora and Fauna Management Annexure (Appendix A1)
Little penguin monitoring program – behaviours and nests	Fortnightly From construction works commencement	SEO	Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)

Monitoring program	Frequency and duration	Responsibility	Reference
	to 6 years following completion of construction		
Tammar wallaby monitoring plan	Annually until 2027. The Tammar wallaby monitoring plan is updated every 5 years to reassess methodologies (next update due 2027). From 2027, the updated Tammar wallaby monitoring plan is to be implemented.	SEO	Flora and Fauna Management Annexure (Appendix A1)
Marine fauna monitoring – maritime trial piling exercise	30 minutes before commencement of piling and throughout piling operations.	MFO	Maritime Trial Piling Exercise Management Annexure (Appendix A6)
Noise and Vibration			
Noise and vibration monitoring program	Ongoing, continuous from early works construction through to completion of construction works.	SEO	Noise and Vibration Management Annexure (Appendix A4)
Dust			
Directional dust deposition gauge monitoring	Monthly from early works construction through to completion of construction works.	SEO	Soil and Water Quality Management Annexure (Appendix A3)
Continuous total suspended particulates monitoring	Continuous (15 minute) from early works construction through to completion of construction works.	SEO	Soil and Water Quality Management Annexure (Appendix A3)
Water Quality			
Surface water quality monitoring	Ongoing, as required from early works construction through to completion of construction	SEO	Soil and Water Quality Management Annexure (Appendix A3)
Groundwater monitoring	One single post-construction groundwater investigation by qualified contaminated land personnel (if spill occurred during the construction period).	SEO/Construction Contractor	Soil and Water Quality Management Annexure (Appendix A3)

11.4.1 Adaptive management measures

The aim of adaptive management measures for the approved Action is to facilitate continuous learning and improvement in environmental management at the site. Activity observations, changes in policy, hazard identification, new technology or methodologies, and near miss incidents, and environmental events are examples of when a review of approach and/or an adaptive management measure may be triggered.

Specific adaptive management measures have been identified in each of the environmental management annexures.

To manage a hazard, change, incident or near miss triggering adaptive management, and to reduce the likelihood of re-occurrence, additional measures and corrective approaches are developed. The adaptive management measures will commonly involve:

– amendments to controls or application of new controls for specific activities
– additional personnel training
– revised environmental protection equipment
– changes to construction methods or timing.

A corrective action may be identified and implemented due to a trigger through incident, near miss, audit outcomes, or a stop-work procedure. The action is implemented to reduce impact and likelihood for re-occurrence. To achieve this, corrective actions are to be documented as an additional measure to the existing management controls, to further manage the likelihood of the hazard. Any corrective action will be recorded and communicated by the SEO to the Construction Contractor for communication to other relevant construction personnel.

Capturing lessons learned through modified procedures (where required) is a key requirement for satisfactory environmental performance. The adaptive management approach facilitates this.

Reporting of non-conformances and environmental incidents is through ongoing activity monitoring (Section 11.4), audits (Section 12) and environmental incident reporting mechanisms (Section 7.1).

12. Audit and review

12.1 Environmental checks and auditing

12.1.1 SEO environmental checks and audits

A key function of the SEO will be to undertake CEMP compliance checks and audits of the approved Action and the Construction Contractor. The SEO's environmental compliance checks and audit program will be developed prior to commencing construction and regularly updated in order to plan and track the Construction Contractors' activities during their various of works. Findings from SEO compliance checks and audits will be provided to the Construction Contractor within one week of the SEO checks or audit date. The SEO will instruct the Construction Contractor to implement and report on the implementation of any corrective actions or adaptive management measures required as a result of the SEO compliance checks or the audit findings.

Records of the SEO checks and audits will be retained in accordance with record keeping requirements outlined in Section 12.2 and a summary provided in regular management reviews (Section 12.3.1).

12.1.1.1 SEO environmental checks

The SEO environmental compliance checks program will provide for regular checking of the Construction Contactor's compliance with the CEMP, to facilitate ongoing oversight between the formal audit activities occurring. The following compliance checks will be included as a minimum:

– Construction Contractor CEMP compliance checks commencing weekly (at a minimum) in order to check Construction Contractor CEMP compliance.
– The Construction Contractor CEMP compliance checks will assess the effectiveness and entrenchment of all environmental management components of the Construction Contractor CEMP and/or their sub-contractor/s EMP (if required), compliance with its requirements and its effectiveness in managing environmental performance, compliance and continual improvement.
– These checks may also focus on specific environmental management activities such as topsoil management etc. The scope and frequency of these checks will vary based on Construction Contractor compliance and the nature and potential environmental impact of the construction activities underway

12.1.1.2 SEO environmental audits

The SEO will develop audit protocols for the performance of the post-mobilisation audit, 6-monthly Construction Contractor CEMP compliance audit and the demobilisation audit. The protocols will be based directly on the requirements of this CEMP, the EPBC Act approval 2024/10031 and the environmental management annexures and will respectively assess the following:

– Post-mobilisation audits – The focus is on the readiness of the Construction Contractor and/or their sub-contractor/s environmental management components, infrastructure and staff to perform work in a manner that complies with this CEMP and will include the approval and finalisation of the Construction Contractor's CEMP. A post-mobilisation audit will be completed within one month of the date agreed for the finalisation of the Construction Contractor mobilisation.
– 6-monthly Construction Contractor CEMP compliance audits – Like the regular CEMP compliance checks these audits assess the effectiveness and entrenchment of all environmental management components of the Construction Contractor CEMP and/or their sub-contractor/s EMP (if required), compliance with its requirements and its effectiveness in managing environmental performance, compliance and continual improvement. These audits will be structured to inform the 6-monthly CEMP implementation report and ACR reporting requirements to DCCEEW.
– Demobilisation audits – The focus is on verifying that the Construction Contractor and/or their sub-contractor/s environmental management protocols, legal and other requirements, including those relating to the decommissioning of temporary infrastructure and the rehabilitation/remediation of

disturbed areas, have been complied with and that appropriate, accurate records have been provided to allow the SEO to approve the Construction Contractor and their sub-contractors to demobilise. A demobilisation audit on the planned last day of demobilisation (demobilisation pre-audits may be arranged between the SEO and the Construction Contractor before and during demobilisation to assist the Construction Contractor to meet its demobilisation date).

The Construction Contractor's environmental representative will accompany the SEO during audits along with their sub-contractor/s. The Construction Contractor is to allow a minimum of one day to assist the SEO in undertaking any of the audits outlined above when they are undertaken and providing the required information within one week of it being requested by the SEO. The SEO environmental audit schedule will be developed to be used during the approved Action and be made available to the Construction Contractor.

Audit protocols will be in the form of audit tables that include columns for:

– the commitment or condition
– a reference to the source document
– the auditor's assessment (compliant, non-compliant and not applicable)
– a detailed description of the finding
– details of audit activities performed to arrive at the finding (i.e. list of documents and records reviewed, names of interviewees, descriptions of physical observations)
– references to evidence (document numbers, photographs and record numbers)
– recommendations and opportunities for improvement.

12.1.2 Construction Contractor environmental inspections and audits

The Construction Contractor will develop a similar environmental audit and inspection schedule to mirror the audits and inspections outlined above in Section 12.1 and the schedule is to be submitted to the SEO for review and approval within the Construction Contractor CEMP to integrate this into the SEOs environmental audit schedule. The Construction Contractor environmental audit schedule will be maintained by the Construction Contractor for the life of the approved Action.

Any audit and inspection findings from Construction Contractor and/or their Sub-contractor/s environmental audits will be provided to the SEO within 24 hours of the audit occurring. For scheduled audits the Construction Contractor will ensure that an approved copy of the relevant audit protocol is provided to the sub-contractor's environmental representative at least one week in advance.

The Construction Contractor and their sub-contractors will ensure that they conduct internal environmental compliance audits as approved by the SEO within the Construction Contractor's CEMP.

12.1.3 Independent audits

Conditions 52-60 of the EPBC Act approval 2024/10031 require that independent audits are undertaken each subsequent 3-year period following the commencement of the Action until the expiry date of the EPBC Act approval 2024/10031 (or as otherwise directed by the Minister).

DEPAC are responsible for engaging an independent auditor to undertake this audit every 3 years or as directed by the Minister, in accordance with Conditions 52-60 of EPBC Act approval 2024/10031 including reporting and notification requirements outlined in Table 7.112.

The independent audit will be:

– consistent with the Independent Audit and Audit Report Guidelines for controlled actions which have been approved under Chapter 4 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia, 2019) ('Independent Audit and Audit Report Guidelines')
– completed to the satisfaction of the Minister and consistent with the Independent Audit and Audit Report Guidelines to the extent that the Independent Audit and Audit Report Guidelines are consistent with the conditions of EPBC Act approval 2024/10031

– of a sufficient scope to determine the compliance status for each condition of approval, and each commitment made in each environmental management annexure required by EPBC Act approval 2024/10031.

Compliance records may be subject to audit by DCCEEW or by an independent auditor in accordance with Section 458 of the EPBC Act and/or be used to verify compliance with the conditions. Summaries of the results of an audit may be published on the DCCEEW's website or through the general media.

12.2 Control of documented information

All environmental management documents and records required by this CEMP will be managed so that they can be identified, stored, protected, retrieved, retained and disposed appropriately.

If DCCEEW makes a request in writing, DEPAC will provide electronic copies of compliance records to DCCEEW within the timeframe specified in the request.

All reports and plans required by EPBC Act approval 2024/10031 will be published on the Defence website and kept on the website from the first date which that report must be published and until the expiry date of the EPBC Act approval 2024/10031, inclusive of all attachments. Plans and reports, relevant for this CEMP, that are required to be published on the website include:

– this CEMP and relevant environmental management annexures required to support or to be included with or within the CEMP by the EPBC Act approval 2024/10031 (refer to Conditions, 6, 8, 9, 11, 12, 13, 18, 19, 21 and 25)
– the ACR, including all attachments, for each reporting period
– independent audit reports for each audit period.

All other environmental management records required by this CEMP will be kept by the SEO on behalf of the approved Action for a period of at least 7 years and be accurate, complete, legible, identifiable, and traceable. This includes:

– relevant approvals, licences and permits
– copies of drawings and plans showing environmental controls
– current site contact list, including emergency contacts
– records of training and induction sessions, including attendance tracking and topics covered
– completed site inspection sheets, signed and dated
– environmental monitoring results, including identification of any exceedances of threshold values
– waste transport certificates
– records of complaints and communications
– records of non-conformances, incidents and emergencies, including corrective and preventative actions taken
– CEMP implementation reports
– records of management review
– documentation of any site inspections, meetings or correspondence from responsible authorities, issues raised, and corrective action taken to address any items of non-conformance
– other documents as may be required to demonstrate compliance with this CEMP or the Construction Contractor's CEMP.

12.3 Review and continuous improvement

12.3.1 CEMP reviews

Once finalised, regular reviews of this CEMP at intervals deemed necessary by the Environment Advisor and/or the SEO will occur. This will include, but not be limited to:

- when there are changes in contractual or project requirements including delivery phase progression
- when there are changes to legislation or approval conditions
- correcting disparities identified during project auditing
- ensuring it is consistent with the commitments within the EPBC Act approval 2024/10031
- being required as a result of significant environmental incidents or non-conformances
- where an improvement is identified through either onsite experience, management reviews, audit findings or a change in industry best practice or standing legislation.

In addition to SEO initiated reviews, regular management reviews of this CEMP will occur, as directed by Defence, and undertaken by the PMCA. These management reviews will evaluate the relevance and effectiveness of the CEMP and associated environmental management annexures.

Any changes required to this CEMP and associated environmental management annexures will be communicated to and approved by DEPAC and the PMCA as the approval authorities for Defence, and all construction personnel with responsibilities associated with the changes.

DEPAC may require re-submission of the CEMP for approval where changes to the project scope occur. Consideration of any potential environmental impact requiring management will be incorporated into the CEMP following consultation with DEPAC.

Updated CEMPs will be published to the SRF-West Infrastructure Project webpage on the Department of Defence website prior to implementation of the relevant works and/or changes to activities occurring, as required by the EPBC Act approval 2024/10031.

12.3.2 Continuous improvement

The process of continuous improvement seeks incremental improvement to environmental performance through ongoing analysis of environmental monitoring, investigation of incidents and detected adverse outcomes. The environmental performance criteria and management controls that are described in the environmental management annexures (refer to Section 11.1) and monitored by the environmental monitoring requirements and inspections described in Section 11.4, are how this information is obtained. The reporting of environmental incidents and the non-conformance corrective actions (Section 7.1) are aimed at achieving continuous improvement during the construction activities proposed for this phase of the Action.

If environmental monitoring determines the controls identified in this CEMP are not effective, as outlined in Section 11.4.1, adaptive management measures may be determined in accordance with the environmental management framework set out within this CEMP and associated environmental management annexures.

The principal goal of continuous improvement is to rapidly respond to environmental incidents that occur during the construction activities and effectively identify corrective actions or adaptive management techniques to reduce the likelihood of a recurrence. For the Action, the principal method of continual improvement is to capture lessons learned in an environmental incident or event into a revised CEMP and environmental management annexures. These revisions, if they require additional on-site actions, will then be captured in amended site inductions, personnel training, procedures and monitoring requirements.

A CEMP Change Notice Form is required to be completed, and a working Change Notice Register will be maintained (templates both provided in Appendix H) to capture continuous improvements to the CEMP, arising from but not limited to outcomes of incident reviews, event reviews, corrective actions, and adaptive management techniques that are identified. The Change Notice Form is required to be prepared by the SEO, reviewed by the Site Environmental Advisor, and approved and issued by the PMCA to the relevant Construction Contractor(s). Following issuance of this form, the Change Notice Register will be updated, and the information contained in the register will be used to inform future CEMP reviews.

13. Glossary

Term	Definition
Acoustic parameter	A measurable quantity used to describe the characteristics of sound, such as its level, frequency, or duration. Common acoustic parameters include sound pressure level (SPL), equivalent continuous sound level (LAeq), maximum sound level (Lmax), and statistical levels (e.g., L10, L90). These parameters help quantify and assess noise in environmental and occupational settings.
Action area	As defined in the EPBC Act approval 2024/10031 and illustrated in Map 1 of that approval.
Avoidance area	Area within the Action area with ecological value where direct impacts will be avoided and as defined in the EPBC Act approval 2024/10031.
CEMP boundary	The area to which this CEMP applies and illustrated as 'CEMP boundary' in Figure 2.
CIF	Controlled Industrial Facility: A specialist purpose-built facility for managing and holding very low-level and low-level radioactive material (radioactive material) from submarines.
CIF area	As defined in EPBC Act approval 2024/20031.
Construction	As defined in EPBC Act approval 2024/20031.
Construction area	An area within the CEMP boundary to which the Construction Contractor's CEMP applies as illustrated in the Construction Contractor's CEMP site plan/s.
Construction Contractor	Means the Construction Contractor, including site manager or delegate.
Compliance report	Means a written report of compliance with, and fulfilment of, the conditions of approval.
DCCEEW EMP Guidelines	Means the Department of Climate Change, Energy, the Environment and Water, Environmental Management Plan Guidelines, Commonwealth of Australia 2024.
Decibel (dB)	Decibel is the logarithmic unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dBA	Decibel expressed with the frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at low and high frequencies.
Desktop assessment area	The Action area and a 10-kilometre (km) search buffer.
Disturbance footprint	The area of direct impact by the Action, including ground/sea floor disturbance that is both permanent and temporary in nature.
Early Works or Early Works Activities	The scope of work associated with the EPBC Act approval 2024/10031 covered by this CEMP as outlined in Section 3, including vegetation clearing, site levelling and preliminary civil earthworks.
Enabling works	The scope of work associated with the EPBC Act approval 2024/10031 covered by this CEMP as outlined in Section 3, including trenching for site services, installation of new sub-surface service infrastructure (max depth < 2.0 m bgl), bulk earthworks, foundation works including installation of Controlled Modulus Columns (CMC) to support the construction of the controlled industrial facility (CIF).
Environment and Heritage Assessment	The Submarine Rotational Force – West Priority Works Environment and Heritage Assessment (GHD, 2025) associated with EPBC Act approval 2024/10031.
Environmental management measures	Inclusive of all environmental management activities, controls, and mitigation measures that detail how the potential environmental impacts of the Action will be managed.
Environmental management annexure	Supporting documentation for this CEMP that detail the requirements to meet environmental objectives and performance criteria for specific aspects (includes aspect specific, environmental management controls and monitoring requirements).
Event	An event is an occurrence that does not meet the definition of an incident under the EPBC Act approval 2024/10031 but is relevant to the ongoing environmental performance of the project.

Term	Definition
	Environmental events may include, but are not limited to: – exceedance of 'review' trigger levels of noise, vibration or dust that remain within acceptable limits and do not result in harm to protected matter – evidence of minor habitat degradation (e.g. burrow collapse or rock wall instability) where following assessment by seabird ecologist, there is no attributable site-related cause – discovery of minor nest or burrow damage where seabird ecologist has noted no injury or mortality to protected fauna has occurred – observations of environmental conditions that, while not causing harm, indicate a potential weakness in environmental controls.
Incident	– An event which has the potential to, or does harm any protected matter, which includes, but is not limited to: • Vessel strikes to little penguins and Indian Ocean bottlenose dolphins • Leaks and spills of any substance that can cause harm to protected matters • Exceedance of the noise threshold level at little penguin nesting sites • Exceedance of the vibration threshold level at little penguin nesting sites • A decline in the little penguin population at Garden Island below the baseline population or a declining population trend that has the potential to decrease the little penguin population at Garden Island below the baseline population. – Potential non-compliance with these conditions, including the administrative requirements. – Actual non-compliance with these conditions, including the administrative requirements. – Potential non-compliance with one or more commitment made in a plan – Actual non-compliance with one or more commitment made in a plan.
Important habitat	Habitat that supports species survival, including habitat that is used for reproduction, foraging, and/or roosting.
Intertidal zone	The area between Highest Astronomical Tide and Lowest Astronomical Tide.
IP66	Dust-tight, water projected in powerful jets from any direction shall have no harmful effects.
Landside area	The portion of the Action occurring within the terrestrial environment, excluding the intertidal zone.
Landside facilities	The scope of work associated with the EPBC Act approval 2024/10031 covered by this CEMP as outlined in Section 3, including supporting infrastructure required to enable operation of the CIF.
$L_{A10(period)}$	The noise level exceeded for 10 percent of the measurement period and is approximately the average of maximum noise levels.
$L_{A90(period)}$	The noise level that is exceeded for 90 percent of the measurement period.
$L_{Aeq(8hr)}$	LAeq(8hour) refers to the A-weighted equivalent continuous sound pressure level, averaged over an eight-hour period and expressed in decibels (dB) referenced to 20 micropascals, as defined in AS/NZS 1269.1. It represents the total noise energy a person is exposed to during a standard working day, accounting for both the intensity of the noise and the duration of exposure.
$L_{Aeq(1sec)}$	LAeq(1sec) refers to the A-weighted equivalent continuous sound pressure level, averaged over a 1-second period and expressed in decibels (dB) referenced to 20 micropascals. It represents the steady sound level that would contain the same acoustic energy as the actual fluctuating sound measured over that one-second duration. This metric is often used to assess short-duration noise events.
L_{AFmax}	The absolute maximum noise level in a noise sample.
Little penguin nesting site	The areas used by little penguins for breeding and moulting, and the known nesting areas identified in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Appendix A5).
Little penguin departure period	The period of time over which little penguins depart from the little penguin nesting sites, for approximately 2 hrs before sunrise to spend the day foraging at sea.
Little penguin arrival period	The period of time over which little penguins raft and then return to the little penguin nesting sites, typically commencing from sunset, with most of the little penguins (80%) back to shore within 40 minutes after sunset.

Term	Definition
Little penguin day-time period	The period commencing from sunrise and ending at sunset.
Little penguin night-time period	The period commencing immediately after the little penguin arrival period and ending immediately prior to the little penguin departure period.
Luminaire classification system	The Luminaire Classification System (LCS) is a method developed by the Illuminating Engineering Society (IES) to categorise outdoor light fixtures based on their light distribution. This classification helps in designing lighting systems that minimise glare, and reduce light pollution and spill light. The system is particularly important in outdoor lighting, where controlling light spill and uplight is crucial.
Maritime area	The portion of the Action occurring within the marine environment, including the intertidal zone.
Monitoring location	Defined locations where noise and vibration levels are considered representative of sensitive receptors.
No-go zone	Area identified in the Construction Contractor's CEMP that must be avoided during construction.
Noise threshold level	Noise threshold level means the maximum threshold of acoustic sound measured in decibels (dB) that is considered safe to operate within the Action area without harming the local little penguin population.
Post-construction	Activities required after construction activities associated with the Action have ceased and/or been completed. This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Pre-construction	Activities required prior to commencement of construction including field surveys, installation of temporary fences or signage, or any routine and minor, maintenance associated with the ongoing operation of the installed infrastructure so long as it does not harm any protected matters. This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Permanent Threshold Shift (PTS)	Permanent loss of auditory sensitive, usually the result of excessive exposure to high noise levels.
Protected matters	A matter protected under a controlling provision in Part 3 of the EPBC Act for which EPBC Act approval 2024/10031 has effect. Matters protected under the EPBC Act include the 9 MNES and the environment in general for actions by Commonwealth agencies (refer to Appendix C10.1).
Radioactive material	The International Atomic Energy Agency (IAEA) defines radioactive material as 'material designated in national law or by a regulatory body as being subject to regulatory control because of its radioactivity' (IAEA, 2018a).
Radioactivity	Radioactivity is the result of unstable atoms (radionuclides) spontaneously emitting nuclear radiation, usually alpha particles or beta particles often accompanied by gamma rays (ARPANSA, n.d.). The activity of radioactive material is determined by measuring the number of disintegrations per unit of time, measured in a unit called the becquerel (Bq) (One Bq is equivalent to one disintegration per second) (IAEA, 2018a).
Relocation area	For the Perth slider (*Lerista lineata*) and other reptiles: – Approximately 650 m south of the CEMP Boundary in same or very similar habitats. The release site has existing access and is comprised of remnant vegetation, outside of the core operational area of the base and away from humans. For the Tammar wallaby: – Approximately 500 m south of the CEMP Boundary in the same or very similar habitats and within a Tammar's home range. The release site has existing access, is comprised of remnant vegetation and is different to the Perth slider and other reptile relocation area.
Sound exposure level (SEL)	Level of the sound exposure as defined in ISO 18405. In underwater acoustics, the reference value of time-integrated squared sound pressure is 1 μPa^2 s.
Sound power level (SWL)	A measure of the total acoustic energy emitted by a source, expressed in decibels (dB) relative to a reference power of 10^{-12} watts. It is an inherent property of the source and is independent of the surrounding environment or distance from the source.

Term	Definition
Sound pressure level (SPL)	A measure of the pressure fluctuations caused by a sound wave at a specific location, expressed in decibels (dB) relative to a reference pressure of 20 micropascals (μPa). It varies with distance from a sound source and is influenced by environmental conditions.
Stop works procedure	The procedure that would be undertaken in the event that either the stop works noise threshold level or stop works vibration threshold level is exceeded. Stop works procedure means a procedure implemented by the approval holder and its Construction Contractors that ensures the following steps are implemented in the event of an incident: – immediately cease all construction work that has potential to contribute to the exceedance or incident, – investigate and undertake corrective action within 48 hours of the incident, – record the incident and corrective measures. Only recommence construction following completion of the above steps and upon approval of the Site Environment Officer or the relevant environmental authority on site.
Suitably qualified acoustic expert (acoustic consultant)	The acoustic consultant means a person who has relevant professional qualifications and has at least 3 years of work experience designing and implementing surveys and environmental management annexures to manage the negative impacts of noise and vibration pollution in construction settings on native fauna (either in-air and/or underwater as relevant to the context). This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Suitably qualified field ecologist (field ecologist)	The field (as defined in the EPBC Act approval 2024/10031) for the purpose of undertaking environmental surveys means a person who is authorised by the Western Australian Government to capture and handle wildlife, and who has relevant professional qualifications and at least 3 years of work experience designing and implementing surveys for the fossorial species and can give an authoritative assessment and advice on the presence of fossorial species. The suitably qualified field ecologist has authority to supervise, halt and order the manner in which any clearing and construction is undertaken. Minimum qualification requirements for individuals being considered for the role of suitably qualified field ecologist for undertaking relocation, and/or rescue include: – qualified ecologist – Environmental Consultants Association (or equivalent) – fauna training – experience in fauna handling and relocation – experience in fauna trapping for relocations – relevant licenses required to interact with fauna species must be provided. Copies of these licenses are required to be sent to Defence prior to the commencement of any relocation.
Suitably qualified marine fauna observer (MFO)	For the purpose of inspecting safety zones for marine fauna, means a specialist with experience in marine mammal identification, including behaviour and distance estimation.
Suitably qualified marine field ecologist (marine ecologist)	The marine ecologist (for the purposes of Syngnathid translocation surveys and translocating collected Syngnathids) means a person who is authorised by the Western Australian Government to capture and handle wildlife, and who has relevant professional qualifications and at least 3 years of work experience implementing surveys and translocations for Syngnathids and can give an authoritative assessment and advice on the presence of Syngnathids.
Suitably qualified professional;	Suitably qualified professional means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.
Suitably qualified seabird conservation ecologist (seabird ecologist)	The seabird ecologist (for the purpose of preparing and implementing monitoring programs to detect changes in little penguin population and correlating these changes with environmental variables) means a person who has relevant professional qualifications and: – at least 5 years of work experience with little penguins, – has an in depth understanding of little penguin ecology, threats to little penguins and their conservation, – can give an independent, authoritative assessment and advice on the little penguin species and its habitat using relevant protocols, standards, methods and/or literature – has implemented monitoring programs and analysed and reported on monitoring results to better understand little penguin ecology, population dynamics and correlations between

Term	Definition
	population/breeding success with environmental and other variables. This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Sunrise	Is defined as the instant in the morning under ideal meteorological conditions, with standard refraction of the Sun's rays, when the upper edge of the sun's disk is coincident with an ideal horizon (Taken from Geoscience Australia). For the purpose of this Action, it means the time that the sun rises according to the Perth Observatory 'Sun Rise and Set Times' web page (currently available at the following link – http://www.perthobservatory.com.au/astronomy/sun-and-moon-tables). This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Sunset	Is defined as the instant in the evening under ideal meteorological conditions, with standard refraction of the Sun's rays, when the upper edge of the sun's disk is co-incident with an ideal horizon (Taken from Geoscience Australia). Or the purpose of this Action it means the time that the sun sets according to the Perth Observatory 'Sun Rise and Set Times' web page currently available at the following link – http://www.perthobservatory.com.au/astronomy/sun-and-moon-tables). This must be read in conjunction with the definitions in EPBC Act approval 2024/10031.
Temporary Threshold Shift	Temporary loss of auditory sensitivity, usually the result of excessive exposure to high noise levels.
The Action	Activities associated with the construction and operation of the CIF, and activities associated with the construction of the maritime infrastructure upgrades approved by EPBC Act approval 2024/10031.
The Project	Means the Action
Vibration threshold level	Vibration threshold level means the maximum threshold level of vibrational sound measured in millimetres per second (mm/s) that is considered safe to operate within the Action area without harming little penguins.
Website	Means the website as defined in the EPBC Act approval 2024/10031, currently the Department of Defence Submarine Rotational Force-West Infrastructure Project website: **https://www.defence.gov.au/about/locations-property/infrastructure-projects/submarine-rotational-force-west-infrastructure-project**

14. Abbreviations

Abbreviation	Definition
ACM	Asbestos-Containing Material
ACR	Annual Compliance Report
ADES	Assistant Director Environment and Sustainability
AH Act	*Aboriginal Heritage Act 1972* (WA)
Amended AH Act (WA)	*Aboriginal Heritage Act 1972* (WA) reinstated with amendments in 2023
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARPANS Act	*Australian Radiation Protection and Nuclear Safety Act 1998* (Cth)
AS	Australian Standard
ASBINS	Asbestos in Soil
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013
AS IEC	Australian Standards that adopt the International Electrotechnical Commission standards
AS/NZS	Australian Standards/New Zealand Standards
AUKUS	Australia, the United Kingdom and the United States
AZA	Association of Zoos and Aquariums
BC Act	*Biodiversity Conservation Act 2016* (WA)
bgl	Below ground level
BS	British Standard
Bq	Becquerels
BUG	Backlight-Uplight-Glare (BUG) rating system
CALM	Department of Conservation and Land Management (WA)
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CFA	Continuous Flight Auger
CIF	Controlled Industrial Facility
CMC	Controlled Modulus Column
CMF	Construction Management Framework
CoPC	Contaminants of Potential Concern
CO	Commanding Officer
CSMC	Cockburn Sound (*Derbal Nara*) Management Council
CSS	Contaminated Sites Specialist
dBA	A-weighted decibels
dB	Decibel
DBCA	Department of Biodiversity, Conservation and Attractions (WA)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Environment and Conservation (WA)
Defence	Department of Defence
DEHM	Defence Environmental and Heritage Manual
DEPAC	Directorate of Environmental Planning, Assessment and Compliance
DEPSEC SEG	Deputy Secretary Security and Estate Group
DGS Act	*Dangerous Goods Safety Act 2004* (WA)

Abbreviation	Definition
DIN	German Institute for Standardisation (Deutsches Institut für Normung)
DMIRS	Department of Mines, Industry Regulation and Safety (WA)
DoEE	Department of the Environment and Energy (Cth)
DPIRD	Department of Primary Industries and Regional Development (WA)
DPLH	Department of Planning, Lands and Heritage (WA)
DoH	Department of Health
DSEWPaC	Department of Climate Change, Energy, the Environment and Water
DWER	Department of Water and Environment Regulation (WA)
EHA	The Submarine Rotational Force – West Priority Works Environment and Heritage Assessment (GHD, 2025) associated with EPBC Act approval 2024/10031.
EOC	Emergency Operations Centre
EPDM	Ethylene Propylene Diene Monomer
EPA	Environmental Protection Authority (WA)
EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESM	Environment and Sustainability Manager
EWP	Elevating Work Platforms
FBW	Fleet Base West
GEMS	Garrison Estate Management System
GHD	GHD Pty Ltd
GML	GML Heritage
ha	Hectare
HEPA	Heads of EPAs Australia and New Zealand
HMAS	Her Majesty's Australian Ship
IES	Illuminating Engineering Society
IP66	Ingress Protection rating 66
km	Kilometre
LAA	Licensed Asbestos Assessor
LAeq	A-weighted, Equivalent Continuous Sound Level
LCS	Luminaire classification system
MFO	Marine Fauna Observer
mm	Millimetre
mm/s	Millimetres per second
MNES	Matters of National Environmental Significance
NAR	Native Animal Rescue
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measures
NM-CFI	National Maritime, Capital Facilities and Infrastructure
NZ	New Zealand
HMAS Stirling OSCM	HMAS Stirling Oil Spill Contingency Manual
PCA	Pre-Construction Contamination Assessment
PFAS	Per- and poly-fluoroalkyl substances
PMCA	Project Management and Contract Administration
PMO	Program Management Office

Abbreviation	Definition
PSM	Port Services Manager
PPE	Personal protective equipment
PPV	Peak Particle Velocity vibration level
PSM	Port Services Manager
PTS	Permanent Threshold Shift
RIWI Act	*Rights in Water and Irrigation Act 1914* (WA)
RPS	Radiation Protection Series
RTA	Roads and Traffic Authority New South Wales
RWQMP	Routine Water Quality Monitoring Program
SAQP	Sampling Analysis and Quality Plan
SEO	Site Environment Officer
SEL	Sound Exposure Level
SLM	Sound Level Meter
SOP	Standard Operating Procedure
SPL	Sound Pressure Level
SMART	Specific, Measurable, Attainable, Relevant and Timebound
SME	Subject Matter Expert
SMS	Short message service
SRF-West	Submarine Rotational Force – West
SSN	Ship submersible, nuclear
SWL	Sound Power Level
TBT	Tributyltin
TfNSW	Transport for New South Wales
TSP	Total Suspended Particulates
UK	United Kingdom
US	United States
USW	Undersea Warfare
UWA	University of Western Australia
WA	Western Australia
WHS	Work Health Safety

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Appendices

Appendix A

Environmental management annexures

A-1 Flora and Fauna Management Annexure Version 2

A-2 Heritage Management Annexure Version 2

A-3 Soil and Water Quality Management Annexure Version 2

A-4 Noise and Vibration Management Annexure Version 2

A-5 Little Penguin Monitoring and Management Plan (RPS, 2026)

A-6 Maritime Trial Piling Exercise Management Annexure

Australian Government
Defence

SRF-W Priority Infrastructure Works
Construction Environmental Management Plan Version 2

A1

Flora and Fauna Management Annexure



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A1 Flora and Fauna Management Annexure Version 2

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Table 1 Change register

Change register			
Version	**Revision**	**Date**	**Reason for revision**
1	Rev 1	11/08/25	Published version for establishing project monitoring programs, and for activities required under the early works activities
2	Rev 0	20/02/26	Updates made to incorporate activities required for enabling works, and construction of landside facilities including the Controlled Industrial Facility *(*CIF). Updates include: – Section 3 – added Condition 8bb construction lighting – Section 7 – added management controls for additional activities (construction lighting, out-of-hours work permit and osprey nests). Tables 5 and 6 restructured for clarity and to remove repetition. – Section 8 – added monitoring requirements for construction lighting – Section 9 – information consolidated into a single table

1. Objectives

The primary objective of this Flora and Fauna Management Annexure is to implement controls and procedures during construction to avoid, minimise, manage, monitor and document potential adverse direct and indirect impacts to fauna and flora, during construction of the Submarine Rotational Force - West (SRF-West) Priority Infrastructure Project.

This annexure supports the Construction Environmental Management Plan (CEMP), which fulfils a requirement under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2024/10031, and as identified by the environmental risk assessment (refer to section 10.2 of the CEMP) to mitigate impacts to specific environmental and heritage values of the Action area. The specific approval conditions relevant to this annexure and how they have been addressed are detailed in Section 3.

The requirements outlined in this annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to flora and fauna management including rescue and relocation, management of the Tammar wallaby, and biosecurity, during construction. Table 2 summarises how each relevant condition has been addressed in this annexure.

The CEMP defines terms used and activities managed by this annexure. The CEMP must be referred to for additional context, including:

– approved Action details, the EPBC Act Action and person accepting responsibility for the CEMP and all associated annexures, including annexure
– the approved Action description
– emergency contacts, procedures, and specific exemptions that may apply
– potential environmental risks and impacts of the approved Action
– auditing and review requirements
– the glossary
– the references.

This annexure must be read in conjunction with the CEMP and all other annexures. A physical copy of this annexure will be on-site for use should an incident occur.

2. Reference documents

This annexure has been prepared in accordance with the following regulations and guidance documents.

Commonwealth:

– *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
– Environment Protection and Biodiversity Conservation Regulations 2025 (Commonwealth)
– *Biosecurity Act 2015* (Commonwealth)
– Biosecurity Regulations 2016 (Commonwealth)
– National Light Pollution Guidelines for Wildlife 2023, Department of Climate Change, Energy, the Environment and Water (DCCEEW)
– Environmental Management Plan Guidelines 2024, DCCEEW
– Survey Guidelines for Australia's Threatened Mammals 2011, Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)
– Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act, Commonwealth of Australia 2011 (DSEWPaC)
– Arrive Clean, Leave Clean Guidelines 2015, DCCEEW.

State (Western Australia):

- *Biodiversity Conservation Act 2016* (State)
- Biodiversity Conservation Regulations 2018 (State)
- *Biosecurity and Agriculture Management Act 2007*
- Biosecurity and Agriculture Management Regulations 2013
- Department of Biodiversity, Conservation and Attractions (DBCA) Standard Operating Procedure SC24-11 Hand Restraint of Wildlife (2024)
- Policy Statement No. 29 Translocation of Threatened Flora and Fauna (CALM, 1995)
- Department of Biodiversity, Conservation and Attractions Feral Cat Strategy 2023-2028
- Department of Primary Industries and Regional Development (DPIRD) polyphagous shot-hole borer information and Quarantine Areas (2024).

Department (Defence):

- Department of Defence (2019) Environment and Heritage Manual
- Department of Defence (2021) Defence Landscape Management Manual, with specific reference to Chapter 2 ‘Non-established pests, weeds and pathogens’ and Chapter 3 'Established pest, weeds and pathogens'
- Standard Operating Procedure Preventing the introduction of soil-borne pathogens on the Defence Estate in WA
- Defence Base Services (2020) Western Australia Weed Management Plan 2020-2022
- HMAS Stirling Base Instruction relating to biosecurity matters.

The following documents should be consulted for additional context and details on the requirements outlined in this annexure where required:

- Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
- Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f).

The management of the Tammar wallaby (*Notamacropus eugenii derbianus*; WA subspecies) at HMAS Stirling is documented in:

- Garden Island Tammar wallaby Management Plan (Eco Logical 2023a, Appendix F)
- Garden Island Tammar wallaby Monitoring Plan (Eco Logical 2023b, Appendix G)
- Standard Operating Procedure Wallaby fencing on Garden Island (Department of Defence, 2019b).

Additional context may also be sought from:

- Environment and Heritage Assessment (GHD (2025a)
- Biodiversity Values Report (GHD (2024g)
- Garden Island Fox and Cat Management Plan (GHD, 2026a).

3. Conditions of approval

The requirements outlined in this annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to flora and fauna management including rescue and relocation, management of the Tammar wallaby and biosecurity, during construction. Table 2 summarises how each relevant condition has been addressed in this annexure.

Table 2 Conditions of approval applicable to this Flora and Fauna Management Annexure

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
EPBC Act approval 2024/10031			
Clearing limits			
1 a-c	*The approval holder must not:* – *Clear outside of the Action area.* – *Construct outside of the Action area.* – *Harm protected matters within the avoidance areas.*	Performance criteria in Section 6. Avoidance, management and monitoring measures are provided in Section 7 'Management controls and Section 8 'Monitoring requirements' in this annexure.	Sections 6, 7 and 8 of this annexure.
2 a	*The approval holder must not clear more than: 1.78 hectares (ha) of Perth slider habitat.*	Table 4 in this annexure provides the flora and fauna management objectives and performance criteria, including this requirement regarding Perth slider habitat.	Table 4 in Section 6 of this annexure.
Injury avoidance and veterinary care			
4	*From the commencement of the Action until the completion of the Action, the approval holder must arrange for veterinary care or assistance from an experienced wildlife carer for any native terrestrial or marine animal found injured within the Action area.*	Fauna Rescue and Relocation Protocols outlined in Appendix B of this annexure states the process for veterinary care to be accessed, should terrestrial fauna be found injured within the Action area. Provided in Appendix B of this annexure and Appendix C of the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5)	Section 7 of this annexure. Appendix B of this annexure. Appendix C of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
5	*The approval holder must ensure that, from the commencement of the Action until the completion of construction, if any little penguin, Perth slider or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure.*	Steps to remain compliant with this condition are outlined in the rescue and relocation protocol. This protocol outlines a requirement to stop work and call wildlife care to ensure appropriate care for the animal. Provided in Appendix B of this annexure and Appendix C of the Little Penguin Monitoring and Management Plan. (RPS 2026) (Annexure A5).	Appendix B of this annexure. Appendix C of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).
Vibration and terrestrial noise			
8 h	*The CEMP must include measures to undertake a pre-construction survey of the structural condition of all little penguin nesting sites prior to the commencement of construction, to determine any structural reinforcement measures that need to be implemented to prevent collapse or damage arising from construction.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4), and in the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5).	Section 6.3, Section 9.2, Appendix A and Appendix B of the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5). Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f).
8 i (i)	*Specify terrestrial noise threshold levels (dB) and vibration threshold levels (mm/s) that will not be exceeded at any little penguin nesting sites during construction to avoid harm to little penguins and little penguin nesting sites, including the methodology relied on to establish these acoustic parameters. Vibration threshold levels and noise threshold levels must be specified for each of the following periods to reflect their different sensitivities (i) little penguin arrival period, (ii) little penguin departure period, (iii) little penguin day-time period and (iv) little penguin night-time period.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 3 of the Noise and Vibration Management Annexure (Annexure A4).
8 i (ii)	*Specify how noise and vibration levels generated by the Action during construction will be continuously monitored in order to detect any exceedance of the acoustic parameters that may harm little penguins.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 5 of the Noise and Vibration Management Annexure (Annexure A4).

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
8 i (iii)	*Be capable of detecting any exceedance of the terrestrial noise threshold level or vibration threshold level at the little penguin nesting sites.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 5 of the Noise and Vibration Management Annexure (Annexure A4).
8 i (iv)	*Trigger implementation of a stop works procedure if a noise threshold level or vibration threshold level is exceeded.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Table 5 of the Noise and Vibration Management Annexure (Annexure A4).
8 l (i)	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will only occur under exceptional circumstances and be minimised.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 2 of the Noise and Vibration Management Annexure (Annexure A4).
8 l (ii)	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will be particularly avoided or minimised during the little penguin arrival period and little penguin departure period.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 2 of the Noise and Vibration Management Annexure (Annexure A4).
8 l (iii)	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will not exceed the relevant noise threshold levels and vibration threshold levels specified in condition 8i.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 2 of the Noise and Vibration Management Annexure (Annexure A4).
8 l (iv)	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will only involve the use of the quietest available equipment that is capable of doing the task.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4).	Section 2 of the Noise and Vibration Management Annexure (Annexure A4).
Little penguin behaviour monitoring			
8 n	*The CEMP must specify the implementation of adaptive management measures in response to the detection of changes of behaviour in little penguins.*	Controls are detailed in the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5).	Section 7 of the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5).
Perth slider			
8 w (i)	*The CEMP must specify that within two weeks prior to clearing in the Controlled Industrial Facility (CIF) area, a suitably qualified field ecologist will undertake an initial Perth slider salvage survey using the methods specified in the Survey guidelines for Australia's threatened reptiles.*	Surveys will be conducted as per management controls and monitoring requirements. If species are encountered,	Appendix B, and Sections 2, 7 and 8 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
		controls will be applied as detailed in Appendix B of this annexure. Suitably qualified person is defined and the requirement for ecologist oversight of clearing activities is captured in Table 7.	
8 w (ii)	*The CEMP must specify that immediately prior to undertaking clearing in the Controlled Industrial Facility (CIF) area, a suitably qualified field ecologist will undertake a secondary Perth slider salvage survey, including by raking or causing similar surface disturbance to detect and relocate any Perth slider present.*	Surveys will be conducted as per management controls and monitoring requirements. If species are encountered, controls will be applied as detailed in Appendix B of this annexure.	Appendix B, and Sections 2, 7 and 8 of this annexure.
8 w (iii)	*The CEMP must specify that a suitably qualified field ecologist will oversee all clearing in the CIF area to minimise harm to the Perth slider.*	Surveys will be conducted as per management controls and monitoring requirements. If species are encountered, controls will be applied as detailed in Appendix B of this annexure.	Appendix B, and Sections 2, 7 and 8 of this annexure.
Biosecurity			
8 y (i)	*The CEMP must specify biosecurity measures that will be implemented during construction to ensure the Action is undertaken in a manner that prevents the introduction of new pathogens, environmental weeds, or exotic marine and terrestrial species to Garden Island or Cockburn Sound that could harm the environment.*	Controls are detailed in this annexure.	Sections 6, 7 and 8 of this annexure.
8 y (ii)	*The CEMP must specify biosecurity measures that will be implemented during construction to ensure the Action is undertaken in a manner that prevents the spread of pathogens, environmental weeds, and exotic marine and terrestrial species to areas where they were not previously present.*	Controls are detailed in this annexure.	Sections 6, 7 and 8 of this annexure.
8 z	*The CEMP must specify biosecurity measures that will be implemented during construction for the following: Phytophthora species, polyphagous shot-hole borer, carpet sea squirt, Asian green mussel, white colonial sea squirt, and black rat.*	Controls for terrestrial species are detailed in this annexure.	Sections 6, 7 and 8 of this annexure.
Cumulative impacts			
8 aa	*The CEMP must include a commitment that the schedule and timing of construction activities will be planned in consultation with a suitably qualified*	A commitment to consult a suitably qualified ecologist is included in the CEMP.	Section 3.6 of the CEMP. Sections 3.2 and 3.3 of the Little Penguin Monitoring

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
	seabird conservation ecologist to avoid and minimise harm to little penguins, including but not limited to cumulative impacts.	Controls are detailed in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).	and Management Plan (RPS, 2026) (Annexure A5).
8bb	*The CEMP must include a construction lighting management plan that:* – *is consistent with the Light Pollution Guidelines for Wildlife* – *ensures all lighting from construction is directed away from little penguin nesting sites and little penguin arrival areas, and* – *specifies mitigation measures to minimise the impacts of spill-over light from construction lighting on little penguins and little penguin nesting sites.*	A light management plan and associated controls will be detailed in the Contractor's CEMP as required in Section 11 of the CEMP, and Sections 7 and 8 of this annexure. In addition, the roles and responsibilities of the seabird ecologist defined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) capture the provision of advice.	Contractor CEMP. Section 11 CEMP. Sections 7 and 8 of this annexure. Section 9.2 Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).
Little penguin – Direct disturbance and obstruction			
14	*The approval holder must ensure that, prior to commencement of clearing and construction, all little penguin nesting sites located within 50 m of the Action area are identified, clearly signed and demarcated, and that signage is maintained until the completion of the Action.*	Controls are detailed in the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5), and in this annexure.	Sections 9.2 and 9.4 of the Little Penguin Monitoring and Management Plan (RPS,2026) (Annexure A5). Sections 7 and 8 of this annexure.
15	*The approval holder must not, as a result of taking the Action, directly disturb little penguin nesting sites.*	Controls are detailed in this annexure.	Section 7 of this annexure.
Little penguin – Artificial lighting			
19 a-c	*To avoid and mitigate harm to Little Penguins from artificial light associated with the Action, prior to installation of any lighting, the following must be provided electronically to the department for approval by the Minister:* – *a) Final lighting plans.* – *b) A Light Impact Assessment Report, developed in consultation with a suitably qualified seabird conservation ecologist, that assesses and details impacts, including cumulative impacts to little penguins from new light installations associated with the Action.* – *c) A Light Management Plan, developed in consultation with a suitably qualified seabird conservation ecologist, that details measures that will be*	Not triggered.	N/A

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
	implemented to avoid (where possible) and mitigate potential impacts identified by the Light Impact Assessment Report in regard to little penguins and consistent with the Light Pollution Guidelines for Wildlife and details residual impacts remaining after avoidance and mitigation measures are implemented.		
20	*The approval holder must implement the Light Management Plan prior to the installation of any new lighting and continue to implement it until completion of the Action.*	Not triggered.	N/A
Administrative conditions			
29 d vii	*The approval holder may choose to revise a plan required to be implemented under condition 19 without submitting it for approval under section 143A of the EPBC Act, if:* – *d) the approval holder notifies the department electronically that it has prepared a revised version of the plan (the 'revised plan'). In notifying the department, the approval holder must specify each condition which references the plan and provide the department with:* – *vii) a copy of the compliance report for the latest Annual Compliance Report (ACR) period and a statement of any relevant history of compliance (including non-compliance) in relation to the plan.*	All reporting will be documented and submitted in the Annual Compliance Report (ACR) (Section 7.2 of the CEMP).	Sections 7, 11.3, and 12 of the CEMP.
40	*The approval holder must ensure that any monitoring data, surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the Guidelines for biological survey and mapped data, Commonwealth of Australia 2018 and Guide to providing maps and boundary data for EPBC Act projects, Commonwealth of Australia 2021, or as otherwise specified by the Minister in writing. The approval holder must submit all monitoring data, surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 20 business days following the end of each Annual Compliance Report Period (ACR period), except where otherwise specified in a plan.*	All reporting will be documented and submitted in the ACR (Section 7.2 of the CEMP).	Sections 7, 11.3, and 12 of the CEMP. Section 8 of this annexure.
41	*The approval holder must upload, at least annually, to the Atlas of Living Australia or the relevant state biodiversity database, all fauna sightings recorded during the specified monitoring activities related to this Action.*	This annexure steps through the compulsory upload requirement by ecologists (in consultation with DEPAC) of fauna sightings to the Atlas of Living Australia, with a minimum annual upload.	Appendix A, and Section 10 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and annexure	Relevant section
		As part of DBCA licence number FR28000499, a fauna return of all relocated fauna will be submitted to DBCA as part of their fauna returns process. (Refer to Appendix A of this annexure for licence conditions). Relocations or injury incidents will be captured in incident reports. General sightings from monitoring programs will be summarised in monitoring reports.	
50	*The approval holder must notify the department electronically, within 2 business days of becoming aware of any incident. The approval holder must specify in each notification:* – *a) any condition or commitment made in a plan which has not been, or may have not been, complied with,* – *b) a short description of the incident, and* – *c) the location (if applicable, including co-ordinates), date and time of the incident.*	Reporting and documentation requirements outline the need for description, time and dates of incidents. There is a requirement for capture of incidents in the ACR.	Section 7 of the CEMP.

4. Induction and training

Induction and training requirements are identified in Section 8 of the CEMP. Flora and fauna management aspects from this annexure that will be included in induction and training material are:

- fauna and habitat values (protected or of interest) - fauna species to be included within the training include but are not limited to; Tammar wallaby, Perth slider, little penguins, osprey and rainbow bee-eater (refer to Appendix D, Appendix E, Appendix F and Appendix G of this annexure and the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) for further detail)
- identification of native fauna to support reporting and documentation
- identification of weeds and exotic species (outlined in Appendix C of this annexure) to support reporting and documentation
- avoidance of the introduction and spread of pathogens, environmental weeds or exotic terrestrial species to Garden Island/*Meeandip*
- avoidance areas, delineated boundaries and no-go zones
- protocols for relocation and rescue of fauna.

5. Responsibility

The key roles and responsibilities for implementation of the CEMP, including the associated environmental management annexures, are provided in Section 6 of the CEMP. As specified in the CEMP, the SEO is responsible for oversight and monitoring the implementation of the environmental management annexures on behalf of Defence for the approved Action. Table 3 outlines roles and responsibilities relevant to this annexure. Responsibility for the specific management controls and monitoring requirements in this annexure are provided in section 7, Table 5 and Table 7.

Table 3 Responsibilities for this Flora and Fauna Management Annexure

Role	Responsibility
Construction Contractor	Implement and comply with management measures as outlined in the CEMP and this annexure including: – Providing evidence to prove compliance as required though this document – Briefing all construction personnel on the flora and fauna management measures relevant to their work, and incident reporting procedures – Reviewing and checking that all management controls including exclusion zone fencing are maintained as required – Maintaining records of interactions with fauna as required by this annexure.
Site Environment Officer (SEO)	In addition to responsibilities outlined in the CEMP, the SEO will (for all aspects covered under this annexure relating to biosecurity, flora and fauna including the fauna rescue and relocation protocols, little penguin and Perth slider injury/death incident record forms and the stop works procedures): – Oversee the preparation and implementation of induction and training requirements in this annexure – Undertake site inspections and compliance audits in accordance with the CEMP and at the frequencies specified in Section 8 of this annexure – Communicate with the Project Manager Contract Administrator (PMCA) and Defence as part of incident response – (With other roles, where required in this annexure) identify and review causes and implement measures to prevent incident recurrence and, when triggered, implement adaptive management measures

Role	Responsibility
	– Engage the suitably qualified experts required to undertake the environmental assessments, surveys and monitoring required in this annexure – Engage and supervise the pest management technician.
Suitably qualified field ecologist (field ecologist)	A field ecologist (as defined in the EPBC Act approval 2024/10031 for the purpose of undertaking environmental surveys) means a person who is authorised by the Western Australian Government to capture and handle wildlife, and who has relevant professional qualifications and at least 3 years of work experience designing and implementing surveys for the fossorial species and can give an authoritative assessment and advice on the presence of fossorial species. The field ecologist has authority to supervise, halt and order the manner in which any clearing and construction is undertaken. The field ecologists will be responsible for the identification of specific fauna and the recovery and relocation of all fauna covered in this annexure. Minimum qualification requirements for individuals being considered for the role of field ecologist for undertaking relocation, and/or rescue include: – Qualified ecologist – Environmental Consultants Association (or equivalent) – Fauna training – Experience in fauna handling and relocation – Experience in fauna trapping for relocations – Relevant licenses required to interact with fauna species must be provided. Copies of these licenses are required to be sent to Defence prior to the commencement of any relocation.
Pest management technician	Licenced professional by the Department of Health (Government of Western Australia) engaged to undertake Phytophthora, weed and pest control.
Suitably qualified seabird conservation ecologist (seabird ecologist)	Refer to Table 9.1 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
Experienced wildlife carer/vet	Experienced wildlife carer means a person who practices in, and holds current qualifications for caring for injured wildlife, and has access to adequate equipment and resources to provide adequate care. The experienced wildlife carer/vet will be responsible for receiving, treating and managing injuries should they arise, in accordance with Appendix B of this annexure. The planning of release or future management for little penguins post rehabilitation with an experienced wildlife carer/vet will be the responsibility of the experienced wildlife carer/vet.
Suitably qualified acoustic expert	Refer to the Noise and Vibration Management Plan Annexure for further information on roles and responsibilities associated with the acoustic expert.
Authorised person (per the DBCA Fauna Taking (Relocation) Licence).	An authorised person means a person authorised in accordance with the DBCA Fauna Taking (Relocation) Licence FR28000499 (Appendix A). The authorised person will be responsible for the safe removal of animals in accordance with the DCBA Fauna Taking (Relocation) Licence FR28000499 (Appendix A).

6. Performance criteria

Performance criteria associated with this annexure are outlined in Table 4 below

Table 4 Flora and fauna management objectives and performance criteria

Objective	Performance Criteria
General flora and fauna management objectives and performance criteria	
Prevent impacts to native vegetation outside the approved clearing area.	No clearing or damage to vegetation outside of the Action area.

Objective	Performance Criteria
Minimise indirect impacts to surrounding sensitive receptors.	100% compliance with controls listed in Table 5 and Table 6.
Prevent impacts to native fauna resulting from approved Action activities.	No injury or harm to fauna attributable to construction personnel interactions and construction activities. If injury or mortality occurs, assistance and care is provided in accordance with this annexure and the Fauna Relocation and Rescue Annexure. All stop works procedures (for little penguin and Perth slider) are implemented and reporting requirements met. Documentation will be kept detailing the incident and the response to the incident.
Little penguin management objectives and performance criteria	
No measurable decline in little penguin population size attributable to the SRF-West Project landside and maritime construction works.	Little penguin monitoring will record nesting behaviour, nest conditions, breeding success, population size and environmental variables within expected ranges of variation during construction and for a 6-year period following the completion of construction. The little penguin monitoring data will demonstrate little penguin population size changes are within acceptable limits or will provide evidence to demonstrate that changes are due to external factors.
Perth slider management objectives and performance criteria	
Prevent impacts to Perth slider habitat outside the approved clearing area.	Clearing will not exceed 1.78 ha of Perth slider habitat within the defined disturbance footprint.
Tammar wallaby management objectives and performance criteria	
Prevent impacts to Tammar wallaby resulting from approved Action activities.	All interactions with Tammar wallaby will be humane and ethical. If relocation is required, it will be conducted by a field ecologist, as detailed in the Relocation and Rescue Protocol (Appendix B of this annexure). Animals will be removed from the area, in accordance with this annexure and the Fauna Relocation and Rescue Protocols, and with controls implemented to reduce the likelihood of return.
Monitoring requirements identified in Table 7 are undertaken and records completed.	Construction Contractor reporting captures evidence to verify all monitoring requirements have been undertaken within the timeframes and frequency specified.
Relocation and rescue management objectives and performance criteria	
To avoid potential disturbance to, and injury or death of, fauna.	Fauna will only be relocated if required, after following the management controls detailed in this annexure.
To minimise potential disturbance to, and injury or death of, fauna.	Any fauna relocation must not involve removing individuals from the current population extent. The capture site and release site are both to be within the individual's home range.
To manage, monitor and document potential disturbance to, and injury or death of, fauna.	All interactions with animals captured during the relocation program will be humane and ethical. The animal handler/s (ecologists with appropriate handling experience and licencing) will be experienced in working with specific species. The length of time spent handling animals will be kept to a minimum. Animals will be safely removed from the area and temporarily held, following all relevant controls and protocols outlined in this annexure.

Objective	Performance Criteria
Avoid translocation of native fauna, in accordance with the DCCEEW definition of translocation[1].	Fauna will be relocated/released in a safe location as close as practicable to the Action area.
Biosecurity management objectives and performance criteria	
Prevent the introduction of new pathogens, environmental weeds or exotic terrestrial species to Garden Island/*Meeandip* that could harm the environment.	No new pathogens, environmental weeds and exotic terrestrial species are introduced to Garden Island/*Meeandip*
Prevent the spread of pathogens, environmental weeds (arum lily, bridal creeper, cottonbush) and exotic terrestrial species (fox, cat and black rat) to areas where they were not previously present on Garden Island/*Meeandip.*	Pathogens, environmental weeds and exotic terrestrial species are not spread to areas of Garden Island/*Meeandip* where they were not previously present.

7. Management controls

Management controls relevant to this annexure are outlined in Table 5.

The management controls and monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna in the Action area:

– Heritage Management Annexure (Annexure A2)
– Soil and Water Quality Management Annexure (Annexure A3)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

The fauna management controls in this annexure apply to native fauna. Where any conflict exists, any species-specific guidance or advice from an ecologist will prevail.

Table 5 Pre-construction stage Flora and Fauna Management Annexure controls

Item	Specific control	Reference	Responsibility
Pre-construction			
General			
1	Prior to clearing, all relevant permits and approvals must be reviewed, and all clearing requirements identified and communicated to Construction Contractors. The PMCA must record delivery of this documentation to Construction Contractor.	Construction contract and notices	PMCA
2	Works must not commence until all relevant approval documentation is received.	Construction contract and notices	Construction Contractor
3	The timing of all construction works must be planned in consultation with the seabird ecologist to avoid and minimise harm to little penguins, including but not limited to cumulative impacts.	EPBC Approval 2024/10031 – 1) c)	PMCA
4	To minimise risk of fauna disturbance and injury, signposted vehicle speed restrictions will be observed. Maximum vehicle speed in the Action area will be 20km/hr.	EPBC Approval 2024/10031 – 1) c) Eco Logical, 2023a	Construction Contractor

[1] Translocation is the human-mediated movement of living organisms from one area to another, either to sites where the particular species may already be present, to new sites, or to sites where the animal or plant has become locally extinct (DSEWPaC, 2013).

Item	Specific control	Reference	Responsibility
5	Wildlife warning signs will be installed to reduce the incidence of wildlife-vehicle collisions on main roads.	Eco Logical, 2023a	Construction Contractor
6	No Construction Contractors will access the avoidance area identified in Figure 4 of the CEMP, the exception of when emergency access is required.	EPBC Approval 2024/10031 – 15) EPBC Approval 2024/10031 – 8) l) EPBC Approval 2024/10031 – 1) c)	Construction Contractor
Training and awareness			
7	Prior to works commencing, induction and awareness materials about little penguins, Perth sliders, Tammar wallaby, any other relevant protected matters and general fauna management will be provided to support the Construction Contractor's training and induction program.	Section 4 - Induction and training	SEO
8	Induction material will include basic identification of weeds, pests and diseases relevant to each approved Action phase outlined in Appendix C of this annexure.	EPBC Approval 2024/10031 – 8) y) i) and ii)	SEO
9	Prior to and throughout construction, the training and induction program established for the works, including ongoing topic specific weekly toolbox talks on biosecurity, little penguins, Perth sliders, Tammar wallaby and general fauna management will be implemented and records will be maintained.	Section 4 - Induction and training	Construction Contractor
Installation of fencing and demarcation of avoidance areas and no-go zones			
10	A pre-construction site inspection must be undertaken within the CEMP construction boundary area to relocate fauna prior to completion of construction site fencing and again at fencing completion. This must be undertaken under the guidance of a field ecologist (refer to item 19 for relocation controls).	EPBC Approval 2024/10031 – 1) c)	Construction Contractor
11	The Construction Contractor must delineate the approved clearing area limit by the use of pegs, fencing, continuous flagging tape and/or another suitable method by a qualified engineering surveyor. 'Avoidance areas' as identified in Section 3.2 of the CEMP must be clearly demarcated with signage and physical barricades. Avoidance areas must be marked on site plans. A copy of the site plan will be available during construction.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) b) EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 2) a)	Construction Contractor
12	In consultation with the seabird ecologist (Annexure A5: Little Penguin Monitoring and Management Plan (RPS, 2026)) clearly sign and demarcate all little penguin nesting sites within 50 m of the Action area. The Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) details avoidance areas and demarcation methods relating specifically to little penguins.	EPBC Approval 2024/10031 – 14)	Construction Contractor
13	A no-go zone will be established surrounding the Action area with Tammar wallaby fencing. This will include provision of adequate escape routes. Construction sites, trenches and excavations must have effective fauna fencing installed at all times to prevent entrapment or injury to fauna. Smaller trenches and holes will be covered with fence panels or ply board when unattended. Larger sites must	Standard Operating Procedure - Wallaby fencing on Garden Island (Department of Defence, 2019b)	Construction Contractor

Item	Specific control	Reference	Responsibility
	be fenced with temporary construction fencing with a mesh apron along the base to exclude fauna. Installation of perimeter construction fencing must be completed in a way that ensures wallabies and other fauna cannot be trapped.		
14	Perimeter fences will be constructed of materials that minimise wind deflection and shading. This will take into account the requirements of dust management.	EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 8) i) (i) EPBC Approval 2024/10031 – 14)	Construction Contractor
15	A temporary noise attenuating fence will be established prior to commencement of the Action, which will also act as a demarcation of the site to prevent entry to the little penguin nesting sites in the main colony area.	EPBC Approval 2024/10031 – 15)	Construction Contractor
Pre-vegetation clearance surveys			
16	Vegetation clearance must not commence until all pre-vegetation clearance surveys have been completed and approved by a field ecologist.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) b) EPBC Approval 2024/10031 – 1) c)	Construction Contractor
17	Within 2 weeks prior to the commencement of vegetation clearance, a survey and relocation of the Perth slider and other reptiles and mammals must be conducted. The methods specified in the survey guidelines for Australia's threatened reptiles will be used. Additionally, surveys will be in accordance with the Fauna Relocation and Rescue Protocols (Appendix B). The survey will be undertaken by a field ecologist. Relocation of any fauna will be undertaken under the guidance of a field ecologist.	EPBC Act, relevant fauna survey guidelines EPBC Approval 2024/10031 – 8) w) i) EPBC Approval 2024/10031 – 8) w) ii) EPBC Approval 2024/10031 – 41)	SEO
18	Within 48 hours prior to undertaking vegetation clearing in the CIF area, a fauna survey of the Action area must be undertaken to determine the presence of, and relocate any, terrestrial fauna. Relocation of any fauna will be undertaken under the guidance of a field ecologist.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) b) EPBC Approval 2024/10031 – 1) c)	SEO
19	Immediately prior to undertaking clearing in the CIF, a field ecologist to undertake a secondary Perth slider salvage survey, including by raking or causing similar surface disturbance to detect and relocate any Perth sliders present. Relocation of any fauna must be undertaken under the guidance of a field ecologist.	EPBC Approval 2024/10031 – 8) w) ii)	SEO
20	Any individuals identified during fauna surveys required by items 9, 16, 17, 18 and 19, must be relocated in accordance with the Fauna relocation and rescue protocol (Appendix B of this annexure).	EPBC Approval 2024/10031 – 1) c)	Field ecologist
Pre-construction surveys			
21	Within 4 weeks prior to the commencement of construction within Moresby Harbour and/or potential osprey nesting sites in Careening and Sulphur Bays, a survey must be undertaken within the operational area to	EPBC Approval 2024/10031 – 1) c)	SEO Seabird ecologist

Item	Specific control	Reference	Responsibility
	determine the presence of osprey and the status of osprey breeding by a seabird ecologist.		
22	Based on the outcomes of the preconstruction osprey survey, the seabird ecologist will provide recommendations on any specific management controls or monitoring requirements required prior to the commencement of construction, in the form of a short technical report.		Seabird ecologist
23	Following receipt of the technical report with the findings of preconstruction osprey survey, recommendations for specific management controls or monitoring requirements outlined in this document must be included as adaptive management measures or as changes to the CEMP using the change management process.		SEO
24	Prior to commencement of construction, a pre-construction survey must be undertaken of the structural condition of all little penguin nesting sites.	EPBC Approval 2024/10031 – 8) h)	SEO
Biosecurity specific controls			
25	A suitable area will be established at the vehicle / plant / equipment exit point of the CEMP boundary, to remove soil, mud, plant and organic debris via brush down, rumble strip or similar prior to using the road network leaving Garden Island/*Meeandip*. This staging area will be established in a way that prevents sediment runoff outside of the CEMP boundary.	EPBC Approval 2024/10031 – 8) y) i) and (ii) EPBC Approval 2024/10031 – 8) z)	Construction Contractor

Table 6 Construction stage Flora and Fauna Management Annexure controls

Item	Specific control	Reference	Responsibility
Construction			
General			
26	To minimise risk of fauna disturbance and injury, signposted vehicle speed restrictions will be observed. Maximum vehicle speed in the Action area will be 20km/hr.	EPBC Approval 2024/10031 – 1) c) Eco Logical, 2023a	Construction Contractor
27	'Avoidance areas' and 'no-go zones' must be clearly demarcated with signage and physical barricades.	EPBC Approval 2024/10031 – 8) w) iii)	Construction Contractor
28	Construction contractors will not access the avoidance area identified in Figure 3 of the CEMP. Emergency access is the only exception to this.	EPBC Approval 2024/10031 – 15) EPBC Approval 2024/10031 – 8) l) EPBC Approval 2024/10031 – 1) c)	Construction Contractor
30	Where lighting is required (night works or works in low natural light environment), lighting will be in accordance with a construction lighting management plan approved by the PMCA.	EPBC Approval 2024/10031 – 8) bb) Section 11.1.1.3 of the CEMP	Construction Contractor
31	Siting and positioning of construction security lighting to minimise light shed onto the water, beach or rock wall and in accordance with a construction lighting management plan approved by the PMCA.	EPBC Approval 2024/10031 – 8) bb) Section 11.1.1.3 of the CEMP	Construction Contractor
32	Any landscaping solutions will seek to minimise grassed areas within the Action area to reduce the attraction of Tammar wallaby.		Construction Contractor
33	Operation of machinery including cranes and other heavy machinery, must be suspended if within 100m of an osprey nest when occupied.	EPBC Approval 2024/10031 – 1) c)	Construction Contractor
Vegetation clearance			
34	All vegetation clearing in the Action area must be overseen by a field ecologist.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 8) w) iii)	Construction Contractor
35	To minimise disturbance to protected matters within the avoidance area, perimeter fences will be constructed of materials that minimise wind deflection and shading This will take into account the requirements of dust management measures in the Soil and Water Quality Management Annexure (Annexure A3).	EPBC Approval 2024/10031 1 c	Construction Contractor
36	Vegetation outside of the Action area will not be cleared for parking, vehicle or machinery access, material storage, or any other construction-related activity. 'No access' area signage will be maintained and strictly observed.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) b) EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 14)	Construction Contractor
37	Clearing will be undertaken in a directional manner to allow native fauna to move into uncleared/larger areas of intact		Construction Contractor

Item	Specific control	Reference	Responsibility
	native vegetation and away from areas such as roads, car parks, etc. Notifications to base management and additional signage will be installed to warn existing base users and other contractor personnel of the potential increased movement of Tammar wallaby and other fauna in the areas surrounding the Action area.		
38	Mulch produced from cleared vegetation material reused on site will be confined within the approved clearing area only. Mulch will not be placed on intact vegetation.	EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 8) y) ii)	Construction Contractor
39	Mulch or vegetation stockpiles will be secured if to be left for seven days.		Construction Contractor
40	Mulch piles and or vegetation stockpiles that have been left insitu for seven days will be cleared by a field ecologist prior to mulching or removal from site.		Construction Contractor
41	A surface bonding agent will be used on all areas cleared of vegetation or hardstand to prevent dust generation whilst unattended for three or more consecutive days.		Construction Contractor
42	Areas cleared of vegetation, and areas of hardstand to be left unattended for three or more consecutive days will be treated with a green colouring agent to deter nesting of Fairy terns. In the case of newly cleared areas of vegetation, dark- or green-coloured surface bonding agent is to be applied within one day of clearing. The surface bonding agent must be approved by the seabird ecologist or SEO.	EPBC Approval 2024/10031 – 15)	Construction Contractor
Fauna relocation and rescue			
43	Fauna ladders or ramps will be installed within open trenches and excavations to allow fauna to exit. Tammar wallaby will be provided adequate escape routes from site.	EPBC Approval 2024/10031 – 1) c)	Construction Contractor
44	Fauna will not be approached, herded, corralled, chased, or fed, with interaction only occurring from a field ecologist, or a person delegated by the field ecologist who has been authorised by the DBCA Fauna Taking (Relocation) Licence in the case of relocation. All construction personnel will be appropriately trained on fauna management.	EPBC Approval 2024/10031 – 8) n) EPBC Approval 2024/10031 – 1) c)	Construction Contractor
45	If native fauna is encountered either within or outside the construction area and/or Action area, and the injury or death was caused by a Contractor vehicle or action, the SEO must be notified in accordance with the Fauna Relocation and Rescue Protocols (Appendix B of this annexure).	EPBC Approval 2024/10031 – 4)	All construction personnel
46	Any identified Perth sliders will be collected by a field ecologist, or by a person delegated by a field ecologist who has been authorised by the DBCA Fauna Taking (Relocation) Licence. Perth sliders will be temporarily maintained in calico bags prior to relocation. They will be in bags for no longer than two hours from capture to release. Relocation will occur within similar habitat, at the relocation site selected during the pre-clearance assessment. The relocation site will be approved by the field ecologist.	EPBC Approval 2024/10031 – 8) w) ii) DBCA Fauna taking (relocation) licence FR28000499 Condition 1	Field ecologist Authorised person (per the DBCA Fauna Taking (Relocation) Licence)

Item	Specific control	Reference	Responsibility
47	All other native animals will be relocated, where required and safe to do so, under the guidance of a field ecologist, or an authorised person in accordance with the DBCA Fauna Taking (Relocation) Licence. The length of time spent handling animals will be kept to a minimum (no longer than two hours from capture to release unless advised otherwise by a field ecologist) (DBCA, 2024). Animals will be safely removed from the area and temporarily held by a field ecologist, or a person delegated by the field ecologist who has been authorised by the DBCA Fauna Taking (Relocation) Licence (held for no longer than two hours from capture to release) (DBCA, 2024).	DBCA Fauna taking (relocation) licence FR28000499	Field ecologist Authorised person (per the DBCA Fauna Taking (Relocation) Licence)
48	Release methods will be applied during the relocation process, in accordance with the Fauna Relocation and Rescue Protocols (Appendix B).	Fauna Relocation and Rescue Protocols (Appendix B)	Field ecologist Authorised person (per the DBCA Fauna Taking (Relocation) Licence)
49	In the case of wildlife injury or mortality, incident response and reporting procedures, including arranging veterinary care or assistance from an experienced wildlife carer, will be conducted in accordance with the Fauna Relocation and Rescue Protocols (Appendix B of this annexure).	EPBC Approval 2024/10031 – 4) DBCA Fauna taking (relocation) licence FR28000499 Condition 2	SEO
50	As per the Fauna Rescue and Relocation Protocols (refer to Appendix B of this annexure), stop work procedures will be implemented if any little penguin, Perth slider or marine mammal is found injured or killed within the Action area. The incident will be reported to the SEO and recorded via the relevant incident notification process.	EPBC Approval 2024/10031 – 5) CEMP Section 7.3	Construction Contractor
51	Injured fauna will not be harmed or killed unless consultation with a suitably qualified person (e.g. a veterinarian) has occurred and a decision to euthanise by approved methods by a suitably qualified person is made (e.g. a veterinarian). Relevant contact numbers for the authorised persons are documented in the CEMP	EPBC Approval 2024/10031 – 1) c) EPBC Approval 2024/10031 – 4) CEMP Section 9	Construction Contractor
52	If a little penguin suffers an injury, the animal will be transported to an appropriately qualified veterinarian or wildlife carer for treatment and rehabilitation. Follow the procedures outlined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).	EPBC Approval 2024/10031 – 4)	Seabird ecologist
53	If a Perth slider suffers an injury, the animal will be transported to an appropriately qualified veterinarian or wildlife carer for treatment and rehabilitation. Follow the fauna handling procedure in Appendix B of this annexure.	EPBC Approval 2024/10031 – 4)	Field ecologist
54	Little penguins found dead are not to be disposed of. They are to be frozen until they are able to be collected by the seabird ecologist.	EPBC Approval 2024/10031 – 5)	SEO
Biosecurity specific controls			

Item	Specific control	Reference	Responsibility
55	No mulch, topsoil, or soil containing vegetation/organic matter is to be imported onto Garden Island. Plant stock must be sourced from the Garden Island nursery, grown from seed collected on the island	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z)	Construction Contractor
56	All vehicles / plant / equipment entering Garden Island/*Meeandip* will be inspected and certified by a suitably qualified and/or experienced member/s of the Construction Contractor organisation to be clean and free of soil, mud, plant and organic debris that may carry pests and diseases prior to arrival. This inspection reports will be provided to the PMCA and SEO prior to mobilisation of vehicles / plant / equipment to Garden Island/*Meeandip*.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z) Arrive clean, leave clean guidelines (DCCEEW)	Construction Contractor
57	Vehicles / plant / equipment will proceed over rumble strips in designated bunded areas and / or will be brushed down of all soil, mud, plant and organic debris prior to demobilisation from the CEMP boundary to avoid spread of existing infestations of pathogens and weed species, and mobilisation of mud/sediment. A suitably qualified member of the Construction Contractor organisation will document this has occurred and provide documentation to the SEO and the PMCA prior to demobilisation.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z) Arrive clean, leave clean guidelines (DCCEEW)	Construction Contractor
58	All PPE (particularly work boots) must be cleaned and free from soil, mud, plant and organic debris upon entry/exit of the CEMP boundary to avoid spread of existing infestations of pathogens and weed species.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z) Arrive clean, leave clean guidelines (DCCEEW, 2015)	All construction personnel
59	Cleared vegetation will be mulched, where the area will not be accessed or actively worked in for more than three consecutive days (excluding weekends).	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
60	Mulch will be stockpiled within the CEMP Boundary for a maximum of two weeks.	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
61	Mulch will either be reused within the CEMP CIF Boundary or taken to a licensed waste facility within the Quarantine Area (Figure 1 of this annexure).	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
62	Soil material will be handled and disposed of (if required) in accordance with the waste classification designated in the Soil and Water Quality Management Annexure (Annexure A3).	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
63	Vegetation removed with a root network extending to and/or deeper than 3.5 m below ground level (which is the approximate depth of groundwater table) will be handled and disposed of (if required) in accordance with the waste classification designated in the Soil and Water Quality Management Annexure (Annexure A3).	EPBC Approval 2024/10031 – 1) c)	Construction Contractor
64	If disposal is required, soil will be disposed of at a licensed waste facility within the Quarantine Area (Figure 1).	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor

Item	Specific control	Reference	Responsibility
65	Designated general waste bins (not construction) will be provided. Bins will have lids to avoid attracting exotic terrestrial fauna species identified in Appendix C of this annexure.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z)	Construction Contractor
66	Any sighting of exotic terrestrial species will be documented and reported to the SEO within 4 hours.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z)	All construction personnel
67	Notify HMAS Stirling Environment and Sustainability Manager (ESM) of any fox sightings upon receiving of sighting report.	EPBC Approval 2024/10031 – 8) y) ii)	SEO
68	Engage a licenced pest management technician to undertake treatment of weeds within one week of weeds being reported or observed during regular monitoring.	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
69	Plant material that is required to be brought onto or disposed of off Garden Island/*Meeandip* is subject to the following requirements: – untreated or unseasoned wood will not be moved outside the Quarantine Area (Figure 1), unless chipped to pieces that are 2.5 cm or less in diameter – plant materials, inclusive of living plants, that are greater than 2 cm in diameter will not be moved outside the Quarantine Area (Figure 1) – wood or plant materials, including living plants, may be moved into Zone A (Figure 1). Any machinery used to handle green waste will be certified clean by a suitably qualified member of the Construction Contractor organisation before it can be moved outside the Quarantine Area. Documentation will be provided to the SEO and PMCA within one week of demobilisation from the CEMP area.	EPBC Approval 2024/10031 – 8) y) i) and ii) EPBC Approval 2024/10031 – 8) z) Polyphagous shot-hole borer Information and Quarantine areas (DPIRD, 2024)	Construction Contractor
70	Herbicide treatment of weeds will be undertaken by a licenced pest management technician.	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor
71	Appropriate treatment approach for pathogen, weed or pest species will be defined by the pest management technician, and agreed by the SEO and the HMAS Stirling ESM prior to treatment.	EPBC Approval 2024/10031 – 8) y) i) and ii)	SEO
72	Where manual removal and disposal of weeds is required, this will include removal of all plant material including tuber and rhizomes (below ground material) and above ground material. Disposal of plant material will be in a plastic bag and into general waste (not green waste or compost) or other similar process defined by the Pest Management Technician as agreed with the SEO and HMAS Stirling ESM.	EPBC Approval 2024/10031 – 8) y) i) and ii)	Construction Contractor

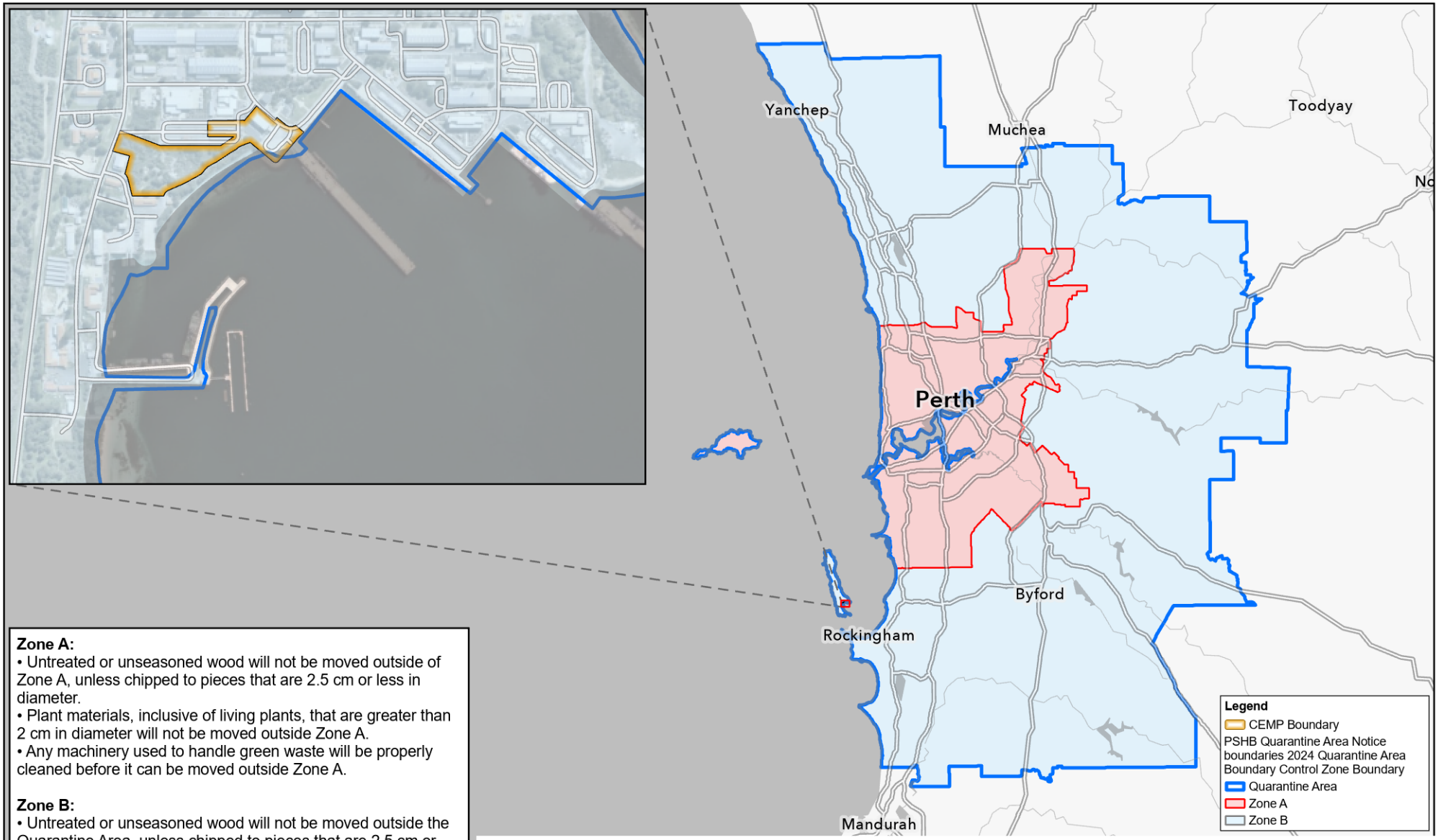


Figure 1 Polyphagous shot-hole borer Quarantine Area (DPIRD, 2024)

8. Monitoring requirements

Flora and fauna monitoring requirements are provided in Table 7, with further details regarding the Tammar wallaby and biosecurity monitoring requirements in the subsections below.

Regular Construction Contractor CEMP site inspections and compliance audits will be undertaken by the Construction Contractor and SEO respectively, in accordance with the CEMP and at the frequencies specified in Table 7 below. The frequency may be adjusted based on the compliance records and relative risk of each requirement.

The monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna in the Action area:

– Heritage Management Annexure (Annexure A2)
– Soil and Water Quality Management Annexure (Annexure A3)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026). (Annexure A5).

Table 7 Flora and fauna monitoring requirements

Location	Monitoring Requirement	Frequency	Record	Responsibility
Pre-construction				
General flora and fauna				
Construction area	Fauna survey to determine the presence of terrestrial fauna, undertaken by a field ecologist.	Within 48 hours of undertaking clearing within the CIF area	Survey data and memo	SEO
Construction area	A secondary Perth slider salvage survey, including by raking or causing similar surface disturbance to detect and relocate any Perth sliders present, undertaken by a field ecologist.	Immediately prior to undertaking clearing in the CIF area	Survey data and memo	SEO
Construction area	A survey of the Perth slider and other reptiles and mammals undertaken by a field ecologist.	Within 2 weeks prior to the commencement of vegetation clearance	Survey data and memo	SEO
Construction area	Construction Contractor to record georeferenced spatial data indicating the actual extent of clearing undertaken.	Every 2 weeks during vegetation clearance	Survey data	Construction Contractor
Construction area	Review georeferenced spatial data indicating extent of clearing and provide a clearing log to the PMCA, with start and end clearing dates.	Monthly and within 2 weeks post completion of clearing	Survey data and memo	SEO
Construction area	Visual inspection by a field ecologist to check for all fauna (specifically for Perth slider and Tammar wallaby).	Daily/prior to activities (for the duration of clearing in the CEMP Boundary area)	Compliance checklist	Construction Contractor
Construction area	A visual inspection to clear fauna prior to constructing the perimeter fence under the guidance of a field ecologist.	Pre-construction	Contractor site records	Construction Contractor

Location	Monitoring Requirement	Frequency	Record	Responsibility
Biosecurity				
Construction area	Monitor for weeds establishing within the construction area.	Fortnightly between clearing completion and foundations / building commencement	Contractor site records	Construction Contractor
		Monthly	Compliance checklist	SEO
During construction				
General flora and fauna				
Construction area	Visual inspection to check no removal of vegetation has occurred outside the approved clearing area (as identified on site plans).	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Visual inspection of fencing and signage in all avoidance areas and no-go zones (as marked on site maps) to check that they are intact and functional, with no signs of damage or encroachment. This includes: – Tammar wallaby fencing – fencing of little penguin nesting sites located within 50m of CEMP Boundary – all other avoidance areas and no-go zones (as marked on site maps).	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Inspection to check that pests and weeds have appropriate controls (if required).	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area (including areas immediately adjacent)	Visual inspections to check that no work activities impacting, or that have the potential to impact, fauna are occurring or have occurred.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Visual inspection of all open trenches, excavations and pipes to: – identify if any fauna are trapped (if so, follow the rescue and relocation procedure) – confirm there are escape routes for fauna (including Tammar wallaby) such as fauna ladders or ramps – confirm that they are covered at night	Twice daily: – Once within 3 hours after sunrise – The second between the hours of 3:00 pm and 6:00 pm of the same day	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Record all fauna sightings, removals, deaths or injuries in a register. The register must identify:	At the end of each shift	Fauna tracking register/	Construction Contractor

Location	Monitoring Requirement	Frequency	Record	Responsibility
	– date, time and location – type and number of fauna – status (e.g. dead/alive/ injured) – method of removal – location of removal – details of person (name, contact, registration/licence details etc) – action undertaken.		Contractor site records	
	Check fauna tracking register is being maintained by the Construction Contractor	Weekly	Fauna tracking register/ compliance checklist	SEO
Construction area	Light spill inspection to be carried out during out-of-hours works to ensure no work activities are impacting native fauna or have the potential to occur. This will only occur if lighting is used out of hours.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Incident location	Monitoring injured fauna until wildlife carer has been called and incident is resolved.	On instance of fauna injury	Incident report/fauna tracking register/ACR report	SEO
Relocation area	Visual check for fauna in relocation area by a field ecologist, or a person delegated by the field ecologist who has been authorised by the DBCA Fauna Taking (Relocation) Licence.	After 2 weeks post-relocation (baseline) then 3-monthly	Compliance checklist/ incident report/ACR	Field ecologist
Tammar wallaby				
Areas outlined in the Garden Island Tammar wallaby Monitoring Plan (2023b) (Appendix G of this annexure)	Tammar wallaby monitoring (that is, trapping, spotlighting, thermal drone) to be undertaken annually to collect a comprehensive baseline of population data and develop optimal monitoring and management programs. Trapping (mark-recapture) may be focused on more discrete areas to provide increased trapping effort and better opportunities for robust population estimates. Continuing to update the Garden Island Tammar wallaby Monitoring Plan (Eco Logical, 2023b) (Appendix G of this annexure) every 5 years to reassess methodologies.	Annually - update monitoring plan every 5 years	Garden Island Tammar wallaby Monitoring Plan (Eco Logical, 2023b) next update 2027	Field ecologist
Little penguin				
The little penguin colony area and burrows	The seabird ecologist to inspect site during and after a rainfall event of greater than 50mm for evidence of surface water damage/scouring to the penguin colony area and burrows.	During and after a rainfall event of greater than 50mm	Compliance checklist	SEO
Biosecurity				
Construction area	Visual inspection of all plant, equipment (including PPE) and	Daily	Contractor site records	Construction Contractor

Location	Monitoring Requirement	Frequency	Record	Responsibility
	vehicles mobilising to within CEMP Boundary to confirm they have been cleaned and are clear of soil, mud, plant and organic debris to prevent the introduction of weeds or pests.	Weekly	Compliance checklist	SEO
Construction area entry/exit	Visual inspection of all plant, equipment (including PPE) and vehicles entering and exiting the CEMP Boundary to confirm they are clear of soil, mud, plant and organic debris to prevent spread of weeds or pests (and excess soil or mud on roadways).	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO

9. Adaptive management measures

This annexure is intended to be dynamic and may be updated to reflect changes in management practices and the natural environment with time. This will also allow flexibility to adopt new technologies/management measures. Amendments to management actions will be completed on an as-needed basis. The review and updates to this annexure may include, but are not limited to:

– updates to management actions that are identified as not achieving the desired outcome and/or to achieve a greater environmental outcome
– additional management actions required as a result of adaptive management processes
– amendments to relevant legislation that may affect the implementation of management actions
– improvements to practices, achieving a greater environmental outcome.

If monitoring results, instances of non-conformances or audit results determine that the controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused by the SEO and/or the PMCA. Alternative mitigation measures will be determined in accordance with the environmental management framework set out within the CEMP and associated annexures. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP. Monitoring will continue to determine if the alternative adaptive management measures are effective.

Adaptive management measures for little penguins can be found in Section 7.2.2.3 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) and adaptive management measures are provided in Section 5.3 of the Noise and Vibration Management Annexure (Annexure A4).

9.1 Flora and fauna adaptive management measures

Table 8 presents the general flora and fauna management triggers and adaptive management measures for this annexure.

Table 8 Flora and fauna management triggers and responses

Trigger	Adaptive Management Measure
Clearance of vegetation outside of limits	– Conduct incident response including investigation, implementation of corrective actions and reporting in accordance with the CEMP (refer to CEMP Section 7.3 and Appendix F). – Any damage caused by the Construction Contractor to flora or vegetation outside approved clearing areas must be reinstated at the Construction Contractor's cost and in consultation with

Trigger	Adaptive Management Measure
	DEPAC and the relevant authorities (DBCA, DWER and DCCEEW) as required.
Native terrestrial animal is found injured or deceased within the Action area	– Follow incident response in the Fauna Rescue and Relocation Protocol (Appendix B of this annexure). – Ecologist/wildlife carer will assess the cause and propose amended management measures. – SEO and field ecologist confirm updated management measures. – If an effective way to eliminate the risk of additional deaths and injuries cannot be determined, then the specific construction process will pause until the risk is mitigated.
Relocation leading to death or injury of fauna individuals	– Cease relocation while investigation is conducted. – Report to the SEO within 4 hours via phone and email. The SEO has the responsibility to report to the PMCA, the ESM, DEPAC and where directed, to the Command Team at HMAS Stirling. DEPAC are responsible for reporting to DCCEEW in accordance with Section 7.3 of the CEMP. – Investigate incident. – Review and revise the Fauna Rescue and Relocation Protocol (Appendix B of this annexure). – Educate all construction personnel on updated protocol.
Monitoring identifies an overall negative impact on Tammar wallaby populations	– Conduct incident response including investigation, implementation of corrective actions and reporting in accordance with the CEMP (refer to Section 7.3 and Appendix F). – Update management measures as required. – Educate all construction personnel on the updated management measures.
Monitoring identifies little penguin nest damage, nest abandonment or that chicks are losing weight at levels above those observed during the baseline monitoring period	– Follow alert and action procedure in Figure 7-1 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
Little penguin population size change	– Seabird ecologists to undertake review of compliance records, environmental indicators and biologging data to understand any potential factors that could explain a decline in breeding adults for that year. – Seabird ecologists to report to SEO and DEPAC. – DEPAC communicate with DCCEEW as required. – Seabird ecologists to identify revised management controls and monitoring requirements for the remaining approved Action elements. – Review and revise the Fauna Rescue and Relocation Protocol (Appendix B of this annexure) – Educate all construction personnel on the updated protocols.
Noise threshold exceedances	– Follow the Noise and Vibration Management Annexure and Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
Introduction of new pathogens, weeds or pest species not currently identified within this annexure	– Within two businesses days of detection, consult with a pest management technician to determine and implement suitable control measures. – Identify the species, likely origins, potential pathways for dispersal and the biosecurity risk level. – Restrict movement of soil, vehicles or equipment from affected area, and flag and isolate outbreak zones. – Assess likely origin, and revise hygiene procedures as needed

Trigger	Adaptive Management Measure
	– Review and update this annexure.
Spread of weeds and pest species (for example, arum lily, bridal creeper, cotton bush and black rat) known to exist and be managed on Garden Island/*Meeandip*.	– Within two business days of detection, consult with a pest management technician to determine and implement suitable control measures. – Within 1 week of detection, implement suitable control measures. – Identify the species, potential pathways for dispersal and the biosecurity risk level. – Restrict movement of soil, vehicles or equipment from affected area, and flag and isolate outbreak zones. – Revise hygiene procedures as needed. – Review and update this annexure.

10. Reporting and documentation requirements

All reporting requirements of the CEMP with reference to the EPBC Act approval 2024/10031 are detailed in Section 7 of the CEMP.

All compliance documents and records required by this annexure must be maintained and stored in accordance with the document control requirements specified in Section 12.2 of the CEMP. Compliance records may be subject to audit and/or be used to verify compliance with the conditions of approval in accordance with Section 12 of the CEMP.

All fauna sightings will be uploaded to the Atlas of Living Australia and other relevant state biodiversity databases, as decided by ecologists and in consultation with DEPAC.

As part of DBCA licence number FR28000499, a fauna return of all relocated fauna will be submitted to DBCA as part of their fauna returns process. This must be done in consultation with DEPAC.

Table 9 presents the flora, fauna and biosecurity reporting requirements. Additional biosecurity reporting requirements are specified in Table 6 of this annexure.

The reporting requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna in the approved Action area:

– Heritage Management Annexure (Annexure A2)
– Soil and Water Quality Management Annexure (Annexure A3)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

Table 9 Flora and fauna reporting requirements

Reporting Requirement	Frequency
Construction Contractor to provide the PMCA with georeferenced spatial data indicating the actual extent of clearing undertaken.	– Every 2 weeks during vegetation clearance – Within 2 weeks of the completion of the clearing within the Action area or prior to the end of the financial year (whichever is sooner)
Construction Contractor must provide the fauna register to the PMCA.	– On request – Within two weeks of construction completion
Construction Contractor must provide other reporting in line with the CEMP on request, including but not limited to daily/weekly checks and incident reporting.	– On request – Monthly reporting updates

Reporting Requirement	Frequency
Construction Contractor to provide the PMCA with record of pathogens, weed or exotic terrestrial species found within the CEMP boundary, along with remediation measures and outcomes.	– Within 2 weeks of construction completion
Construction Contractor to provide PMCA with records outlining that plant, equipment and vehicles are clean and free of soil/plant debris prior to entering Garden Island/*Meeandip.*	– Within 2 weeks of construction completion

11. Continuous improvement and review

If monitoring determines the controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused by the SEO. Alternative management controls will be determined in accordance with the environmental management framework set out within the CEMP and in accordance with the measures identified in Table 8 this annexure. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP.

Environmental management plans such as this annexure are not static documents. Environmental management annexures will be updated during the course of the Action to reflect new information and changes to management controls, in accordance with the triggers and revision processes described in section 12.3 of the CEMP.

In accordance with Section 12.3.2 of the CEMP a working Change Notice Register will be maintained to capture continuous improvements to this annexure of the CEMP, arising from but not limited to outcomes of incident reviews, corrective actions, and adaptive management techniques that are identified. The Change Notice Register will be used to inform future CEMP reviews.

Appendix A

Fauna taking (relocation) licence conditions

DBCA Fauna taking (relocation) licence FR28000499 has been granted for this approved Action, the conditions of which are presented in Table 10.

Table 10 Conditions of DBCA Fauna taking (relocation) licence FR28000499

Number	Condition
1	*The licence holder must not:* *a) release any fauna in any area where it does not naturally occur;* *b) transfer fauna to any other person or authority unless approved in writing by the CEO of DBCA; or* *c) dispose of the remains of fauna in any manner likely to confuse the natural or present day distribution of the species.*
2	*Any inadvertently captured species of fauna which is listed as threatened, extinct or specially protected (Biodiversity Conservation Act 2016) is to be released as directed by the CEO of DBCA, or a wildlife officer.* *Where the fauna is injured or deceased, the licence holder shall contact the Department of Biodiversity, Conservation and Attractions Wildlife Licensing Section (wildlifelicensing@dbca.wa.gov.au) for advice on treatment or disposal.* *Details of such fauna must be included in the fauna taking return as required under this licence.*
3	*The written authorisation of the person in possession or occupation of the land accessed and upon which fauna is taken and/or disturbed, as required under regulation 101(2) and referred to in "Additional information" section below, must:* *a) state location details (including lot or location number, street/road, suburb and local government authority);* *b) state land owner or occupier name, and contact phone number;* *c) specify the time period that the authorisation is valid for;* *d) be signed and dated; and* *e) be attached to this licence at all times.*
4	*This licence must be carried at all times while conducting licensed activities and be produced on demand by a wildlife officer.*
5	*The licence holder must create, compile and maintain records and information as required in a Department of Biodiversity, Conservation and Attractions (DBCA) approved "Return of Fauna Relocated" of all fauna relocation activities as they occur.*
6	*A DBCA-approved "Return of Fauna Relocated" form must be completed in full (including nil taking details) and submitted to DBCA Wildlife Licensing Section (wildlifelicensing@dbca.wa.gov.au) prior to the expiry of this licence (refer to "Additional Information" section below).*

Appendix B

Fauna Rescue and Relocation Protocols

Table 11 below describes the ground truthing process to identify presence of fauna. If fauna is located at any time, the rescue and relocation protocol outlined in Figure 2 and described in Table 12 must occur. Figure 3 and Figure 4 outline the actions described in Table 11 and Table 12 and must be read in conjunction with those tables.

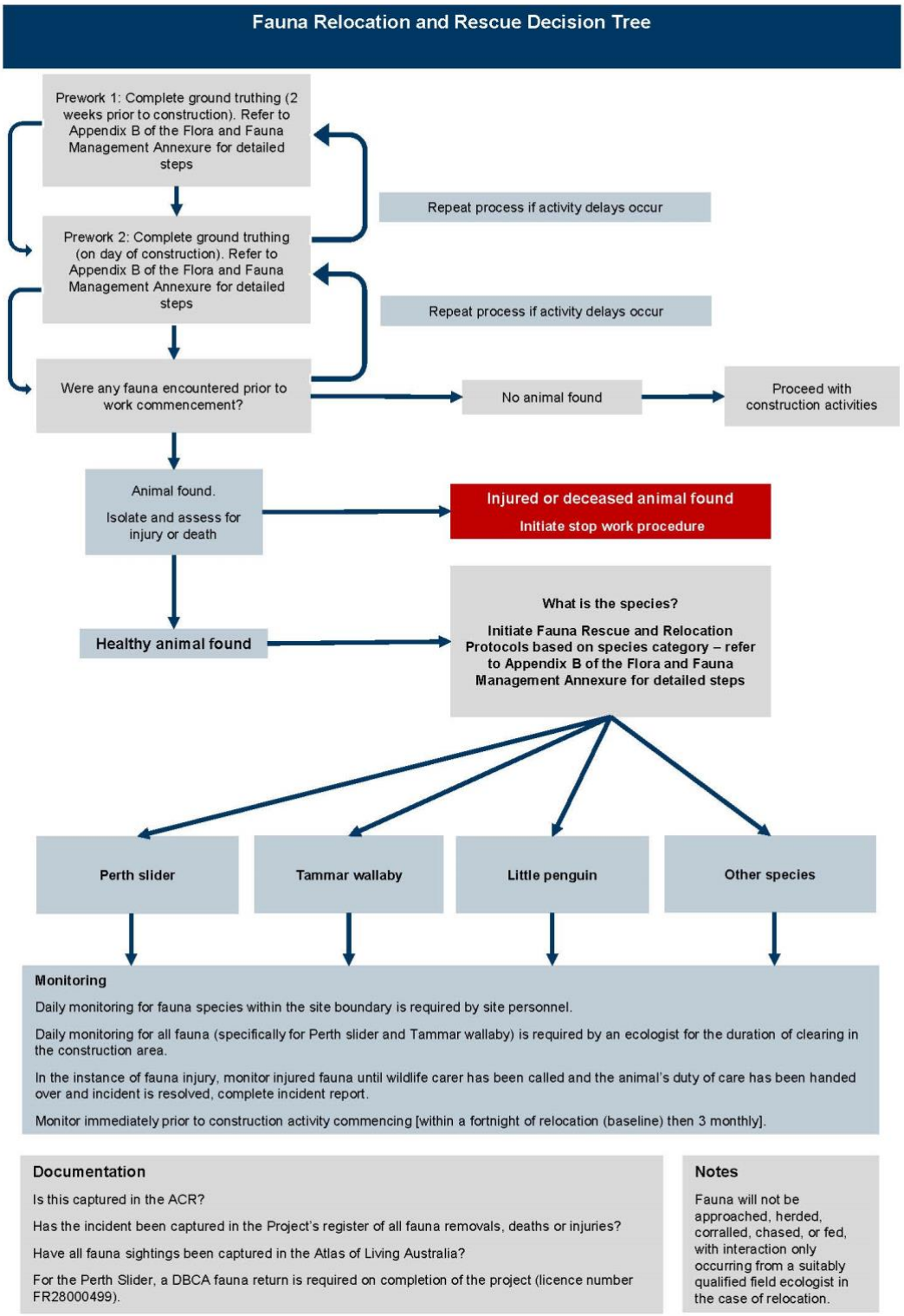


Figure 2 Fauna Relocation and Rescue Decision Tree

Table 11 Ground truthing process

Task	Action
Prework 1 – Ground truthing	Within 2 weeks of construction activities, an initial salvage survey will identify any native fauna that are present within the Action area. Specific searches will be conducted for Perth slider, as per Condition 4. Surveys will be conducted during dates advised by the PMCA, to ensure that the survey is in accordance with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) EPBC 2024/10031 conditions. DBCA Fauna taking (relocation) licence FR28000499 has been granted for this approved Action (Refer to Appendix A of this annexure for licence conditions). The survey will take place over a 2-day period. Surveys for the Perth slider involve raking (using a three-prong cultivator rake) surface soil under debris, base of bushes or trees, leaf litter or soil spoils (DSEWPaC 2011). The ideal survey time for the Perth slider using hand raking is during cooler periods, from July to September. When skinks are cool, they sit higher in soil and debritic habitats, exhibiting less activity, which aids capture. If Perth sliders are present within the survey area, objects which can be used as shelter (such as logs, rocks or corrugated iron) will be turned and checked (DSEWPaC 2011).
Prework 2 – Ground truthing	Ground truthing will be conducted on the day of construction activities as described in Prework 1. As clearing is undertaken, a field ecologist will follow equipment, visually inspecting if any fauna species are being unearthed, and complete other required activities.
Clearing	Clearing may begin. Once the site has been cleared of vegetation, if any construction activities are delayed for more than 24 hours following site preparation works, then preclearance ground truthing must be repeated.

Table 12 Native fauna rescue and relocation protocol

Step	Action		
1	If native fauna is encountered within the construction area and/or Action area, the SEO will be notified. If injured or deceased native fauna is encountered outside of the construction and Action area, but the injury or death was caused by a Contractor vehicle or action, this procedure must also be followed. If the encountered fauna is a target species (see Table 14 in Appendix D), stop works will be applied to the entire site. The SEO must be notified of the incident and will attend the site under the guidance of a field ecologist. If the animal is a little penguin, the SEO must notify the seabird ecology team and refer to the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). The SEO and field ecologist will determine the extent of stop work. If stop works are to continue, it will continue in the delineated area only. The individuals on site will be assessed by the field ecologist to determine whether they are injured. If an injured animal is encountered, proceed to Step 2. If the animal is not injured, proceed to Step 3. If the animal is deceased, proceed to Step 4.		
2 – Assessment of animal injury	A field ecologist will assess the extent of injury to the native fauna. This may require advice from DBCA, Ventia, a veterinarian, or wildlife care support. This assessment and any subsequent actions will follow the technical guides: • Environmental Protection Authority (EPA). (2023). Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment. Perth. • Department of Biodiversity, Conservation and Attractions (DBCA). (2023g). Standard Operating Procedure (SOP) No. 14.2: First Aid for animals. The SEO will take photographs of the injured animal and record the coordinates. The field ecologist will, seeking further advice if required, determine whether the injured animal requires expert or prolonged care. Where expert or prolonged care is required, the animal will be gently restrained and kept in a quiet, dark location at less than 20°C. The animal will immediately (departure within one hour) be transported, in an air-conditioned vehicle, to a suitable wildlife carer or veterinary clinic. If the injured animal is a little penguin, Ventia will be engaged by the seabird ecologist to transport it to WA Wildlife, who are the preferred carers for little penguins. Where expert or prolonged care is not required, the animal will be relocated and released, as per Step 3. Any Tammar wallaby who leaves Garden Island/*Meeandip* is not permitted to return. No mainland Tammar wallaby can be translocated onto Garden Island/*Meeandip*, even rehabilitated animals that originated from Garden Island/*Meeandip*. As described below, veterinary care will be sought from Native Animal Rescue (NAR) where required. Orphaned joeys are only permitted to leave Garden Island/*Meeandip* if they meet the following criteria: – assessed by NAR as having a high likelihood of success of rehabilitation and subsequent ability to be released (for example, stage of development, extent of injuries etc.) – do not exceed a maximum of 10 individuals to be rehabilitated (per year) by NAR for the period documented in the ACR.		
3 – Relocation	**Perth slider**	**Tammar wallaby**	**Other Species**

Step	Action		
	If found, Perth sliders will be collected and temporarily held (for no longer than 2 hours from capture to release) in calico bags before relocation to the relocation area. Relocation will occur within the same habitats, outside the Action area (refer to Glossary of the CEMP for definition and description of location). Raking will occur systematically over the site, so as to cover the entire area and remove as many sliders as possible.	Capturing Tammar wallaby is not anticipated as part of relocation. Relocation will involve the field ecologist moving Tammar wallaby over several days, starting in the east and moving west expecting individuals to move on their own accord, away from the construction area towards existing habitat outside the construction area. As this occurs, habitat will be progressively excluded from Tammar wallaby (via fencing). If any animals are retained on site in the final stages, then these will be herded/pushed in the desired direction of movement (southwest and south) towards the relocation area (refer to Glossary of the CEMP for definition and description of location). The construction area will then be fenced to exclude individuals from returning. Care will be taken to ensure animals are not herded onto or across Dampier Road and other roadways during peak traffic times.	Relocation will occur outside the Action area within the same habitats for all species. The relocation area for all other species (besides the Tammar wallaby) is the same as the relocation area for the Perth slider (refer to Glossary of the CEMP for definition and description of location for Perth slider). Where possible, the handling of animals will be avoided, with preference for passive movement away from the Action areas. If short-term restraint of animals is required during the relocation program (for example, for transfer to a holding bag), DBCA SC24-11 Hand Restraint of Wildlife (2024) will be followed. This provides general advice on suitable hand restraint techniques. Animal handling will only be undertaken by people with experience in animal handling. In instances where fauna needs to be transferred between bags, an expert animal handler will facilitate this without the need for hand restraint. Hand restraint will only be employed where necessary and is unlikely to be required during this relocation program. Direct contact between handlers and animals increases the risk of transferring oils and chemicals (such as those in sun cream or insect repellent) to the animal. Captured animals will be transported to the appropriate release site directly adjacent to where they are found. The animals will be transported within containment bags, within crates. Crates will be securely packed so as to not vibrate or move excessively during transport. When placing animals (within crates and bags) within a

Step	Action		
			vehicle, additional insulation will be layered on the floor to stop heat being transferred from the vehicle. Release will take place at the pre-selected release site, away from the edge of the habitat. Animals will be held for no longer than 2 hours from capture to release. The crate door will be propped open to allow the animal to leave when ready. The following considerations will apply during relocation: – individuals will be placed with their original family groups (colonies will be relocated together to a new site) – adhere to Standard Operating Procedure Hand Capture of Wildlife – individuals will be measured, weighed and photographed – where possible, some of the materials under which the animal had shelter will be relocated with it – relocate some of the scat material with the colony to the new colony site.
4 – Deceased animals	The field ecologist, or an authorised person (per the DBCA Fauna Taking (Relocation) Licence), will take photographs of the injured animal and record the coordinates. They will then collect the animal and dispose of it appropriately. Deceased little penguins must be collected and frozen in the Ventia freezer.		
5 – Monitoring	Visual checks will be carried out daily inside and outside of the Action area to check that no work activities impacting native flora and fauna have occurred or have potential to occur. The relocation area(s) will be monitored 2 weeks post-relocation (baseline), and every 3 months. This will be conducted by a field ecologist, or a person delegated by the field ecologist who has been authorised per the DBCA Fauna Taking (Relocation) Licence and captured in the ACR/incident report. Further monitoring details are provided in Table 7 of the Flora and Fauna Management Annexure (Annexure A1).		
6 – Documentation	The SEO must, in consultation with DEPAC, ensure all fauna sightings recorded during the specified monitoring are uploaded to the Atlas of Living Australia or the DBCA database. For the Perth slider, a DBCA fauna return is required on completion of the approved Action (licence number FR28000499 – refer to Appendix A of this annexure for licence conditions).		

Step	Action
	The SEO must ensure all fauna sightings, removals, deaths or injuries are recorded in a register. The register must identify: – date, time and location – type and number of fauna – status (for example, dead/alive/injured) – method of removal – location of removal – details of person (name, contact, registration/licence details etc) – action undertaken.
7 – Reporting death or injury to native fauna	Any fauna death or injury during construction will be recorded by the Construction Contractor and reported to the SEO within 4 hours via phone and email. The SEO has the responsibility to report environmental incidents (including near-misses) to the PMCA, the ESM, DEPAC and where directed, to the Command Team at HMAS Stirling. If any little penguin, Perth slider or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure.
Notes	Native Animal Rescue (NAR) is the preferred provider for veterinary care services for all fauna other than little penguins. The Fauna Rehabilitation Foundation, which operates under the registered trading name of NAR, is a community-based non-profit, non-government incorporated body dedicated to the rehabilitation and release of sick, injured, orphaned and displaced native wildlife. NAR provides specialist facilities for the care and rehabilitation of over 200 species of native animals. WA Wildlife is the preferred provider for veterinary care services for little penguins due to their history of collaboration with the seabird ecologists. The personnel involved in relocation and rescue must be listed and their roles, qualifications and experience must be outlined. If third parties contributed to the reporting or analysis of incident data, their details and roles must also be included.

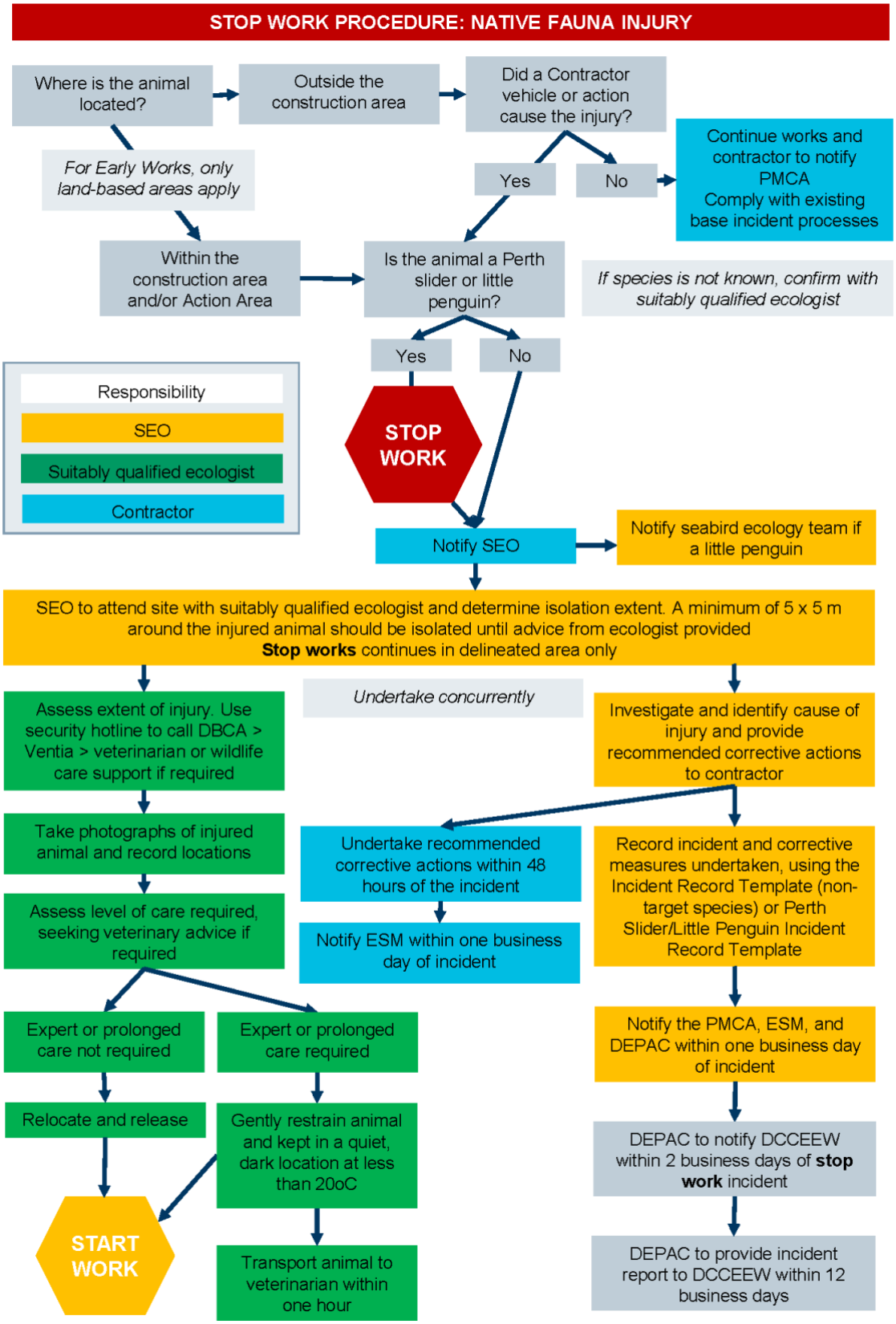


Figure 3 *Stop Work Procedure: Fauna Injury*

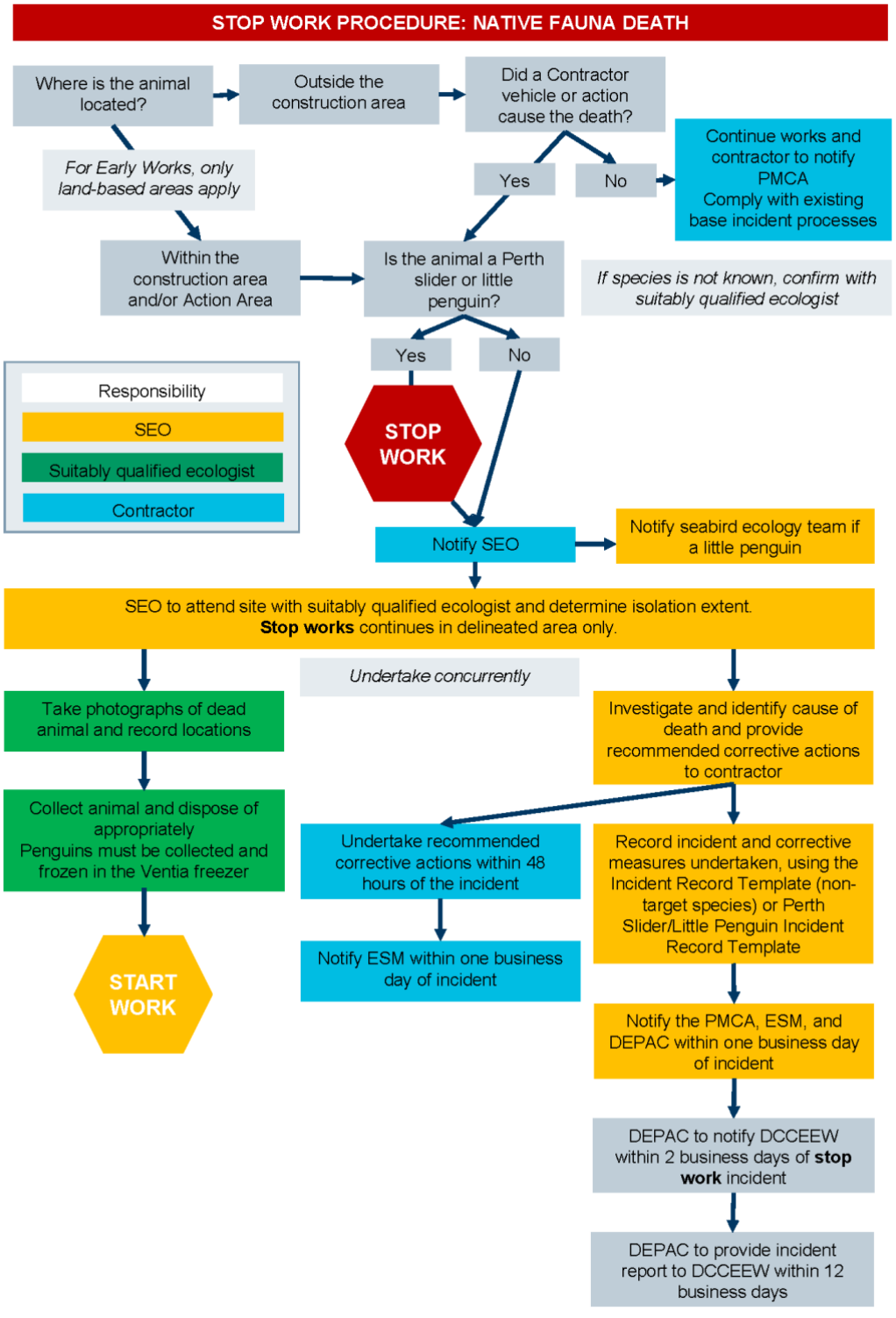


Figure 4 *Stop Work Procedure: Fauna Death*

Table 13 Non-native fauna procedure

Step	Action
1 – Notify SEO	Any sighting of exotic terrestrial species will be reported to the SEO.
2 – Biosecurity target species	SEO to notify HMAS Stirling ESM of any sightings of biosecurity target species, including: – Black rat (*Rattus rattus*) – Cat (*Felis catus*) – Fox (*Vulpes vulpes*) The SEO and contractor must conduct any actions recommended by the ESM.
3 – Other non-native fauna	If possible, injured or non-injured individuals will be captured per relocation protocols and handed to the SEO. The SEO will contact Ventia for management. The SEO will record the event in the fauna register. If the animal is not able to be captured, the SEO will record the event in the fauna register. No further action is necessary. Deceased individuals will be collected by the field ecologist or SEO and disposed of appropriately.

Appendix C

Biosecurity target species

The primary objective of biosecurity management for the SRF-West Project is to prevent the introduction and spread of pathogens, environmental weeds and terrestrial species to Garden Island/*Meeandip* or Cockburn Sound/*Derbal Nara* that could harm the environment.

The targeted species in this annexure comprise weeds (specifically environmental weeds which modify natural environments adversely leading to decline in native communities), pests (exotic terrestrial species) or pathogens. Examples include but are not limited to:

- Arum lily (*Zantedeschia aethiopica*)
- Bridal creeper (*Asparagus asparagoides*)
- Narrow leaf cotton bush (*Gomphocarpus fruticosus*)
- Black rat (Rattus rattus)
- Cat (Felis catus)
- Fox (Vulpes vulpes)
- Phytophthora species (*Phytopthora sp.)*
- Polyphagous shot-hole borer (*Euwallacea fornicatus*).

Appendix D

Species List

Table 14 presents the species lists from the Environment and Heritage Assessment (EHA) and the Biodiversity Values Report relevant to the approved Action. Target species are bolded.

Table 14 Species List from EHA and Biodiversity Values Report

Species List from EHA	Status
Marine mammals	
Pygmy blue whale (*Balaenoptera musculus/m brevicauda*	Endangered, Migratory, Cetacean
Southern right whale (*Eubalaena australis*)	Endangered, Migratory, Cetacean
Australian sea-lion (*Neophoca cinerea*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Migratory, Cetacean
Long-nosed fur seal (*Arctocephalus forsteri*)	Marine
Indo-Pacific bottlenose dolphin (*Tursiops)*	**Cetacean**
Birds	
Little penguin (*Eudyptula minor*)	**Marine**
Great knot (*Calidris tenuirostris*)	Vulnerable, Migratory, Marine
Grey plover (*Pluvialis squatarola*)	Vulnerable, Migratory, Marine
Ruddy turnstone (*Arenaria interpres*)	Vulnerable, Migratory, Marine
Terek sandpiper *(Xenus cinereus*)	Vulnerable, Migratory, Marine
Australian fairy tern (S*ternula nereis nereis*)	Vulnerable, Marine
Caspian tern (*Hydroprogne caspia*)	Migratory, Marine
Common sandpiper (*Actitis hypoleucos*)	Migratory, Marine
Crested tern (*Thalasseus bergii*)	Migratory, Marine
Osprey (*Pandion cristatus*)	Migratory, Marine
Red-necked Stint (*Calidris ruficollis*)	Migratory, Marine
Roseate tern (*Sterna dougallii*)	Migratory, Marine
Sanderling (*Calidris alba*)	Migratory, Marine
Red-capped plover (*Charadrius ruficapillus*)	Marine
Welcome swallow (*Hirundo neoxena*)	Marine
Silvereye (*Zosterops lateralis*)	Marine
Rainbow bee-eater (*Merops ornatus*)	Marine
Reptiles	
Green turtle (*Chelonia mydas*)	Vulnerable, Migratory, Marine
Leatherback turtle (*Dermochelys coriacea*)	Endangered, Migratory, Marine
Loggerhead turtle (*Caretta caretta*)	Endangered, Migratory, Marine
Sharks	
Grey nurse shark (west coast population)	Vulnerable, Migratory
Great white shark (*Carcharodon carcharias*)	Vulnerable, Migratory
Fish	
Pugnose pipefish (*Pugnaso curtirostris*)	**Marine**
West Australian seahorse (*Hippocampus subelongatus*)	**Marine**
Invasive Marine Pests	

Species List from EHA	Status
Carpet sea squirt (*Didemnum vexillum*)	
White colonial sea quirt (*Didemnum perlucidum*)	
Sabella spallanzanii (European fan worms)	
Asian green mussel (*Perna viridis*)	
Invertebrates	
Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*)	Priority 3 (State)
Graceful sun-moth (*Synemon gratiosa*)	Priority 4 (State)
Terrestrial Reptiles	
Black-striped snake (*Neelaps calonotos*)	Priority 3 (State)
Perth slider (*Lerista lineata*)	**Priority 3 (State)**
Terrestrial Mammals	
Tammar wallaby (*Notamacropus eugenii derbianus*)	**Priority 4 (State)**
Weeds	
Bridal creeper (*Asparagus asparagoides*)	Weed of National Significance, Declared Weed (State)
Arum lily (*Zantedeschia aethiopica*)	Declared Weed (State)
Terrestrial Pests	
Polyphagous Shot Hole Borer (*Euwallacea fornicatus*)[2][3]	

Information found from the following sources:

– GHD. (2024a). Biodiversity Values Report. GHD Pty Ltd. An unpublished report for the Department of Defence

– GHD. (2024b). Environment and Heritage Assessment. GHD Pty Ltd. An unpublished report for the Department of Defence.

[2] Priority 3 and Priority 4 species in Western Australia are protected under the Biodiversity Conservation Act (2016).
[3] Declared Weeds in Western Australia are plants regulated under the Biosecurity and Agriculture Management Act (2007).

Appendix E

Tammar wallaby species background

The Tammar wallaby is a known breeding resident of Garden Island/*Meeandip*. Most females deliver a single young in late January to early February. The Tammar wallaby is known to utilise the remnant vegetation within the Careening Bay Action area for foraging and refuge, despite these vegetation types containing very little understorey and being close to operational areas of HMAS Stirling. The species is positively associated with *Melaleuca huegelli* and is not found within or directly adjacent to the Action area. Whilst the Tammar wallaby does utilise the habitat within the Action area for foraging and refuge, higher quality habitat that is preferential for the species occurs in other areas on Garden Island/*Meeandip*. A Garden Island Tammar Wallaby Monitoring Plan (Appendix G) is in place for the species (Eco Logical, 2023b). Main threats to this species as identified by DBCA is fox predation and habitat loss. Predation risks are covered in the Garden Island Fox and Cat Management Plan (GHD, 2026a).

The Tammar wallaby is herbivorous, and their diet consists mostly of grasses (DEC, 2012). On Garden Island/*Meeandip*, Tammar wallaby on the base were found to be gaining approximately 85% of their diet from **Cynodon dactylon* (Couch Grass) growing on the base's ovals and road verges. Those in the bushland areas of Garden Island/*Meeandip* were found to rely on *Acacia rostellifera* (Summer-scented Wattle), *Austrostipa flavescens*, *Eremophila glabra*, *Rhagodia baccata* (Berry Saltbush), *Solanum symonii*, and introduced weeds (McMillan, 2010, McMillian, 2006). The species can survive without permanent freshwater and are known to drink seawater (TSSC, 2019).

The Tammar wallaby breeding cycle is documented only for the Kangaroo Island population (DEC, 2012). It shows a strictly seasonal pattern, with single young born from late January to March and suckled in the pouch for 8-9 months until leaving the pouch in September or October (October or November in WA). Females become mature about nine months after suckling, and males mature at two years. The rate of reproduction is high, with approximately 90% of females carrying a pouch young by the end of the breeding season. Males may live to at least 11 years and females to 14 years (Hinds, 2008).

Appendix F

Garden Island Tammar wallaby Management Plan (Eco Logical, 2023a)

Garden Island Tammar Wallaby Management Plan

Ventia

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DOCUMENT TRACKING

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Template 2.8.1

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Abbreviations

Abbreviation	Description
The Base	HMAS Stirling Naval Base
DBCA	Department of Biodiversity, Conservation and Attractions (WA)
Defence	Department of Defence
DPaW	Department of Parks and Wildlife (WA)
ELA	Eco Logical Australia
HMAS	Her Majesty's Australian Ship
MOU	Memorandum of Understanding
SOP	Standard Operating Procedure

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1. Introduction

1.1. Background

The Department of Defence (Defence) operates the HMAS Stirling Naval Base (the base) on Garden Island (Figure 1). Garden Island has an area of approximately 1,200 ha and is 10 km long by 1.5 km wide, lying approximately 5 km off the coast of Rockingham in Western Australia (WA), and linked by an artificial causeway and bridge. The naval base infrastructure is fenced, and primarily confined to the southern end of the island, leaving the majority of the remaining island relatively undisturbed.

The establishment of the base has led to a relatively constant supply of favourable food resources for the only native mammal to become established on Garden Island; the WA subspecies of tammar wallaby (*Notamacropus eugenii derbianus*). Approximately 85% of their diet comes from **Cynodon dactylon* (Couch Grass) growing on the base's ovals and road verges (McMillan et al. 2010, McMillian 2006).

The high number of tammar wallabies on the base, in and around heavily trafficked areas, has led to ongoing problems with the management of road-kills, injured adults and orphaned joeys. Whether this has led to any form of population decline is however, unknown. Defence has recognised road deaths of tammar wallabies on Garden Island as a considerable problem for a number of years. Road deaths of tammar wallabies on Garden Island have been recorded since 2000 (Chambers 2008), with maintained records available for the 2004-2015 and 2018-2022 time periods. On average approximately 366 adults are killed per year (see Section 2.3 for further information). There have been a significant number of studies examining the road-kills, including variables affecting (Chambers and Bencini 2010, Chambers and Bencini 2008, Walker 2002), mitigation through deterrents (Muirhead et al. 2006, Muirhead 2001) and population level impacts (Chambers 2009).

1.2. Scope and objectives

A Memorandum of Understanding (MOU) was established in 2014 between the Defence Support and Reform Group Central and West, Department of Parks and Wildlife (DPaW; now Department of Biodiversity, Conservation and Attractions [DBCA]), and Native Animal Rescue for a period of two years to ensure the ethical management of injured and orphaned tammar wallabies on Garden Island. One of the outcomes of the MOU was the requirement for a Tammar Wallaby Management Plan to be prepared for Garden Island. At the time of writing, an updated MOU has not been put in place and works were continuing under the 2014 MOU.

The purpose of this plan is to provide a series of recommendations to better manage the Garden Island tammar wallaby population and in particular to manage impacts resulting from vehicle collisions (i.e., death, injury and orphans). The objectives are:

1. To ensure the tammar wallaby population across the island is sustainable into the future and individuals are in a healthy condition (i.e., free of significant injury and disease);
2. To ensure all injured animals are handled quickly and ethically in accordance with State and Federal legislation;
3. Reduce the number of tammar wallaby road deaths, injuries and orphaned joeys by 20% over five years; and
4. To manage the tammar wallaby population across the island in a holistic way in conjunction with broad scale biodiversity and land management objectives.

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Garden Island features

- Study Area
- HMAS Stirling Base
- Roads

N

0 250 500 1,000
Meters

Datum/Projection:
GDA 1994 MGA Zone 50

22PER3396-ED Date: 20/03/2023

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1.3. Considerations and issues

A number of key considerations and issues relating to Garden Island were considered during the preparation of this plan:

- Environmental:
    - Changes to tammar wallaby population dynamics (i.e., survival rates, reproduction rates) as a result of environmental variables and/or Defence operations.
- Animal welfare:
    - Impacts to tammar wallabies as a result of vehicle strikes (stress, death, injury, orphaned joeys, euthanasia).
    - Malnourishment/starvation due to reduction in availability of food resources, or due to presence of an unsustainable population during years of poor vegetation growth.
- Social and economic:
    - Staff wellbeing (primarily staff involved directly in vehicle strikes, care of injured/orphaned animals and euthanasia of critically wounded animals).
    - Adherence to relevant legislation, as well as compliance with WA environmental policies, initiatives and legislation.
    - Impacts to Defence's reputation and public image as a result of 'doing nothing'.
    - Disruptions to Defence operations as a result of tammar wallaby management.

1.4. Garden Island policies and procedures

Several Defence procedures have been developed specifically for Garden Island that relate to the management of tammar wallabies, including but not limited to the following:

- Standard Operating Procedure (SOP) No. 1: Management Of Dead, Sick, Injured And Orphaned Tammar Wallabies at Garden Island; updated May 2022. This includes Appendix A Tammar wallaby Response Flow Chart – Part 1 and Tammar wallaby Response Flow Chart – Part 2.
- Joey Management Guidelines; updated May 2022.
- Fauna Triage Room Management Guidelines; updated May 2022.
- Checklist for signs of Wallaby Death; updated May 2022.
- Checklist for Tammar Wallaby Euthanasia Decision Marking; updated May 2022.

These policies should be updated, where recommended in Section 4 below, and used in conjunction with the Garden Island Tammar Wallaby Management Plan.

1.5. Tammar Wallaby conservation status

The WA subspecies of the tammar wallaby is listed as Priority 5 by DBCA and Western Australian Museum. Priority 5 species are defined as 'Conservation Dependent species'; species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (WAM 2022).

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2. Tammar wallabies on Garden Island

2.1. Relevant biology/ecology

The tammar wallaby is a small marsupial, with the WA subspecies 2.9-6.1 kg in males and 2.3-4.3 kg in females (DEC 2012). This species typically inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland. This species is primarily nocturnal; during the day individuals rest in thick cover, venture into the open to forage after dark, and return to cover before dawn. They have defined home ranges, but are non-exclusive and overlap the home ranges of other tammar wallabies. Individuals have been observed feeding in the same area and no social grouping has been observed except between females and their young.

The tammar wallaby is herbivorous, and their diet consists mostly of grasses (DEC 2012). On Garden Island, tammar wallabies on the base were found to be gaining approximately 85% of their diet from **Cynodon dactylon* (Couch Grass) growing on the base's ovals and road verges, while those in the bushland areas of Garden Island were found to rely on *Acacia rostellifera* (Summer-scented Wattle), *Austrostipa flavescens*, *Eremophila glabra*, *Rhagodia baccata* (Berry Saltbush), *Solanum symonii*, and the introduced weeds; **Asparagus asparagoides* (Bridal Creeper), ***Asphodelus fistulosus* (Onion Weed) and **Trachyandra divaricata* (Strap Lily/Dune Onion Weed) (McMillan et al. 2010, McMillian 2006). The species can survive without permanent freshwater, and are known to drink seawater (TSSC 2019).

The tammar wallaby breeding cycle is documented only for the Kangaroo Island population (DEC 2012). It shows a strictly seasonal pattern, with single young born from late January to March and suckled in the pouch for 8-9 months until leaving the pouch in September or October (October or November in WA). Females become mature about nine months after suckling, and males mature at two years. The rate of reproduction is high with approximately 90% of females carrying a pouch young by the end of the breeding season. Males may live to at least 11 years and females to 14 years (Hinds 2008).

2.2. Population dynamics on Garden Island

Chambers and Bencini (2008) undertook a detailed study of the tammar wallaby on Garden Island. That study split the island into three different geographic areas that were affected differently by habitat modification and road-kills; naval base (highly disturbed), southern bushland (remnant bushland to the west of the naval base) and northern bushland (undisturbed remnant bushland in the northern portion of Garden Island). Studies to understand population dynamics were conducted targeting the three different areas. Based on the June 2013 monitoring, the base population was estimated to be approximately 613 (± 109) individuals (DPaW 2014a).

Chambers (2009) found that the mean size of the home ranges of the tammar wallabies was approximately 3.9 ha in summer and 3.2 ha in winter. There was no significant difference between the size of home ranges between males and females or between the base and the bushland areas of Garden Island. Tammar wallabies that live near the base in the southern bushland areas were moving onto the base each night to feed.

Chambers (2009) also found that the timing of births in the tammar wallaby population on the base was significantly different to the bushland areas of Garden Island. The tammar wallabies on the base had a median birth date that was approximately 20 days later than those in the bushland and there was also more variation in the birth dates. This may have been the result of artificial light sources on the base influencing the reactivation of embryos from diapause. Reactivation usually occurs as a response to

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reducing day length after the summer solstice and lighting on the base may have been interfering with the tammar wallabies ability to detect this change.

Tammar wallabies on the base have a high natural survival rate and consistently high weaning rates regardless of drought or extremely wet conditions (Chambers 2008). In contrast, the rates of survival and weaning success of the tammar wallabies in the bushland areas of Garden Island was reduced significantly in years with very high or very low rainfall. The size of the tammar populations in the bushland was found to decrease by as much as 25% in years with very high rainfall and low winter temperatures. The specific reasons for this pattern remain unclear but it is possible that significantly higher rainfall paired with low temperatures may decrease food availability (grasses unable to survive in cold temperatures), with the result that wallabies may deplete energy stores to keep warm and become unable to maintain young. In years where rainfall is close to the long-term mean the populations in the bushland areas were predicted to increase in size by approximately 10% (Chambers 2008).

2.3. Road deaths on Garden Island

Road deaths of tammar wallabies on Garden Island have been recorded since 2000 (Chambers 2008), with maintained records available for the 2004-2015 and 2018-2022 time periods (Figure 2, Figure 3).

Average adult deaths per year (from 2004-2015, 2018-2022) is 366.06, with the highest monthly average in May (50.47) and lowest average in December (9.31). Average joey deaths per year (from 2004-2015, 2018-2022) is 31.82, with the highest monthly average in June (6.44) and lowest average in December (0).

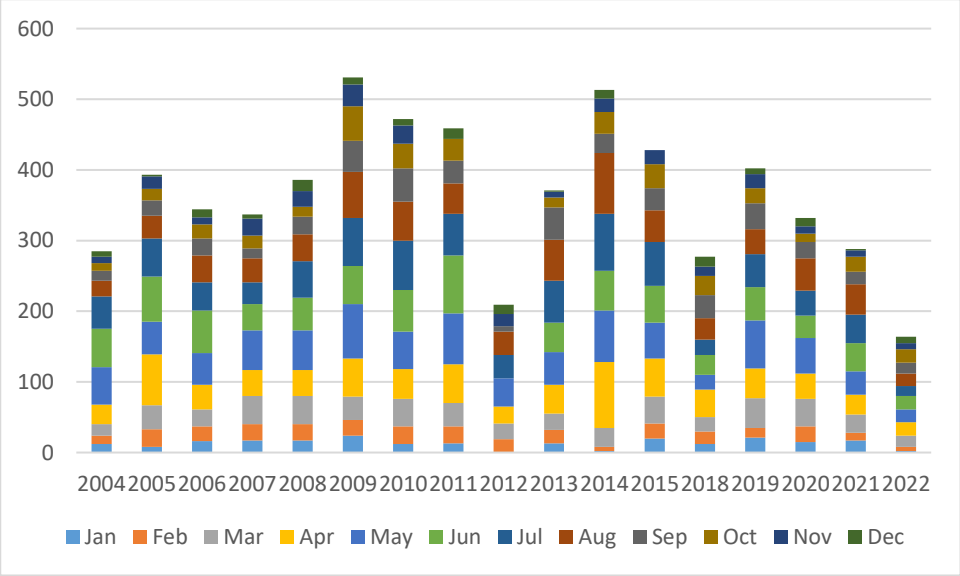


Figure 2: Adult tammar wallaby road death records on Garden Island (2004-2015 and 2018-2022)

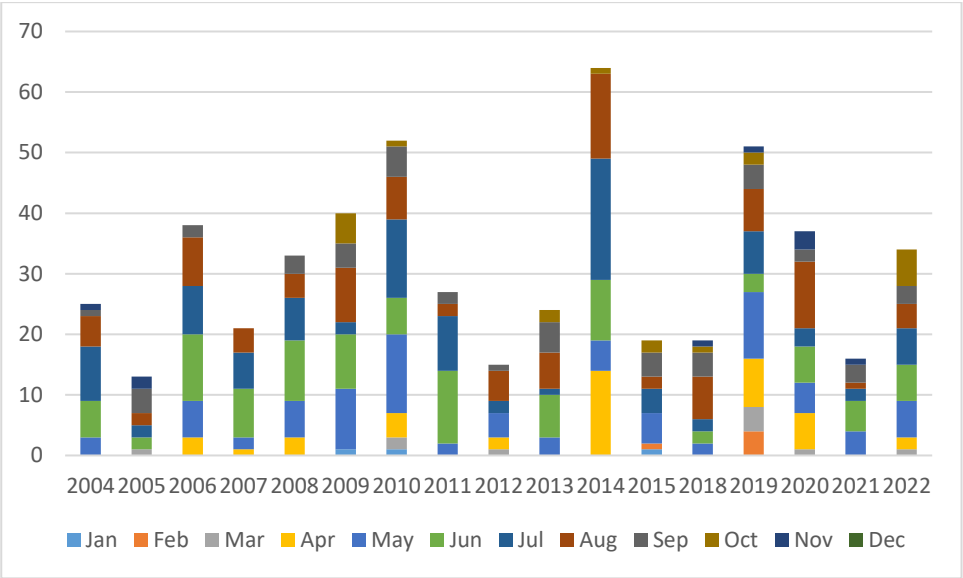


Figure 3: Joey tammar wallaby road death records on Garden Island (2004-2015 and 2018-2022)

Majority of the records were from along Dampier Road (south of the base) and the northern section of the island (pers. comms. Garden Island land management team, 2022; Figure 5). Discovery of road deaths by ground screw mainly occur between the hours of 0500-0700 (Figure 4), at the commencement of personnel shifts, with precise time of death in most cases unknown.

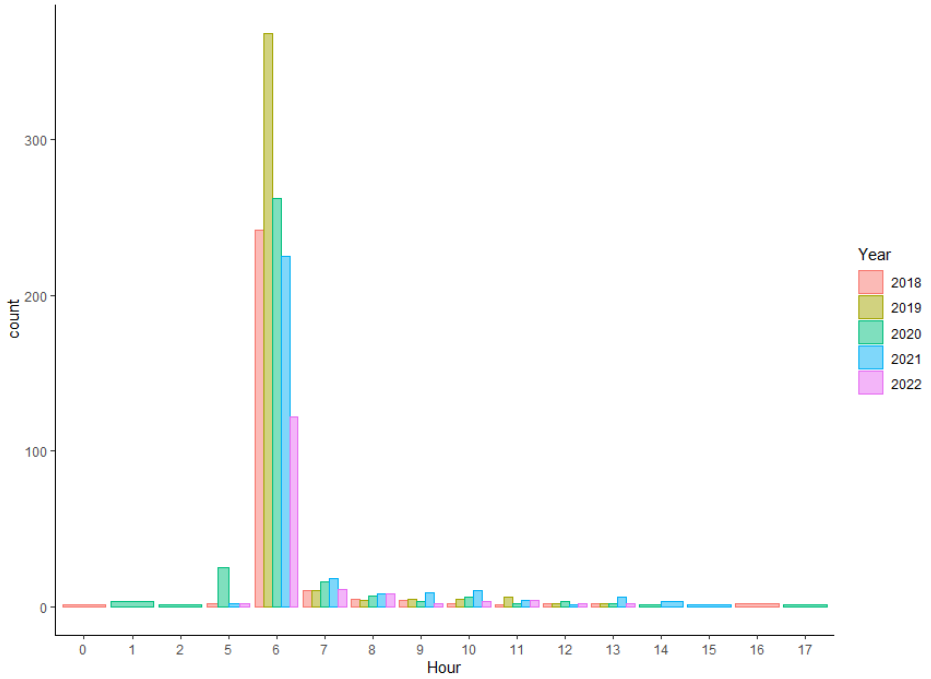
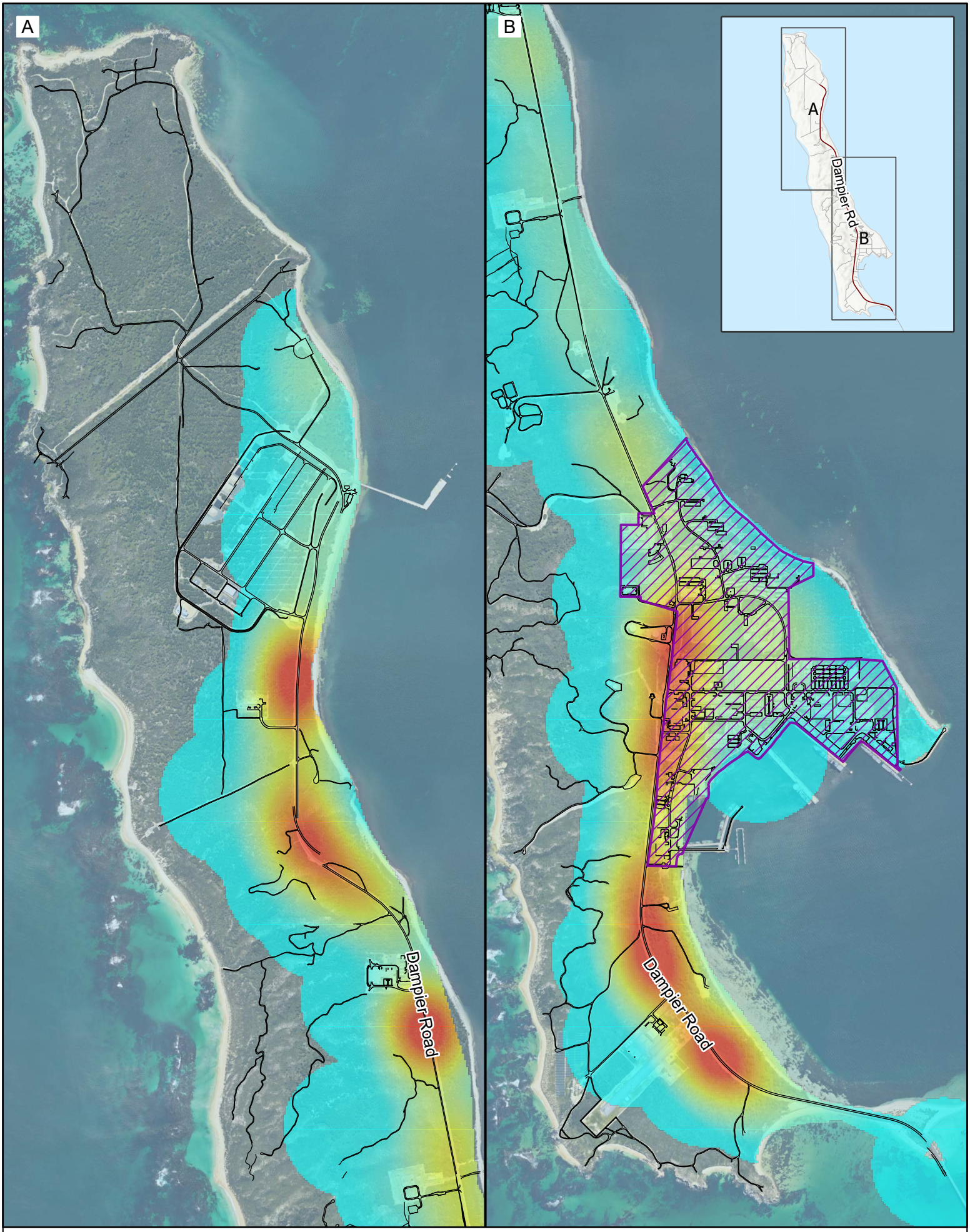


Figure 4: Time of tammar wallaby road deaths on Garden Island (2018-2022)



Tammar wallaby road death heat map 2018-2022

HMAS Stirling Base

Roads

Road death levels

High

Low

N

0 100 200 400

Meters

Datum/Projection:
GDA 1994 MGA Zone 50

22PER3396-ED Date: 21/03/2023

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3. Literature review

Multiple studies have been undertaken on tammar wallabies on Garden Island, or mammal species in restricted environments (i.e., islands). Table 1 below summarises findings which can be used to understand the ecology of the species on the island and determine management strategies.

Table 1: Literature review on tammar wallabies and other relevant mammals

Reference	Conclusions	Management implications
Blacker 2014 *Wallabies and roads: interactions and management in an urbanising landscape*	• Percent of commercial vehicle traffic (positively correlated) and distance to water (negatively correlated) were important spatial variables for determining the patterns of red-necked wallaby road-kill.	• Wildlife warning signs are a common mitigation measure used to reduce the incidence of wildlife-vehicle collisions, yet there is little evidence of their effectiveness. • Animal-activated and vehicle-speed activated signs were highly likely to produce a response from drivers.
Bond and Jones 2014 *Roads and macropods: interactions and implications*	• Some macropod populations are critically affected by the presence of roads (e.g. brush-tailed rock-wallaby, *Petrogale penicillata*) due to either proportionately high road mortalities and/or population fragmentation, and may face continued decline unless effective road-mitigation measures are implemented. • Road kill factors include: ○ Traffic volume: medium traffic volumes are low enough for animals to cope with the disturbance, yet high enough for many animals to become injured or killed during crossing attempts. Very high traffic volumes, however, often result in little wildlife mortality as continuous traffic leads wildlife to avoid the high disturbance associated with these roads. ○ Local road attributes: Vegetation along the roadside verge can also play a role in attracting macropods to the roadside to forage. ○ Landscape attributes: Land use and the type of habitat on either side of the road can also determine where different species are likely to come into contact with the road environment. ○ Temporal variations: Peaks in road deaths have been related to lunar phase, with significantly higher numbers of deaths around full moon. Preceding rainfall levels also appear to influence macropod road-kill rates. ○ Behavioural responses to vehicles: A relatively strong relationship was found between the generalised level of flightiness of a species and the proportion of road mortalities of that species. • Demographic biases: Numerous studies on macropod road-kills have reported some level of bias towards males being killed on roads.	• Investigations of various types of road mitigation focussed on wildlife-exclusion fencing and road crossing structures as the most effective option, although the high cost of these measures appears to limit their implementation. • Examples: wildlife warning signs, crossing structures and fauna fencing, warning reflectors, acoustic repellents and scent repellents.

Reference	Conclusions	Management implications
Chambers 2009 *Human disturbance affects the ecology and population dynamics of the tammar wallaby, Macropus eugenii, on Garden Island, Western Australia*	• Tammar wallabies on the base were in better body condition than those living in the bushland areas of the island. • Birth rates were similar in all areas and approached 90%. Habitat modification on the base may have allowed females to cope better with adverse environmental conditions and be more successful at raising young. • There were no significant differences in the size of tammar wallabies home ranges between areas with modified or unmodified habitats or between the sexes.	• Disturbance caused by the establishment of the base has altered the population dynamics through increasing the amount of food available and through high numbers of road kills.
Chambers and Bencini 2010 *Road mortality reduces survival and population growth rates of tammar wallabies on Garden Island, Western Australia*	• Road mortality counteracted the increase in the size of the tammar wallaby population caused by the habitat modification on the base. • The impact of road mortality in the adjacent bushland areas may result in its long-term decline, as the population may not be able to recover from the reduction in survival rates.	• Road mortality has the potential to threaten susceptible populations.
Chambers et al. 2010 *Speed limit, verge width and day length: major factors in road-kills of tammar wallabies on Garden Island, Western Australia*	• Up to 400 tammar wallabies are killed on the roads of Garden Island every year, which corresponds to approximately 14-18% of the estimated population. • Day length was negatively correlated with road kills, increased verge width was correlated with increased road kills and speed limits of 50 km/h resulted in significantly fewer road kills than 60 km/h or 80 km/h. • Tammar wallaby road fatalities over five years (2000–04) on Garden Island, Western Australia, were noticeably greater between March and August. • Limiting the number vehicles on the road when Tammar Wallabies are most active (between dusk and dawn) would also assist in reducing the number of vehicle strikes.	• Speed, verge width and day length were correlated with the number of road kills and mitigation methods should focus on these three factors.
Eldridge et al. 2004 *Genetic diversity in remnant mainland and ''pristine'' island populations of three endemic Australian macropodids (Marsupialia): Macropus eugenii,*	• Although island populations have been insulated from the relatively recent threatening processes operating on the mainland, they have nevertheless been significantly impacted by increased inbreeding and the substantial erosion of genetic diversity. • Despite the difficulties of ensuring the survival of remnant mainland populations, they appear to retain substantially more genetic diversity	• N/A

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Reference	Conclusions	Management implications
Lagorchestes hirsutus and Petrogale lateralis	than their island counterparts and therefore are more likely to contribute to the long-term persistence of their species.	
McMillan et al. 2010 *Determining the diet of tammar wallabies on Garden Island, Western Australia, using stable isotope analysis*	• Tammar wallabies living on the base rely mainly on introduced grasses as a source of food. • Tammar wallabies from the northern subpopulation may experience food shortages to a greater extent than those living on the base and southern bushland.	• Fencing off ovals or removing the grass from verges would deprive tammar wallabies of this resource and probably result in a decline in the population.
Miller et al. 2011 *Genetic consequences of isolation: Island Tammar Wallaby (Macropus eugenii) populations and the conservation of threatened species*	• This study found all three populations had low genetic diversity, high levels of effective inbreeding and increased frequency of morphological abnormalities.	• These results highlight the importance of incorporating genetic management strategies when utilising islands as refuges for declining mainland populations.
Muirhead et al. 2006 *Roo-Guard® sound emitters are not effective at deterring tammar wallabies (Macropus eugenii) from a source of food*	• Auditory deterrents have been used to keep kangaroos off crops and airstrips. • The Roo-Guard® sound emitter was not effective in deterring tammars from food even when alternative source of food was available.	• Expect that resident tammars might easily habituate to the sound or ignore them.
Robert and Schwanz 2013 *Monitoring the Health Status of Free-Ranging Tammar Wallabies Using Hematology, Serum Biochemistry, and Parasite Loads*	• Wallabies from the naval base have an almost unlimited supply of food and water from irrigated sports fields and lawns, whereas wallabies from north and south bush populations are reliant on the fluctuating abundance of rainfall and natural vegetation growth. • This study also showed that naval base wallabies just prior to summer were in significantly better body condition than those wallabies from the 2 bush sub-populations.	• Health monitoring is an integral part of the management of both captive and free-living populations and the data presented here will serve as an effective management tool in assessing the health status of free-living tammar wallabies.
Robert et al. 2015 *Artificial light at night desynchronizes strictly seasonal reproduction in a wild mammal*	• Light pollution in urban environments masks seasonal changes in ambient light cues, suppressing melatonin levels and delaying births in the tammar wallaby.	• The irrigation of these lawns was recently disconnected, and the only irrigated grassed area (the oval) has been fenced to exclude wallabies. Late-producing base wallabies may suffer a trophic mismatch and food shortages during late lactation, with reduced offspring survival resulting in larger-scale impacts at the population level.

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Reference	Conclusions	Management implications
Schwanz and Robert 2012 *Reproductive ecology of wild tammar wallabies in natural and developed habitats on Garden Island, Western Australia*	• Females in a native bushland were in poorer condition yet were more likely to have pouch young, and had larger pouch young, in March than did females living in a water-supplemented habitat on a naval base. • Annual variation in precipitation had a dramatic effect on population weaning success in the native bushland, but not on the naval base.	• N/A
Walker 2002 *Factors affecting the road deaths of Tammar Wallabies (Macropus eugenii) on Garden Island*	• Tammars were more often accessing the road verge through holes in fences than from unfenced scrub. • The favoured vegetation of the tammar, *Acacia rostellifera – Melaleuca huegelii*, on the road verge may have an impact on the number of road deaths that occur. • Mating season of the tammars correlated with decreased road deaths. • Over 80% of road deaths occurred on the main road of the island and the roads surrounding the main buildings of the Navy.	• Focus on reducing the number of tammars that cross the road and increasing driver awareness of the tammars and their behaviour on the road. • A culvert under the road, which is a form of underpass, could assist the tammars in reaching and returning from their desired destination. • Monitoring of the road deaths is advised in the future to establish the effectiveness of the strategies.

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4. Management strategies

Management of Tammar Wallabies on Garden Island requires a multi-faceted approach given the different and complex issues relating to the base and bushland areas. For this reason, management strategies have been separated according to the relevant objectives as stated in Section 1.2.

Table 2 provides an evolution of the potential management strategies for the tammar wallaby populations on Garden Island. Each objective is supported by one or more management strategies.

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Table 2: Management strategies relevant to the objectives

Management strategy	Rationale	Current management	Future management	Measurement	Frequency/timing	Action trigger
Objective 1: To ensure the tammar wallaby population across the island is sustainable into the future and individuals are in a healthy condition						
1a) Ongoing monitoring of numbers, animal condition and reproduction	Historic monitoring has been too dispersed in time to provide robust data on the population. Annual monitoring over the next five years should be used to provide a solid baseline of data on population distribution, population size, natural population cycles, animal health, rates of survival and reproduction, and to monitor the impacts of management strategies. This includes understanding reproduction, as tammar wallabies are breeding outside of the expected time (i.e., ELA [2023c] observed a high number of females with pouch young or young-at-foot within the base in December).	Trapping has been undertaken irregularly since 2005 (Chambers 2009b, Schwanz et al. 2011, DPaW 2014a). The latest trapping was undertaken in December 2022 (as per ELA [2023a] methodology). Spotlight counts have been conducted from 1999 to 2007, using the transect route defined in Brooker et al. (1992). The latest spotlighting was undertaken in December 2022 (as per ELA [2023a] methodology). Thermal drones were utilised for the first time in 2022.	Tammar wallaby monitoring (i.e., trapping, spotlighting, thermal drone) to be undertaken annually to collect a comprehensive baseline of population data and develop optimal monitoring and management programs. Trapping (mark-recapture) may be focused into more discrete areas to provide increased trapping effort and better opportunities for robust population estimates. Continuing to update the Tammar Wallaby Monitoring Plan every five years to reassess methodologies (next update due 2027). A number of different approaches to monitoring frequency can be employed. One approach would be to invest in 2-3 years of mark-recapture annual surveys to gain quality, robust baseline data for population estimates and monitoring of average health, in one or multiple areas on the island, to set up for long-term monitoring and comparison of data to other methodologies where the accuracy of population counts have yet to be established and animal health cannot be assessed (e.g., thermal drones). Mark-recapture can easily be coupled with spotlighting, with cost efficiencies, to provide detailed data on population size and health in selected areas whilst also being able to a broader population estimate across the entire island. Annual monitoring provides the best opportunity to identify natural patterns in population size and health that in turn allow for more rapid detection of changes in the tammar wallaby population and an understanding of why this is likely happening. Alternatively, if resources are limited, it would be recommended to maintain annual thermal drone and spotlighting as a minimum, with spotlighting providing an opportunity to assess how consistently thermal drone counts are collecting data. This work could be interspersed with or complemented by mark-recapture methodology every 2-3 years to monitor health and condition of animals, and to gain more robust population data over a medium-term time frame. This approach may provide more variable data and result in taking longer to identify broader changes in the local population.	Monitoring undertaken (as per ELA [2023a]) and report prepared. Consider including traps in the bushland east of base (population may be restricted) and consider taking hair samples (for potential future genetic work). Updated Tammar Wallaby Monitoring Plan	Annually until 2027 Every five years	The population shows signs of declining health/condition (i.e., injury, disease) and overall population size.
Objective 2: To ensure all injured animals are handled quickly and ethically in accordance with State and Federal legislation						
2a) Updated MOU	Defence has an obligation to manage road related incidents and to treat sick, injured or orphaned wildlife. Whilst it is acknowledged that a certain number of road deaths on Garden Island are inevitable and, in many cases, unavoidable, allowing injured animals to suffer	The Defence SOP No. 1 Management of Dead, Sick, Injured and Orphaned tammar wallabies is working well, and individuals are being handled quickly and with minimal stress.	An update to the MOU is required. Animal handling training to be undertaken by Defence land management team.	Update of the MOU Certificate of animal handling.	Over the next two years	No significant decrease in average number of deaths/injuries/orphans recorded.

Management strategy	Rationale	Current management	Future management	Measurement	Frequency/timing	Action trigger
	unnecessarily as a direct result of Defence's presence on the island is unacceptable as per the MOU (established in 2014).	A local vet and Perth Zoo are used to provide professional advice and services where required. All staff involved in wallaby handling participate in regular toolbox sessions. There is also a wider pool of people able to triage injured animals, so shorter wait times for animals to be assessed. All injured wallabies and the preceding chain of events are recorded on injury record forms. These are audited by the Environment and Sustainability Manager. Any unusual or concerning events are recorded as environmental incidents, following Defence's Environmental Management System procedures. All deaths and injuries are recorded on a summary spreadsheet. There are records from 2004-2015 and 2018-2022. Road toll rates remain unchanged at this stage and average 400 per year.			One off occurrence including for new starters	
Objective 3: Reduce the number of tammar wallaby road deaths, injuries and orphaned joeys by 20% over five years						
3a) Modify driver behaviour	Current speed limits on Garden Island are impacting upon the number of road deaths (Chambers et al. 2010). It is likely that mortality as a result of vehicle strikes is limiting the increase in individuals at the base (Chambers and Bencini 2010), however this is not an adequate solution to control the population and creates serious animal welfare, social and economic issues for Defence. Defence has a moral and legal obligation to prevent death and injury to tammar wallabies as a result of vehicle strikes or other Defence operations, and to ensure the populations are being managed sustainably.	Speed limit on most roads around base is 40 km/hr, but Dampier road (main road north) remains at 60 km/hr. All staff and contractors receive an induction about environmental matters, including the tammar wallaby population. While the number of road collisions and deaths has not decreased, the quality and level of reporting by all parties has increased significantly.	Permanent wallaby/wildlife warning signs need to be installed. Speed limits along a section of Dampier road should be considered for reduction to 40 km/hr at dawn and dusk. This aligns with the time majority of the deaths are discovered by grounds crew (0500-0700), at the commencement of personnel shifts (Figure 4). The specific section of Dampier road should be guided by the locations where majority of the road deaths are occurring (Figure 5). Research from Blacker (2004) and Bond and Jones (2014) should be considered.	Permanent wallaby/wildlife warning signs (preferably with lighting) installed, particularly along Dampier Road in areas with high death frequency. Speed limit reduced using an interactive sign (such as the flashing signs used around school crossings). This could be paired with interactive speed signs. These speed limits need to then be enforced by Defence.	One off occurrence	Annual trends in roads deaths/injuries/orphans do not decrease by 20% over five years.
3b) Reduce artificial food availability	The establishment of the base on Garden Island has led to a relatively constant supply of food for tammar wallabies from the lawns, ovals and road verges (McMillian et al. 2010). Irrigation of the majority of the grassed areas at base ceased in 2012, leaving only the oval, Quarterdeck and Z-Force Memorial (all fenced) irrigated. However, grass and other palatable weeds still persist in many areas. Grass (i.e., Kikuyu, Couch and Buffalo Grass) should be gradually reduced and removed from around the base, which will encourage tammar wallabies forage in areas of remnant vegetation. Remnant vegetation not only provides tammar wallabies with suitable food resources (both native and introduced species), but also provides cover	A project to replace wallaby fencing around the oval was completed in 2019. This includes new self-closing gates and secure fence skirt around the whole fence. The Z-Force Memorial was fenced in 2020 and Quarterdeck fenced in 2021. Under the base redevelopment a number of roads have been repaired and new footpaths built. During these works grass verges have been reduced and replaced with paths and/or compacted limestone. Some vegetation clearing has been conducted over the last few years to enable bushfire compliance under power lines and near buildings, this has also	More reduction in grass areas, especially along road verges along Dampier Road. Areas may be prioritised based on location (e.g., most frequented areas by traffic, most deaths occurring)	Removal of all grass from road verges and replacement with alternative substrates (e.g., gravel).	Over the next five years	Annual trends in road deaths/ injuries/ orphans do not decrease by 20% over five years.

Management strategy	Rationale	Current management	Future management	Measurement	Frequency/timing	Action trigger
	for them and keeps them away from road verges where risk of vehicle strike is greatest.	had the added effect of increasing visibility along roads and reducing habitat along roadsides.				
3c) Ongoing maintenance and improvements to fencing	Several studies have found that tammar wallabies have been moving between the base and adjoining bushland, most likely to feed on food resources within the base and reside in the bushland (Chamber 2009 and Chambers and Bencini 2010). This poses a serious threat to the individuals in the southern bushland and base due to the high risk of vehicle strikes when individuals move between the two areas.	Installation of wallaby-proof fencing along majority of the base boundary in 2011 and a significant portion of perimeter fencing replaced in 2021 including a wallaby-proof apron. A SOP for wallaby fencing has been prepared and distributed.	Complete a fence/gate check every month and continue to repair fencing/gates as needed. Update the wallaby fencing SOP regularly and distribute to relevant personnel.	Recording system for fencing/gate checks and maintenance. Updated wallaby fencing SOP.	Ongoing	Fencing/gate checks and maintenance occurring less than once per month.
3d) Install one-way gates	Large numbers of tammar wallabies congregate along Dampier road verges to graze on grasses and palatable weeds. A high number of vehicle strikes result from this as individuals get stuck along fence lines and do not have an easy access route out of these areas. One option to counteract this is to install a series of one-way gates in the boundary fence along Dampier Road, providing an alternative escape route for tammar wallabies to reduce the instances of them running into oncoming traffic. This would mean individuals could exit the base into the adjoining bushland but would not be able to return.	One-way gates have previously been trialled by Defence, however they were not very successful due to the design being too heavy for use by tammar wallabies. Swing gate designs have been developed in WA that allow for the movement of kangaroos (DEC 2009), however this design may need to be modified to allow for the difference in size between kangaroos and tammar wallabies. Spear-design one-way gates have also been successful in the management of agile wallabies at RAAF Tindal.	Further investigations required.	One-way gates are installed and used by tammar wallabies.	Over the next five years	N/A
3e) Install grids at main access gate	Tammar wallaby movement from the base to the northern bushland primarily occurs through the main access gate. The main access gate is controlled electronically, and access cards are required to open the gate during most times of the day. However, in the morning and evening the gate is left open due to the high amount of traffic passing through at the commencement and finish of personnel shifts. Tammar wallabies have been observed 'lining up' to pass through the gate at dawn and dusk when the gate is first opened.	Installation of grids on the access gate have been considered a feasible option to potentially reduce the number of tammar wallabies accessing the base. Grids have been installed and used at RAAF Tindal and on King Island in Tasmania (Statham and Statham 2013).	Consider trial installation of a grid at the northern access gate. Ensure bar spacing is narrow enough to prevent the risk of tammar wallabies falling through (including juveniles). Studies undertaken at King Island utilised a grid with the following dimensions: Width 3.2 m; Depth: 3 m; Bar Spacing 125 mm; and Bar width 50 mm (Statham and Statham 2013).	Grids installed and are demonstrated to be effective at reducing tammar wallaby movement.	Over the next five years	Suggest monitoring via motion sensor cameras following installation of grids to gauge success.
3f) Relocate displaced wallabies found inside the cantonment area as required	Tammar wallabies are accessing the cantonment area due to availability of habitat (e.g., food resources). Frequent callouts requested to relocate a wallaby or multiple wallabies found trapped inside fenced areas and require relocation to the bush.	Wallabies are relocated on a case-by-case basis, based on availability of Land Management team.	Relocation of tammar wallabies should be coupled with additional management strategies (3a-e), to prevent initial access of wallabies into the cantonment area. It is recommended that tammar wallabies are relocated to areas with restricted access to return to the cantonment area, to prevent additional risk of road deaths. Tammar wallaby individuals should be dispersed appropriately across the island to prevent increase on population density and stress or competition for resources in one area.	Tammar wallabies are relocated away from the cantonment area. Coupled with additional management strategies (3a-e), less tammar wallaby individuals are returning to the cantonment area.	Ongoing, as required.	Callouts to relocate tammar wallabies from the cantonment area are less frequent.
Objective 4: To manage the tammar wallaby population across the island in a holistic way in conjunction with broad scale biodiversity and land management objectives						

Management strategy	Rationale	Current management	Future management	Measurement	Frequency/timing	Action trigger
4a) Bushfire management	Currently no controlled burns are carried out on Garden Island due to recommendations for management of the *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands Swan Coastal Plain Threatened Ecological Community (DPaW 2014b). Tammar wallabies would also put high grazing pressure on the new growth post-fire. Consideration needs to be given to the impacts to vegetation, impacts to and from tammar wallabies, and the safety of personnel and Defence operations.	The latest Garden Island Bushfire Risk Management Plan is dated 2019-2024 (ELA 2019). In the event of accidental fire, ELA (2019) states 'develop a response plan and monitor the species recovery'.	Update Bushfire Risk Management Plan every five years. Develop a Fire Response Plan or SOP for tammar wallabies in the case of accidental fire. This could include fencing off burnt areas in the event of fire.	Updated Bushfire Risk Management Plan Production of a Fire Response Plan or SOP	Every five years Over the next two years	At least five tammar wallabies observed grazing in fenced off areas (post accidental fire) each month.
4b) Weed management	Bushland condition appears to correlate with the health and condition of tammar wallabies in bushland areas. For example, the southern half of the island is dominated by *Acacia rostillifera* Shrublands with high abundance of arum lily (*Zantedeschia aethiopica*), whilst the northern half of is dominated by *Melaleuca lanceolata* Woodlands with less impact from arum lily (ELA 2023b). This is comparable to the higher number of tammar wallabies observed in the northern bushland area than the southern bushland area (ELA 2023c).	Arum weed control occurs in bushland areas each spring by a licensed weed technician. As arum control needs ongoing follow-up treatments to ensure success, it is not advised to change strategy.	Arum control annually and weed and bushland condition survey biennially. Develop a Weed Management Plan or SOP to ensure frequent weed control is being undertaken.	Weed and bushland condition assessment Production of a Weed Management Plan or SOP	Biennially Over the next two years	Decrease in bushland condition (e.g., from Good to Poor) due to overgrazing recorded in biennial weed and bushland assessment.
4c) Fox management	Foxes are increasingly being observed on Garden Island, with records being kept since January 2022 (pers. comms. Ventia Regional Environmental Manager, 2023). There have been 41 observations, and two of these observations resulted in the death of a tammar wallaby (individual maimed around the neck, fox observed eating an individual).	Defence has engaged DBCA's Western Shield Program, a wildlife conservation program aiming to protect native animals within DBCA managed land and selected remnant bushland areas of Western Australia. The proposed fox management for the island includes 1080 poison baiting and wildlife monitoring camera installation. A 5-night ground shooting program is undertaken by a licensed pest technician when a fox is observed on the island.	Implement DBCA's proposed fox management (i.e., 1080 poison baiting, wildlife monitoring cameras) and continue with ad hoc fox shooting on the island. Develop a Fox Management Plan or SOP to ensure fox management is being undertaken.	Report from DBCA of effectiveness of fox management Production of a Fox Management Plan or SOP	Over the next two years Over the next two years	Deaths associated with foxes recorded.

4.1. Recommended strategies for management

Priorities, timing, indicative costs and responsibilities for implementing each management strategy outlined in Table 2, is presented in Table 3. It is recommended that high priority strategies be implemented first. Some management strategies are ongoing or implanted gradually to ensure strategies do not have sudden detrimental impacts on the tammar wallaby population.

Costs of implementing each strategy are difficult to estimate, therefore an indication of cost has been estimated for each strategy based on three cost levels; Low (less than $10,000), Moderate ($10,000 - $100,000), and High (greater than $100,000).

Table 3: Recommended management strategies, priorities, indicative costs, and responsibilities

Management strategy	Priority	Timing	Cost	Responsibility
Objective 1: To ensure the tammar wallaby population across the island is sustainable into the future and individuals are in a healthy condition				
1a) Ongoing monitoring of numbers, animal condition and reproduction.	High	Annually	High > $100,000	Land Management Contractor (on behalf of Defence), contractors
Objective 2: To ensure all injured animals are handled quickly and ethically in accordance with State and Federal legislation				
2a) Updated MOU	Moderate	Ongoing	Moderate $10,000 - $100,000	Defence, DBCA, native animal rescue
Objective 3: Reduce the number of tammar wallaby road deaths, injuries and orphaned joeys by 20% over five years				
3a) Modify driver behaviour	High	Ongoing	Low <$10,000	Defence
3b) Reduce artificial food availability	Moderate	Over the next five years	Moderate $10,000 - $100,000	Land Management Contractor (on behalf of Defence), contractors
3c) Ongoing maintenance and improvements to fencing	Moderate	Ongoing	Moderate $10,000 - $100,000	Land Management Contractor (on behalf of Defence)
3d) Install one-way gates	Low	Over the next five years	Moderate $10,000 - $100,000	Defence, contractors
3e) Install grids at main access gate	Low	Over the next five years	Moderate $10,000 - $100,000	Defence, contractors
Objective 4: To manage the tammar wallaby population across the island in a holistic way in conjunction with broad scale biodiversity and land management objectives				
4a) Bushfire management	Moderate	Ongoing	Moderate $10,000 - $100,000	Defence, contractors
4b) Weed management	Moderate	Ongoing	High > $100,000	Land Management Contractor (on behalf of Defence), contractors

Management strategy	Priority	Timing	Cost	Responsibility
4c) Fox management	High	Ongoing	Moderate $10,000 - $100,000	Land Management Contractor (on behalf of Defence), DBCA, contractors

4.2. Additional management strategies not considered for inclusion

Several other strategies for the management of tammar wallabies on Garden Island were considered, however it was decided that they were not viable options for inclusion in this management plan. These options may still wish to be considered by Defence.

Table 4: Non-viable management strategies in the 2023 management plan

Considered management strategy	Rationale for not including in the management plan
Translocation This includes translocating individuals that may be restricted to the bushland east of the base (ELA 2023) and translocating individuals from the base to the bushland areas or the mainland if monitoring indicates declines in population health that could be remediated through translocations.	There a number of issues associated with this option including; food availability, gene flow, carrying capacity, capture myopathy, impacts to health/reproduction rates/survival rates etc. Consistent annual population monitoring is required to understand the population growth and carrying capacity of the island before translocation can be considered.
Sterilisation and/or contraception	Sterilisation and contraception (hormone control) are effective methods to reduce reproductive success of macropods. However these methods are very labour intensive and can have varying success (Frawley 2010). Hormone control involves relatively high costs per animal and only provides a limited period of fertility control. Surgical or chemical sterilisation is often irreversible and therefore may have long-term impacts on the population due to loss of genetic diversity and inbreeding amongst the remaining unsterilised animals (Cooper and Larsen 2006). Consistent annual population monitoring is required to understand the population growth and carrying capacity of the island before a reduction in reproduction can be considered.
Culling	Culling is a commonly used means of controlling many overabundant species, particularly macropods, in Australia (Frawley 2010). However it is considered an inappropriate means of population control by many given the issues surrounding animal welfare and the wellbeing of personnel responsible for implementing culling programs. Consistent annual population monitoring is required to understand the population growth and carrying capacity of the island before culling can be considered.
Use of noise/light deterrents	Deterrents such as reduced lighting and sound emitters have proven ineffective on Garden Island (Muirhead et al. 2006, Chambers et al. 2010). Artificial lighting is known to attract, rather than deter, macropods and can have physiological impacts (Robert et al. 2015). Chambers et al. (2010) found that differences in artificial lighting around the base did not

Considered management strategy	Rationale for not including in the management plan
	appear to influence the behaviour of tammar wallabies in regards to vehicle strikes. Noise emitters such as Roo-Guard® do not have a significant effect on tammar wallaby behaviour (Muirhead et al. 2006). Other issues with noise deterrents are that animals can become habituated to signals over time if played constantly, and use of such signals could lead to long-term changes in the species' responses to their own warning signals (Bender 2005).
Installation of overpasses/overpasses	Underpasses and overpasses are intended to facilitate movement of fauna between habitats without the risk of vehicle strikes, and to prevent population fragmentation. Underpasses and overpasses have been listed as potential management strategies in previous studies (Walker 2002), and have been a successful tool in wildlife management in other places in Australia. However, the layout of the base on Garden Island is not suited to the installation of underpasses or overpasses, mainly due to the verge widths and the number of crossroads. Underpasses and overpasses generally work best on large highways that dissect large tracts of remnant vegetation. Installation of underpasses and overpasses is very expensive, particularly if installed after road construction has already been completed. In addition, to be effective, relevant roads would need to be fenced to encourage the use of the underpasses and/or overpasses. This too would be very costly and require ongoing maintenance.

5. Reporting and review

5.1. Reporting

The Tammar Wallaby Management Plan needs to be distributed to all relevant Defence and DBCA personnel, and key stakeholders to ensure staff are aware of their responsibilities for implementing management strategies.

Reporting for the Tammar Wallaby Management Plan should be conducted annually and distributed to all relevant personnel and stakeholders. The aims of the annual report are to keep personnel informed of the outcomes of current and previous management, any changes to management strategies required, and the importance of implementing these actions. The annual report should include progress reports on ongoing management strategies and changes to responsibilities of key personnel.

5.2. Review

It is recommended that the Tammar Wallaby Management Plan has minor reviews at regular intervals to ensure that the management strategies being implemented are appropriate and are adequately managing the populations of tammar wallabies on Garden Island. Factors that need to be considered when reviewing the Tammar Wallaby Management Plan are not only the effectiveness of each individual strategy, but also the ways in which each strategy interacts with others. The welfare of the animals is of key importance, as well as how the strategies are interacting with other Garden Island policies and procedures. Cost is also a factor, and may limit the success of a particular strategy if it cannot be implemented appropriately.

It is recommended that the Tammar Wallaby Management Plan has a major review after five years. This will allow for the incorporation of the data and patterns obtained through conducting the recommended annual monitoring program over the next five years. That data should establish the best means of monitoring the wallaby population and any changes needed in tammar wallaby management to maintain a healthy population on Garden Island. The Tammar Wallaby Management Plan is intended to remain in place until such time as it is revised, updated or replaced.

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Appendix G

Garden Island Tammar Wallaby Monitoring Plan (Eco Logical, 2023b)

Garden Island Tammar Wallaby Monitoring Plan

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Abbreviations

Abbreviation	Description
CASA	Civil Aviation Safety Authority
DBCA	Department of Biodiversity, Conservation and Attractions
DEC	Department of Environment and Conservation
DPaW	Department of Parks and Wildlife
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
RePL	Remote Pilots Licence
TSSC	Threatened Species Scientific Committee
WAM	Western Australian Museum

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Introduction

The tammar wallaby (*Notamacropus eugenii*) is a herbivorous marsupial that is native to southern Western Australia (WA) and South Australia (SA). The distribution of the species in Australia has contracted since European settlement due to loss of suitable thickets due to inappropriate fire regimes, land clearing and predation by the European red fox (*Vulpes vulpes*) (DEC 2012).

The WA subspecies of the tammar wallaby, *Notamacropus eugenii derbianus*, is currently known to inhabit three islands in the Houtman Abrolhos group (East and West Wallabi Island, and an introduced population on North Island), Garden Island near Perth, Middle and North Twin Peak Islands in the Archipelago of the Recherche, and several sites on the mainland - including, Dryandra, Boyagin, Tutanning, Batalling (reintroduced), Perup, private property near Pingelly, Jaloran Road timber reserve near Wagin, Hopetoun, Stirling Range National Park, and Fitzgerald River National Park (DEC 2012, Woinarski et al. 2014).

The WA subspecies of the tammar wallaby is listed as Priority 5 by Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Museum (WAM). Priority 5 species are defined as 'Conservation Dependent species'; species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years (WAM 2022).

Historically, two subspecies of the tammar wallaby occurred in SA; *Macropus eugenii eugenii* (mainland SA) and *M. eugenii decres* (Kangaroo Island). The mainland SA subspecies became locally extinct in the 1930's, but was reintroduced to Innes National Park from 2004.

In 2015, the genus of the tammar wallaby was reverted to *Notamacropus*. Genetic research determined that the Kangaroo Island and mainland SA subpopulations are the same subspecies, and *Notamacropus eugenii eugenii* has now been synonymised with *N. e. decres* (Eldridge et al. 2017).

The SA subspecies of the tammar wallaby was listed as Extinct under the predecessor to the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Endangered Species Protection Act 1992*, and transferred to the EPBC Act in July 2000. The minister has since deleted this species from the Extinct category effective 22 February 2019 (TSSC 2019) and the subspecies is now listed as Least Concern (Woinarski et al. 2014).

1.1. Relevant biology/ecology

The tammar wallaby is a small marsupial, with the WA subspecies 2.9-6.1 kg in males and 2.3-4.3 kg in females (DEC 2012). This species typically inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland. This species is primarily nocturnal; during the day individuals rest in thick cover, venture into the open to forage after dark, and return to cover before dawn. They have defined home ranges, but are non-exclusive and overlap the home ranges of other tammar wallabies. Individuals have been observed feeding in the same area and no social grouping has been observed except between females and their young.

The tammar wallaby is herbivorous, and their diet consists mostly of grasses (DEC 2012). On Garden Island, tammar wallabies on the base were found to be gaining approximately 85% of their diet from **Cynodon dactylon* (Couch Grass) growing on the base's ovals and road verges, while those in the bushland areas of Garden Island were found to rely on *Acacia rostellifera* (Summer-scented Wattle),

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Austrostipa flavescens, *Eremophila glabra*, *Rhagodia baccata* (Berry Saltbush), *Solanum symonii*, and the introduced weeds; **Asparagus asparagoides* (Bridal Creeper), **Asphodelus fistulosus* (Onion Weed) and **Trachyandra divaricata* (Strap Lily/Dune Onion Weed) (McMillan et al. 2010, McMillian 2006). The species can survive without permanent freshwater, and are known to drink seawater (TSSC 2019).

The tammar wallaby breeding cycle is documented only for the Kangaroo Island population (DEC 2012). It shows a strictly seasonal pattern, with single young born from late January to March and suckled in the pouch for 8-9 months until leaving the pouch in September or October (October or November in WA). Females become mature about nine months after suckling, and males mature at two years. The rate of reproduction is high with approximately 90% of females carrying a pouch young by the end of the breeding season. Males may live to at least 11 years and females to 14 years (Hinds 2008).

1.2. Garden Island population

Garden Island has an area of approximately 1,200 ha and is 10 km long by 1.5 km wide, lying approximately 5 km off the coast of Rockingham in WA. The only native mammal to become established on Garden Island is the tammar wallaby.

1.2.1. Previous research

A number of studies have been conducted over the last 50 years involving the population of tammar wallabies on Garden Island. These include genetic comparisons with mainland populations, diet and fire exclusion, health, home range, reproduction and road-kill analysis.

Kelsall (1965) and Yokochi (2007) compared physiology and genetics of tammar wallabies on Garden Island with those from Tutanning Nature Reserve on the mainland and an island in the Houtman Abrolhos. Tammar wallabies could be distinguished from animals on the mainland population by their reddish colouration, proportionally shorter tails and their more elongated skull shape (Kelsall 1965). Tammar wallabies on Garden Island had an intermediate level of inbreeding compared with those from the mainland, which had very low inbreeding, and animals from an island in the Houtman Abrolhos, which had very high levels of inbreeding. These results also suggest that inbreeding does not reduce the fitness of tammar wallabies at the levels found on Garden Island. The high birth rates found by Chambers (2008) also support this assertion.

Moredoundt (1983) and McMillian (2006) studied the diet of the tammar wallabies on Garden Island. Tammar wallabies on Garden Island preferentially graze plants that are regenerating after disturbances such as fires (Moredoundt 1983). The high density of tammar wallabies on Garden Island was therefore likely to restrict the regeneration of these burnt areas (Bell et al. 1987). These finding have strongly influenced the decision to manage Garden Island on a fire exclusion basis.

Bradshaw (1988) studied the physiological well-being of the tammar wallabies on Garden Island and found that in general the population on Garden Island was in very good health with no reported cases of *Salmonella* or other health problems. It was also found that the condition of the tammar wallabies varied greatly over the year with a reduction in the condition of the animals through late summer and autumn to reach a low point in early to mid-winter, before the animals regained condition through spring and early summer as the quality and quantity of the available food increased.

Chambers (2009a) studied the home ranges of tammar wallabies in different areas of Garden Island using radio-telemetry. It was found that the mean size of the home ranges of the tammar wallabies was approximately 3.9 ha in summer and 3.2 ha in winter. There was no significant difference between the size of home ranges between males and females or between the naval base and the bushland areas of

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Garden Island. Tammar wallabies that live near the naval base in the southern bushland areas were found to typically move onto the naval base each night to feed.

Chambers (2009a) found that the timing of births in the tammar wallaby population on the naval base was significantly different to the bushland areas of Garden Island. The tammar wallabies on the naval base had a median birth date that was approximately 20 days later than those in the bushland and there was also more variation in the birth dates. This may have been the result of artificial light sources on the naval base influencing the reactivation of embryos from diapause. Reactivation usually occurs as a response to reducing day length after the summer solstice and lighting on the naval base may be interfering with the tammar wallabies ability to detect this change.

The high number of wallabies on the naval base in and around heavily trafficked areas has led to ongoing problems with the management of road-kills, injured adults and orphaned joeys. The Department of Defence has recognised road deaths of tammar wallabies on Garden Island as a considerable problem for a number of years. Road deaths of tammar wallabies on Garden Island have been recorded since 2000 (Chambers 2008), with maintained records available for the 2004-2015 and 2018-2022 time periods. On average of approximately 400 individuals (adults and joeys) are killed per year (Department of Defence Environment and Sustainability Manager Pers. Comms. 2022). There have been a significant number of studies examining the road-kills, including variables affecting (Chambers and Bencini 2010, Chambers and Bencini 2008, Walker 2002), mitigation through deterrents (Muirhead et al. 2006, Muirhead 2001) and population level impacts (Chambers 2009a).

Walker (2002) studied the temporal and environmental variables that were associated with the number of animals killed by vehicles. It was found that dense roadside vegetation, above average numbers of personnel in port, increasing rainfall and the presence of fences on one side of the road were all correlated with increased numbers of road-kills. Some issues with the statistical analysis in the work were later identified and the study was redone by Chambers and Bencini (2008). This later study found that day length, verge width and speed limit were the only factors that were correlated with the numbers of road-kills. In particular, day length was negatively correlated with the number of animals killed (less animals killed as day length increased) and verge width and speed limit of the road were positively correlated with numbers of animals killed. The relationship between road deaths and rainfall and personnel in port, found by Walker (2002), were artefacts of these variables being correlated with day length.

Muirhead (et al. 2006 and 2001) found that the Roo-Guard™ sound emitting devices, installed in 1995 on Garden Island with the goal of deterring tammar wallabies from grazing, were ineffective at reducing the number of tammar wallabies killed.

Chambers (2003) found that the road-kills of tammar wallabies on Garden Island appeared to be biased towards older animals, however Chambers (2008) found that there was a greater impact on the survival of less than one year old's than on their adult counterparts. It was also found that the road-kills on the naval base were significantly reducing the rate of increase in that population and that the current rate of road-kills was likely to be higher than the population could sustain. In particular the road-kills were predicted to have a serious negative effect on the population of tammar wallabies in the bushland directly to the west of the naval base. It was also found that if the road-kills were not occurring then the tammar population on the naval base itself had the potential to increase in size by as much as 30% per year. This was a result of the tammar wallabies on the naval base having higher natural survival rates and consistently high weaning rates regardless of drought or extremely wet conditions. In contrast, the rates of survival and weaning success of the tammar wallabies in the bushland areas of Garden Island

was reduced significantly in years with very high or very low rainfall. The size of the tammar populations in the bushland was found to decrease by as much as 25% in years with very high rainfall and low winter temperatures. The specific reasons for this pattern remain unclear but it is possible that significantly higher rainfall paired with low temperatures may decrease food availability (grasses unable to survive in cold temperatures), with the result that wallabies may deplete energy stores to keep warm and become unable to maintain young. In years where rainfall is close to the long-term mean the populations in the bushland areas were predicted to increase in size by approximately 10%.

1.2.2. Previous monitoring

Spotlight counts were conducted on Garden Island from 1999 to 2007, using the transect route defined in Brooker et al. (1992). The counts varied in timing (i.e., fixed time versus time relative to sunset) and weather conditions, which has consistently limited the ability to accurately detect changes in the size of the tammar wallaby population. For example, Brooker et al. (1992) found that the number of tammar wallabies had likely increased since the establishment of the naval facilities on Garden Island, but could not confirm this. Another fauna survey by Wykes et al. (1999) found that the number of tammar wallabies had probably not changed significantly between 1991 and 1998. The counts also disagreed with the known biology of tammar wallabies. For example, the spotlight counts in 2005 and 2006 suggested that the number of tammar wallabies was declining from September to December; the period when young animals are weaned and join the population.

Trapping (mark-recapture) has been conducted on Garden Island intermittently since 2005, and recent monitoring has been as per the Chambers (2008) methodology (Chambers 2009b, Schwanz et al. 2011, DPaW 2014). The specific objectives outlined in Chambers (2008) are as follows:

1. To discover any changes in the size of the tammar wallaby population that may have consequences for their long-term persistence and for Defence's ongoing management of Garden Island;
2. To gather sufficient data to determine the likely causes of any decline, or increase, in the numbers of tammar wallabies on Garden Island, noting risk factors such as disease and links to low genetic diversity that are affecting many marsupial species elsewhere in Australia; and
3. To gather long-term data on the relationship between annual weather patterns and the rates of survival and fecundity in the populations of tammar wallabies in the developed and undeveloped areas of Garden Island. This will also allow the assessment of change that may occur in this relationship as a result of climate change.

Chambers (2009a) recognised three separate geographic areas on Garden Island based on broad differences in extent of habitat modification and road-kill levels; naval base (highly disturbed), southern bushland (remnant bushland to the west of the naval base) and northern bushland (undisturbed remnant bushland in the northern portion of Garden Island). Traps were located within each of these three areas to provide comparative data. Based on the most recent monitoring undertaken in June 2013, the naval base population was estimated to be approximately 613 (± 109) individuals (DPaW 2014).

Ongoing population monitoring is required to ensure that defence related activities of Garden Island (i.e., vehicle movement) are not having a negative impact on the population of tammar wallabies – that is, the population is remaining overall relatively stable. This has been stated as a management strategy in Garden Island Tammar Wallaby Management Plan (ELA 2016). It will also allow for the accurate

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assessment of the impact of other and ongoing management strategies, including those aimed at reducing the number of road deaths.

Current Methods

Chambers (2008) suggested that the proposed monitoring plan should be reviewed after five years; therefore the following methods should also be reviewed after five years to ensure that the level and timing of monitoring is suitable to gain adequate data for the management of the tammar population.

2.1. Objectives

- To monitor population size and trajectory to inform management of the population, with the aim for long-term population persistence; and
- Investigate if previously identified drivers of population change (e.g., vehicle movement) are having an affect or being managed.

2.2. Timing and frequency

Based on the relevant biology presented in Section 1.1, monitoring of the tammar wallaby population on Garden Island (the island) should be completed from early November through to mid-December to avoid catching females with pouch young. Trapping during this period gives the opportunity to check females for the presence of elongated teats, which are evidence that they have successfully raised and weaned their young. This allows for determination of fecundity without trapping pregnant females, which can cause excess stress for them and the pouch young.

A number of different approaches to monitoring frequency can be employed. One approach would be to invest in 2-3 years of mark-recapture annual surveys to gain quality, robust baseline data for population estimates and monitoring of average health, in one or multiple areas on the island, to set up for long-term monitoring and comparison of data to other methodologies where the accuracy of population counts have yet to be established and animal health cannot be assessed (e.g., thermal drones). Mark-recapture can easily be coupled with spotlighting, with cost efficiencies, to provide detailed data on population size and health in selected areas whilst also being able to a broader population estimate across the entire island. Annual monitoring provides the best opportunity to identify natural patterns in population size and health that in turn allow for more rapid detection of changes in the tammar wallaby population and an understanding of why this is likely happening.

Alternatively, if resources are limited, it would be recommended to maintain annual thermal drone and spotlighting as a minimum, with spotlighting providing an opportunity to assess how consistently thermal drone counts are collecting data. This work could be interspersed with or complemented by mark-recapture methodology every 2-3 years to monitor health and condition of animals, and to gain more robust population data over a medium-term time frame. This approach may provide more variable data and result in taking longer to identify broader changes in the local population.

2.3. Licensing and Animal Ethics

At the time of writing this document, the following licences and approval are required to be obtained prior to undertaking monitoring (i.e., trapping, spotlighting):

- DBCA Fauna taking (scientific or other purposes) licence application[1];

[1] Details: https://www.dpaw.wa.gov.au/plants-and-animals/licences-and-authorities?showall=&start=4

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- Department of Primary Industries and Regional Development (DPIRD) Scientific Use Licence[2]; and
- Animal Ethics Committee (AEC) approval[3].

2.4. Trapping

These methods are based on that established on the island by Chambers (2008) and as per previous monitoring (Chambers 2009b, Schwanz et al. 2011, DPaW 2014).

2.4.1. Standard operating procedures

The following DBCA SOPs are to be adhered to in relation to using traps and animal handling:

- Soft Cage Traps for Capture of Macropods (DBCA 2018);
- Animal Handling and Restraint Using Soft Containment (DBCA 2022a); and
- Permanent Marking of Vertebrates Using Passive Integrated Transponder (PIT) Tags (DBCA 2022b).

2.4.2. Trapping equipment

The traps used to trap tammar wallabies are soft walled 'Thomas' traps (approx. 480Hx360Wx800L, Sheffield Wire Products, Welshpool, WA) (DBCA 2018). These traps consist of shade cloth 'bag' attached to a collapsible galvanised steel rod frame by cable ties. The door is released via a treadle plate mechanism similar to that of a cage trap.

2.4.3. Trap placement

Previous surveys stratified the island into three geographic areas (outlined in Section 1.2.2), resulting in a clustering of traps and a bias representation of vegetation types across trap sites. For a more effective program that can be statistically analysed and provide proper comparisons of habitat preferences, trapping should be stratified per vegetation type and the number of traps deployed in each vegetation type proportional to the coverage of the vegetation types mapped on the island. Broad vegetation mapping of the island was undertaken in November 2022 (ELA *in prep*; Figure 1); Table 1 outlines the proportion of each vegetation type mapped on the island, number of traps per vegetation type in 2014 trapping and suggested number of traps per vegetation type.

Table 1: Previous and proposed trap placement across vegetation types

Vegetation type	Total area (ha)	Proportion of total island vegetation	Number of traps 2014	Suggested number of traps
Acacia rostillifera Shrubland	274.35	0.23	19	27
Acacia rostillifera, *Alyxia buxifolia* and *Spyridium globulosum* Shrubland over *Lepidosperma gladiatum*	116.33	0.10	3	11
Beach / rocks	63.55	0.05	0	6
Cleared	197.58	0.16	61	20
Low Coastal Heath Shrubland	25.69	0.02	1	2

[2] Details: https://www.agric.wa.gov.au/animalwelfare/using-animals-scientific-purposes

[3] Eco Logical Australia uses the DPIRD Wildlife Animal Ethics Committee (WAEC), established in February 2022. Details: https://www.agric.wa.gov.au/animal-welfare/wildlife-animal-ethics-committee-waec

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Vegetation type	Total area (ha)	Proportion of total island vegetation	Number of traps 2014	Suggested number of traps
Melaleuca and Acacia Shrublands[1]	46.43	0.04	2	5
Melaleuca lanceolata Woodlands	260.15	0.21	23	26
Melaleuca lanceolata and *Callitris preissii* Woodlands	227.74	0.19	10	23

[1] Three vegetation types were combined as they only occur across a small area on the island; *Melaleuca huegelii* and *Acacia rostillifera* Shrublands, *Melaleuca lanceolata* Tall Shrubland over *Alyxia buxifolia* and *Callitris preissii* Woodland over *Melaleuca huegellii* Shrubland.

The survey plan includes 120 trap locations, with 60 traps being deployed for the first three nights and then moved to an alternate location for the following three nights. Trapping and spotlighting transects should be conducted at opposite ends of the island to avoid excessive disturbance of the wallabies e.g., trapping could be conducted at 60 of the southernmost sites and northern spotlighting transects traversed on the first three nights, then swapped.

Traps should be placed in a position where they are braced on either side by a tree, bush or other object, or pegged down, as strong winds can set off Thomas traps and tammar wallabies will also throw themselves around when stressed. On the naval base, traps should be placed away from used roads and paths to reduce the chance of traps being interfered with or captured animals becoming stressed because of passing vehicles or pedestrians. In the bushland areas, traps will be placed adjacent to and visible from unused roads for ease of checking.

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Dampier Rd

Broad vegetation mapping

Roads
GI Firebreaks

Veg Mapping
Cleared
Beach / Rocks

Melaleuca lanceolata Woodlands
Melaleuca lanceolata Woodlands
Melaleuca lanceolata and Callitris preissii Woodlands
Melaleuca lanceolata Tall Shrubland over Alyxia buxifolia

Acacia rostillifera shrublands
Acacia rostillifera Shrubland
Acacia rostillifera, Alyxia buxifolia and Spyridium globulosum Shrubland over Lepidosperma gladiatum

Other Veg Types
Low Coastal Heath Shrubland
Callitris preissii Woodland over Melaleuca huegellii Shrubland
Melaleuca huegelii and Acacia rostillifera Shrublands

0 250 500 1,000
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

22PER3396-ED Date: 22/03/2023

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2.4.4. Baiting traps

Commercially available kangaroo muesli is convenient and effective bait for tammar wallabies. It is produced by Thompson and Redwood Produce Supplies (Upper Swan, WA) and can be purchased through stockfeed retailers such as PETstock. Peanut butter can also be added to the kangaroo muesli to make it more attractive. The bait should be placed towards the back of the trap so that the tammar wallaby cannot stand at the front of the trap and eat it without setting the trap off.

2.4.5. Checking traps

As tammar wallabies are nocturnal, traps should be opened in the late afternoon and checked several times during the night and at dawn (no later than 3 hours after sunrise) to avoid stress, exposure and possible capture myopathy of animals from prolonged containment (DBCA 2018). Traps must be closed after checking in the morning and re-opened again in the late afternoon.

Individuals should be removed from the traps as quickly as possible. DBCA (2018) suggests that tammar wallabies can be removed by tipping the trap on its end and reaching in to grasp the base of the tail and lift the animal out of the trap. AWC experts suggested tammar wallabies can be removed by sealing the entrance of the trap with a suitably sized handling bag and encouraging the individual into the bag. DBCA (2022a) suggested dark heavy cotton drill or denim material, however fleece is known to work too. Individuals will be restrained for no longer than five minutes and processed to record the following data in Table 2.

Table 2: Information to record for individuals trapped

Data to record	Comments
Date and time	Of individual being processed.
Ear tag number/s	Check for an ear tag and record number if one is present. This was the previous method of semi-permanently marking tammar wallabies on the island.
PIT number	Check for a PIT tag and record number if one is present.
Weight	This should be undertaken using a 10 kg spring scale. Total and bag weight should be recorded.
Sex	The pouches of females should be examined. The presence of elongated teats, regressed teats and enlarged mammary should be recorded (example photos are shown in Schwanz and Robert 2012).
Length of long pes	This should be undertaken using 200 mm callipers. Individuals should be assigned age classes (juvenile, sub-adult, adult) based on pes length. Animals were classified as adults if their pes length was > 134 mm (males) or 126 mm (females) (Chambers 2009b, Schwanz et al. 2011).
Health condition	Health condition of each individual captured should be recorded as poor, average or good condition with any additional notes as necessary. The presence of current or historic injuries should be recorded.

DPaW (2014) recommended future monitoring use PIT's due to the rate of ear injuries due to missing or infected ear tags still present. Trovan® and Allflex® PIT tags and portable readers are the most commonly used (DBCA 2022b). For terrestrial mammals, PIT tags are to be inserted subcutaneously under the skin in the area between the scapula (shoulder blades), where the skin is usually the loosest. Individuals should be restrained by two animal handlers, only exposing the implant site and leaving the rest of the body in the handling bag, taking particular care to ensure the eyes are covered.

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Individuals should be released as close to the point of capture as possible whilst protecting the individual from used roads. Although highly unlikely given timing of monitoring (Section 2.2), females with pouch young should be 'soft released' where the individual is left in the bag in a cool shaded spot, so it can exit the bag when it feels safe to do so. The female should be checked within 4-5 hours of being left in the bag to ensure that she has not abandoned her pouch young.

2.4.6. Adverse events

Tammar wallabies should be inspected visually when first seen in the trap to check for any obvious injuries. This will include looking for clear signs of old or new injuries or bleeding, indicating undue stress in the form or constant rapid breathing and/or unceasing agitation or shows illness through lethargy or poor body condition. Injured individuals should be managed as per the Department of Defence SOP: *Management of dead, sick injured and orphaned tammar wallabies at Garden Island* including being taken to Garden Island's designated fauna triage room and housed until a veterinarian can attend or until the animal is taken to the vet for assessment, treatment or euthanasia. Perth Zoo has an agreement with Department of Defence to provide over the phone consulting to assist where possible, and Port Kennedy Veterinary Clinic is utilised for onsite visits and offsite euthanasia. Department of Defence have been taking injured tammar wallabies to the Port Kennedy Veterinary Clinic for assessment, treatment and/or euthanasia since 2018, therefore multiple veterinarians have ample experience handling tammar wallabies.

2.5. Spotlighting

These methods are based on that established on Garden Island by Booker et al. (1992) and with consideration of Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) *Survey guidelines for Australia's threatened mammals* (2011). The limitations of spotlighting outlined in Section 1.2.2 have be taken into consideration for this methodology.

Weather conditions are also known to influence the success of spotlight surveys as extreme temperature, rainfall or wind can reduce animal activity and also make it more difficult for an observer to see individuals. The timing of the work in early summer is expected to minimise this risk of adverse conditions occurring.

2.5.1. Spotlighting equipment

Monitoring surveys should be completed using a light hand-held spotlight (minimum of 30-watt for open forests and woodlands, minimum of 50-75-watt in tall or closed forests; Booker [1992] used 100-watt) that is easily carried and is powered by a suitable battery.

2.5.2. Transects

Line transects to estimate population size of macropods are often carried out during the periods of highest macropod activity i.e., generally an hour either side of sunset and sunrise. Commonly, transects are traversed via a vehicle travelling at a slow, constant speed (e.g., 10km/hr) that allows observers adequate time to scan the surroundings for tammar wallabies.

The line transects should be censused three times, with selected roads in the north censused on three consecutive nights and selected roads in the south censused on the subsequent three nights. Spotlighting should be conducted following trap opening each night.

Given the numbers of tammar wallabies on Garden Island, spotlighting will be most successful with four people in one vehicle; one driver, one recorder (situated in the passenger seat or back middle seat), and

two spotters (situated in the two back window seats). Each individual or group of tammar wallabies observed should be recorded, with the number of individuals, distance and angle between the track and tammar wallaby recorded.

2.5.3. Recording animals

For each night's spotlighting survey, the following should be recorded:

- Survey ID (sequentially numbered from 1);
- Date of survey;
- Survey start time;
- Survey end time; and
- Any relevant environmental conditions (for example, temperature, rain).

To add in mapping of survey effort, GPS tracking should be conducted, starting from the survey start and ending at survey end. For each observation of individual or group of tammar wallabies, the following should be recorded:

- Survey ID (taken from the above survey information);
- Road ID (assigned a numeric ID);
- Coordinate;
- Observation time;
- Number of adults;
- Number of juveniles (if easily able to be distinguished from adults);
- Number of pouch young;
- Distance from observer (recorded to the nearest metre); and
- Direction from observer (e.g., W, NW, N, NE, E).

2.6. Thermal drones

For the 2022 thermal drone survey, a DJI Matrice 300 drone mounted with a H20T radiometric thermal sensor was used. The M300 has high-resolution thermal and visual cameras; and supports up to 200x optical zoom I.R. range finder and is capable of centimetre-level positioning accuracy with the RTK module. A 640×512px Thermal Camera was able to provide the requested thermal imagery, and the rated 15 km H.D. transmission facilitated night flying operations. Pilots and spotters deployed for the survey were RePL (Remote Pilots Licence)-certified under the employment of Drone Inspections Western Australia, which operates under a CASA (Civil Aviation Safety Authority) Remotely Piloted aircraft Operations certificate and have completed CASA regulations required to operate unmanned aircraft vehicles >25kg rating in a commercial arena.

2.6.1. Transects

The team should consist of two qualified pilots and two spotters/radio operators, forming two teams. One team should move to the north and one team should move to the south to keep aerial separation of the drones and to cover the whole island in one night. The efficacy of the thermal camera should be maximised by conducting night flights between 18:00 to 05:00 to ensure no thermal crossover.

A thermal sensor mounted onto a drone should be flown over the entire island keeping clear of any military infrastructure at a variable altitude 70-120m above ground level.

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2.6.2. Thermal image processing

Radiometric thermal images and hot spot detections should be reviewed by a trained image analyst. Any wallabies that went undetected during the adaptive thresholding procedure should be manually added, and false positive detections should be removed. The coordinates corresponding to each wallaby detection should be automatically extracted from the image metadata.

2.7. Data analysis

The data should be collected and analysed using the methods described in Chambers (2009a) as per previous monitoring (Chambers 2009b, Schwanz et al. 2011, DPaW 2014).

POPULATION SIZE, GROWTH AND DRIVERS OF CHANGE

To gain robust estimates of population size, two methods should be employed:

1. Analysis of Mark-Recapture data through statistical modelling techniques (such as maximum likelihood and Markov Chain Monte Carlo analysis through the *'marked'* package in R). This should be compared to estimates made through a Jolly Several model to ensure comparability of data from previous surveys. In its simplest form, this assumes that $N = \frac{Mn}{m}$

   N is the population size to be estimated
   M is the number of individuals of the population that are captured initially and tagged
   n is the number of individuals of the population that are captured subsequently
   m is the number of individuals of this subsequent captured population that are tagged

2. Analysis of spotlight data through Distance Sampling methods (e.g., through the package *'distance'* in R)

Both methods have advantages and limitations when estimating population size. When animals can be caught and marked in the field, mark-recapture analysis allows for a statistically robust determination of population size without detailed assessment of habitat availability and an understanding of differences in visibility of individuals throughout different vegetation zones. However, the accuracy of this method depends on the assumption that a large proportion of the population can be captured during any sampling period, which can be time and labour intensive. Distance sampling however can be relatively inexpensive to conduct, with minimal ethical or licencing implications as animals are not captured. If animals can be consistently observed and their distance and direction along a transect be accurately estimated, distance sampling can provide robust estimates of population size and density, without the cost or expertise required for trapping. A comparison of the two methods in the initial years will allow for a cost-benefit analysis to be performed, informing future surveys.

The drone thermal imaging provides a straight count of number of animals recorded in the pass across the island. As such it provides a potential single total count of the wallabies present. However, at this time there are several unknowns in regards to the counts that make it unclear how accurate this total count is. It is not possible to tell how many animals are being double counted as they move between drone passes. It is also unknown how much impact canopy has on drones recording animals on the ground and so how many wallabies are being missed in forest areas. Finally, it is now well established that drone counts become less effective when ambient temperatures are higher as they may no longer distinguish between a wallaby heat signature and background heat signatures and there are likely to be significant undercounts of wallabies if temperatures reach a point where that occurs. How often this

occurs is unknown and only good comparative data with known methods will allow this effect to be determined and compensated for.

DRIVERS OF POPULATION GROWTH

Population growth has previously been estimated through the following equation:

$$\lambda = \mathrm{S} + b/2$$

where *S* is the probability of animals (non-pouch young) surviving from one spring until the next, and; *b* is the weaning rate of females

These values were calculated through program *MARKED.*

Following five years of data collection, the growth of the population should be determined using this equation, for comparison with previous surveys. This equation however does not allow for modelling of growth models other than the exponential aspect of growth (such as logistic and hyperbolic models or models that account for variable carrying capacity). As such, population growth should be modelled using flexible growth curves, such as through the R package '*growthrates'* or equivalent.

Additionally, generalised linear mixed-effects models can be used to determine the drivers of population size and growth. Predictors should include climatic variables, such as annual temperature and rainfall patterns, as well as habitat availability each year (if data are available). If adequate data are available and models reveal strong drivers of population growth or decline, predictive models should also be built to understand the likely trends in population size under future environmental changes such as climate change or habitat removal and/or modification.

POPULATION VIABILITY ANALYSIS

Modelling population trajectories over the long-term is key in understanding likely future management requirements. Population viability analysis (PVA) is a method of assessing risk of population extinction or overabundance, which can also identify key processes that should be factored into management efforts. A PVA can be built using a current understanding of the breeding biology, island fecundity rates and population demographics. If genetic data are also collected, diversity and inbreeding indices can be incorporated into sampling data in order to determine the effects of genetic health on the population. PVA can be conducted in computer programs such as VORTEX.

HABITAT OCCUPANCY

From spotlight and trapping, the presence of tammar wallabies at each survey location can be determined, and habitat occupancy modelling conducted to determine the elements of the island habitat that are influencing the presence or absence of a species (i.e. climate, predation, resource availability, etc.). This will determine areas of important habitat for tammar wallabies and inform management techniques, such as restriction to important resources for population control, or conservation of important resources for population growth or maintenance. Habitat occupancy models can be conducted through R packages such as *'unmarked'.*

CONDITION

The condition of the animals in the different monitoring areas should be compared using a model such as an Analysis of Covariance (ANCOVA), with the weight of the animals as the dependent variable, pes length as the covariate and study area as the independent variable; similar to Chambers 2008. The least-square mean weights and their corresponding standard errors can be used to compare the condition of

the animals with the same time in previous years. The data from males , females and juveniles should be analysed separately as they are affected differently by seasonal conditions, particularly for females due the requirements of raising young (Chambers 2008).

2.8. Comparison of methodologies

The below table is a comparison of current methodologies, including advantages, disadvantages and approximate costings for each methodology (**Table 3**). In 2022, Mark-recapture and spotlighting methodologies were undertaken concurrently, therefore substantial cost efficiencies were able to be made e.g., reduce pre-field tasks, disbursements.

Table 3: Comparison of current methodologies

Methodology	Advantage/s	Disadvantage/s	Approximate cost (including disbursements) *
Mark-recapture	May provide accurate counts on population numbers, e.g., analysis of Mark-Recapture data. May provide robust data on population dynamics, health and condition of the animals. Knowing health and condition may provide an important prelude for population crashes of the species. Good, robust data collected initially can set up for longer-term monitoring.	More expensive and time consuming than alternative methodologies e.g., minimum 4 nights on ground. Needs to be undertaken more frequently for the first 3-5 years for effective data collection and analysis.	$90,000-$105,000
Spotlighting	May provide accurate counts on population numbers e.g., Distance Sampling Methods. Can collect some information on species health and condition (presence of visible joeys, overall condition).	More expensive and time consuming than thermal drone methodology. E.g., minimum 2-3 nights on ground. Information on species health and condition may not be accurate (accurate breeding state, health and condition).	$45,000-$55,000
Thermal drone	Data is in simple form (easy to interpret). More cost and time efficient than alternative methodologies. Can provide a direct comparison between years; e.g., is there a pattern/are numbers going up or down (relative changes in population numbers).	No robust comparison data to relay accuracy. Counts may vary year to year due to external factors (e.g., weather). Not enough definition on image to account for double counts or false signatures, health of animals, population structure (sex, age, condition). May not be able to relate data to a specific cause (e.g., reason numbers are in decline), no understanding of health of individuals.	$12,000-$15,000

*Costs are estimated based on 2022 surveys and may be subject to change based on personnel, logistics, timing etc. Efficiencies may be made if two or more methodologies are combined e.g., running concurrent methodologies.

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S4	0	Z. Carter	K. Clulow	On File	17/02/26	S. Orr	On File	17/02/26

Table 1 Change register

Change register			
Version	**Revision**	**Date**	**Reason for revision**
1	Rev0	12/08/25	Published version for establishing monitoring programs, and for activities required under the early works activities
2	Rev0	20/02/26	Updates made to incorporate activities required for enabling works, and construction of landside facilities including the CIF and the maritime trial piling exercise. No specific changes made to the Heritage Management Annexure due to additional activities. Minor edits made since the previous revision due to site experience.

1. Objectives

The primary objective of this Heritage Management Annexure is to implement controls and procedures during construction to avoid impacts to heritage values of Garden Island/Meeandip during construction of the Submarine Rotational Force - West (SRF-West) Priority Infrastructure Project, and to address the recommendations of the Heritage Impact Assessment Report (GHD 2024h).

This Heritage Management Annexure supports the Construction Environmental Management Plan (CEMP), which fulfils a requirement under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2024/10031 and as identified by the environmental risk assessment (refer to Section 10.2 of the CEMP) to mitigate impacts to specific environmental and heritage values of the area. The specific conditions relevant for this Heritage Management Annexure and how they have been addressed are detailed in Table 2.

The CEMP defines terms used and activities managed by this annexure. The CEMP should be referred to for additional context, including:

– project details including document control, the EPBC Act Action and person accepting responsibility for the CEMP and all associated annexures, including this Heritage Management Annexure
– project description
– emergency contacts, procedures and specific exemptions that may apply
– potential environmental risks and impacts of the Project
– auditing and review requirements
– glossary
– references.

This Heritage Management Annexure must be read in conjunction with the CEMP and all other annexures.

A physical copy of this annexure will be on-site for use should an incident occur.

2. Reference documents

This annexure has been prepared in accordance with the following regulations and guidance documents:

Commonwealth

– *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act)
– Environment Protection and Biodiversity Conservation Regulations 2025 (Commonwealth) (Section 341S of the EPBC Act and Regulation 10.03B)
– Commonwealth Heritage Management Principles (Section 341Y of the EPBC Act and Regulation 10.03D and Schedule 7B)
– Significant Impact Guidelines 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies (Department of Sustainability, Environment, Water, Population and Communities, 2013)

Departmental (Defence)

– Department of Defence (2019) Environment and Heritage Manual
– Garden Island WA: Heritage Management Plan, prepared for the Directorate of Heritage and Biodiversity Conservation, Department of Defence through Godden Mackay Logan Pty Ltd. (GML, 2013)

The following documents should be consulted for additional context and details on the requirements outlined in this Heritage Management Annexure where required:

– Submarine Rotational Force – West Priority Works: Heritage Impact Assessment Report, prepared for RPS AAP Consulting Pty Ltd (GHD, 2024h)
– Environment and Heritage Assessment (GHD, 2025a)
– Principles of the Burra Charter (ICOMOS, 2013)
– Garden Island Fox and Cat Management Plan (GHD, 2026a)

3. Conditions of approval

The requirements outlined in this Heritage Management Annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to heritage management and Traditional Owner engagement during construction. Table 2 summarises how each relevant condition has been addressed in this annexure.

Table 2 Conditions of approval applicable to the Heritage Management Annexure

Condition number	Requirement	How it is addressed in this annexure	Relevant section of this annexure
EPBC Act approval 2024/10031			
1 a-c	*The approval holder must not:* – *a) Clear outside of the Action area.* – *b) Construct outside of the Action area.* – *c) Harm protected matters within the avoidance areas.*	Controls are detailed in the CEMP	Table 4 Table 5
8 x	*The CEMP must include outcomes and detailed measures to avoid impacts to heritage values of Garden Island and address the recommendations of the Heritage Impact Assessment Report.*	All construction personnel who are working on the site are to undertake an induction for the natural and historic heritage values of Garden Island/*Meeandip*. Temporary fencing of historic heritage sites must be installed prior to construction and maintained during construction. Chance finds procedures for historic heritage and human remains are to be implemented. Engagement with Traditional Owners will be ongoing.	Section 4 – Induction and training Table 5 – Pre-construction Table 5 – Construction

4. Induction and training

Induction and training requirements are identified in Section 8 of the CEMP. Heritage aspects from this annexure that will be included in induction and training material are:

Heritage

– fauna and habitat values (protected or of interest)
– avoidance areas, delineated boundaries and no-go zones
– heritage values of historic assets and the wider Garden Island/Meeandip, as well as relevant management plan procedures (including chance finds protocols)
– engagement with Traditional Owners.

5. Responsibility

The key roles and responsibilities for implementation of the CEMP, including the associated environmental management annexures, are provided in Section 6 of the CEMP. As specified in the CEMP, the Site Environmental Officer (SEO) is responsible for oversight and monitoring the implementation of the environmental management annexures on behalf of Defence for the approved Action. Table 3 below outlines roles and responsibilities specific to this annexure. Responsibility for the specific management controls and monitoring requirements in this annexure are provided in Table 5 and Table 6.

Table 3 Responsibilities specific to the Heritage Management Annexure

Role	Responsibility
Construction Contractor	In addition to responsibilities outlined in the CEMP, the Construction Contractor will: – provide the necessary communication on identified potential historic heritage and/or human remains during site construction – be responsible for enacting the first steps in the chance finds protocols – be responsible for providing evidence that the personnel delivering training or inductions, and those performing the inspections, are suitably experienced or qualified.
HMAS Stirling Indigenous Liaison Team	Within the Fleet Base West Program Management Office (PMO) the HMAS Stirling Indigenous Liaison Team is responsible for the ongoing engagement with Traditional Owners. The HMAS Stirling Indigenous Liaison Team will work with the SEO to make changes to this annexure should they be required.
Project Archaeologist	A project archaeologist will be appointed for the duration of the approved Action to provide specialist archaeological advice including but not limited to advising the SEO on chance finds as per the Chance Finds Protocols.
All construction personnel	In addition to responsibilities outlined in the CEMP, all construction personnel will provide the necessary communication to Construction Contractor and SEO on identified potential historic heritage and/or human remains during site construction.

6. Performance criteria

The Heritage Management Annexure management objectives and performance criteria are provided in Table 4.

Table 4 Heritage Management Annexure management objectives and performance criteria

Objective	Performance Criteria
Prevent impacts to native vegetation outside the approved clearing area	No clearing or damage to vegetation outside of the Action area.
Minimise indirect impacts to surrounding sensitive heritage receptors	100% compliance with controls listed in Table 5 and listed in the CEMP.
Prevent impacts to native fauna resulting from the Action	No injury or death to fauna as a result of the Action. No disturbance of occupied osprey nesting sites. No injury or harm to fauna, including little penguins, attributable to construction personnel interactions.

7. Management controls

Heritage Management Annexure management controls are provided in Table 5.

The management controls and monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of heritage values in the Action area:

– Flora and Fauna Management Annexure (Annexure A1)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)

Table 5 Heritage Management Annexure management controls

Item	Specific control	Reference	Responsibility
Pre - construction			
1	Prior to clearing, all relevant permits and approvals must be reviewed, and all clearing requirements identified and communicated to Construction Contractors. The Project Manager Contract Administrator (PMCA) must record delivery of this documentation to Construction Contractors.	Construction contract and notices	PMCA
2	All works must only occur inside of the Action area. The Construction Contractor must delineate the approved clearing limit by the use of pegs, fencing, continuous flagging tape and/or another suitable method by a qualified engineering surveyor prior to construction.	EPBC Approval 2024/10031 – 1a) (b)	Construction Contractor
3	A heritage induction must be undertaken by all construction personnel involved in ground disturbing activities prior to their commencing work in the Action area. The induction will cover the heritage values of historic assets and will also discuss heritage values of the wider Garden Island/*Meeandip*, as well as the protocols included in this Heritage Management Annexure.	EPBC Approval 2024/10031 – 8) (x)	Construction Contractor

Item	Specific control	Reference	Responsibility
4	Temporary fencing of historic heritage sites during construction. Induction on these avoidance areas, delineated boundaries and no-go zones. If Baudin Road is required for construction traffic, then temporary fencing will be required for the HMAS *Westralia* Memorial (CBS01) and Captain Stirling Statue and Memorial (CBS03). Temporary fencing must be erected prior to construction along the road verge adjacent to the Memorials. Temporary fencing must be either bunting or flagging secured on star pickets.	EPBC Approval 2024/10031 – 8) (x)	Construction Contractor
Construction			
5	Chance finds protocol for human skeletal remains. In the event of the discovery of human skeletal material (or suspected human skeletal material) during approved Action activities, then the Chance Finds Protocol 1: Discovery of Human Skeletal Remains must be followed.	EPBC Approval 2024/10031 – 8) (x) Figure 1 Chance finds protocol 1: Discovery of human skeletal remains	All Construction Personnel
6	Chance finds protocol for possible archaeological objects. In the event of the discovery of possible archaeological objects during approved Action activities, then the Chance Finds Protocol 2: Discovery of Possible Archaeological Objects must be followed.	EPBC Approval 2024/10031 – 8) (x) Figure 2 Chance finds protocol 2: Discovery of possible archaeological objects	All Construction Personnel
Post construction			
7	Replanting of native vegetation following completion of construction within the landside area is to be designed and completed in consultation with the HMAS Stirling Environment and Sustainability Manager (ESM).	EPBC Approval 2024/10031 – 1) (c)	Construction Contractor
8	Follow specific controls to avoid, minimise or manage the potential adverse impacts on Aboriginal heritage values within and adjacent to the Action area provided in the Indigenous Heritage Management Plan.	EPBC Approval 2024/10031 – 8) (x)	All Construction Personnel

Chance Finds Protocol 1: Discovery of Human Skeletal Remains

In the event of the discovery of human skeletal material (or suspected human skeletal material) during project activities, these steps should be followed:

1. STOP WORK

- Any person that observes or uncovers human skeletal materials (or suspected human skeletal material) during the works must notify machinery operations immediately.
- **All activities and/or works in the immediate area of the discovery must cease.**
- **DO NOT** collect samples or move any material from where it has been found

2. NOTIFY

- **IMMEDIATELY** notify Defence, including the Base Manager and Zone Environment Team.

3. PROTECT THE SITE

- Cordon off disturbed area as an exclusion zone so that no further disturbance occurs.
- Post a watch and keep all personnel out of the area until further notice.
- Inform site personnel of the restricted access to the area.
- Any sand/soils related to the find that have been removed prior to 'stop work' must be identified and set aside for assessment.

4. ASSESS THE FIND

- Project's archaeologist/heritage advisor to assess the find as soon as possible.
- If human remains are suspected Defence is to notify Police and provide available details of the remains and their location.
- Where remains are confirmed or suspected to be a First Nations cultural burial, Defence Contract Manager and/or project's heritage advisor to notify the First Nations stakeholders, and DEHPD.

5. POLICE INVESTIGATE

- Police and the Coroner will determine the nature of the suspected remains and advise on further actions should it be determined the skeletal remains are **not** a cultural First Nations burial.
- If the Coroner determines that the skeletal remains are not a cultural First Nations burial, follow the Coroner and Police's directions.
- If the Coroner determines that the skeletal remains are a First Nations cultural burial, follow on the steps below.

6. RECORD

- The First Nations stakeholders must be present.
- Recording of First Nations ancestral remains must be undertaken by, or be conducted under the direct supervision of a specialist physical anthropologist or other suitably qualified person.
- Specialist/s' report/s to be provided to Defence.
- Defence Estate Incident report to be created and submitted to Defence.
- Records must be added to GEMS, including Environmental Factor Record and specialist report/s.

7. DECIDE

- Defence to consider specialist/s report/s.
- Agree next steps in consultation with First Nations stakeholders.

8. TAKE ACTION

- Project/activity responsible party to implement actions that have been agreed to by Defence and the First Nations stakeholders.

9. RESUME WORK

- Implement agreed actions.
- Only the Project archaeologist, in consultation with First Nations stakeholders, can authorise works to recommence at/near the discovery location.
- Once approval is received, resume site works at/near the discovery location.

10. MANAGE

- Manage any skeletal material removed from the site in accordance with agreed decisions made at Step 7.
- NOTE: Reburial of the remains to a specific safe location, including associated cultural ceremony, may be requested by the First Nations stakeholders. The Project will facilitate this process, which can be managed under arrangements to allow works to resume under Step 7.

Figure 1 Chance finds protocol 1: Discovery of human skeletal remains

Chance Finds Protocol 2: Discovery of Possible Archaeological Objects

If any surface/subsurface suspected heritage objects or material is uncovered during the works, then these steps should be followed. Reporting of newly discovered sites must be prepared in accordance with statutory requirements and best practice professional standards:

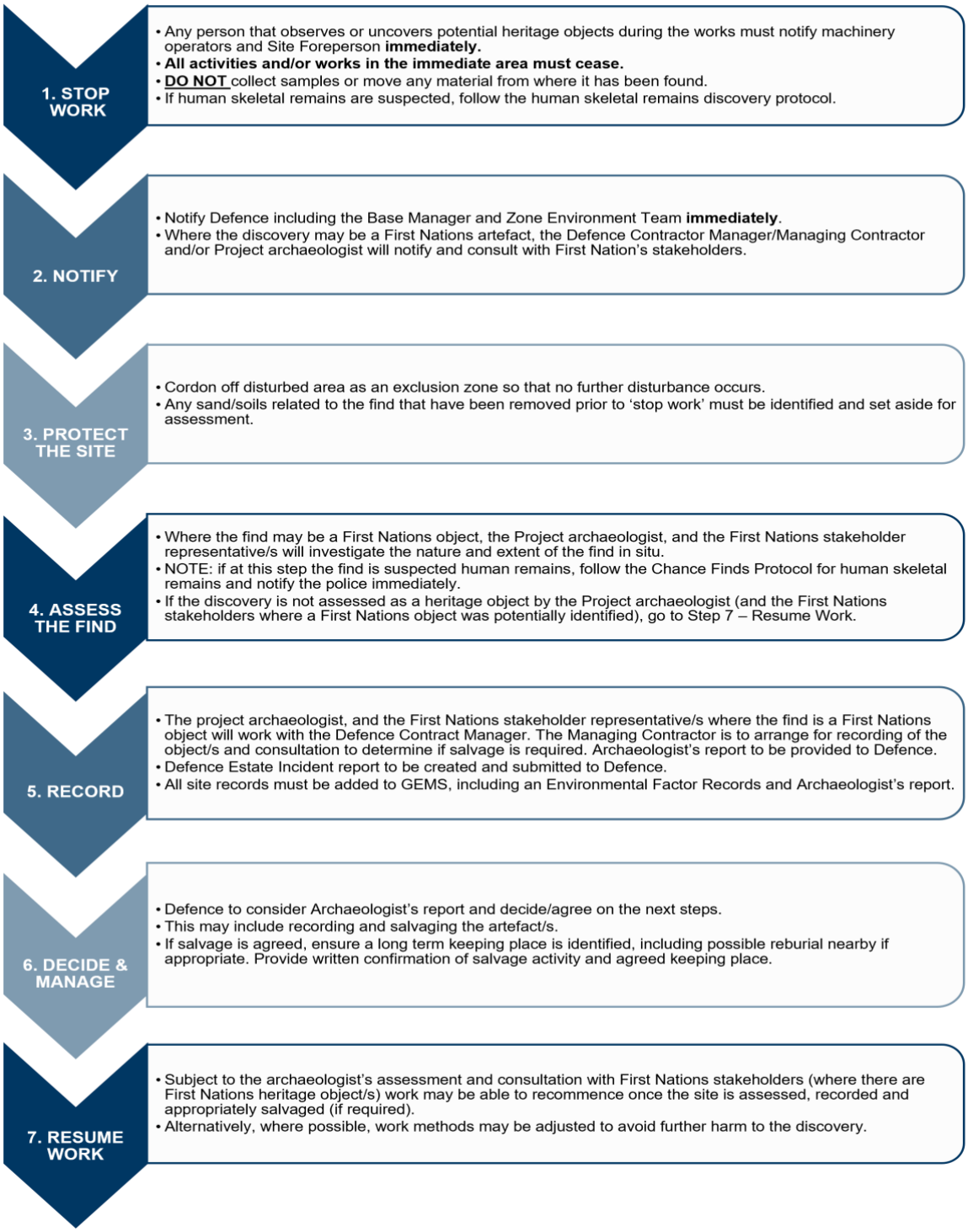


Figure 2 *Chance finds protocol 2: Discovery of possible archaeological objects*

8. Monitoring requirements

The Heritage Management Annexure monitoring requirements are provided in Table 6.

Regular Construction Contractor CEMP site inspections and compliance audits will be undertaken by the Construction Contractor and SEO respectively in accordance with the CEMP and at the frequencies specified in the table below. The frequency may be adjusted based on the compliance records and relative risk of each requirement.

The monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of heritage values in the Action area:

– Flora and Fauna Management Annexure (Annexure A1)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)

Table 6 Heritage Management Annexure monitoring program

Location	Monitoring Requirement	Frequency	Record	Responsibility
Action area	Visual checks will be carried out to ensure no ground disturbing activities are occurring outside of the Action area.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Action area	Visual checks will be carried out during construction activities to ensure no impact on historic or other cultural heritage values and/or human remains uncovered.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	The Construction Contractor must maintain a register of all chance finds. The register must identify: – date, time and location – type of chance finds – condition of chance finds – method of removal – location of removal – details of person (name, contact registration/licence details).	At the end of each shift	Chance finds register	Construction Contractor

9. Adaptive management measures

This annexure is intended to be dynamic and may be updated to reflect changes in management practices and the natural environment with time. This will also allow flexibility to adopt new technologies and management controls. Amendments to management controls and monitoring requirements will be completed on an as-needed basis. The review and updates to this annexure may include, but are not limited to:

– updates to management controls that are identified as not achieving the desired outcome and/or to achieve a greater environmental outcome
– additional management controls that are required as a result of additional impacts being identified
– amendments to relevant legislation that may affect the implementation of management controls
– improvements to practices, achieving a greater environmental outcome.

If monitoring results, instances of non-conformances or audit results determine that the management controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused. Alternative management controls and monitoring requirements will be determined in accordance with the environmental management framework set out within the CEMP and associated annexures. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP. Monitoring will continue to determine if the alternative management controls and monitoring requirements are effective.

Table 7 identifies triggers and adaptive management responses for this annexure.

Table 7 Heritage Management Annexure adaptive management triggers and responses

Trigger	Adaptive Management Response
Incidents	– All environmental incidents need to be reported, documented and followed up with identified corrective action(s). Incident reporting will occur in accordance with the CEMP. – Corrective actions must be identified and documented by the construction personnel involved, with the record and actions approved by the SEO. – Corrective actions must be monitored and updated throughout the course of the construction works until the identified actions have been fully completed.
Human skeletal remains (or suspected human skeletal material) are encountered during the approved Action.	In the event of the discovery of human skeletal material (or suspected human skeletal material) during the approved Action, then the Chance Finds Protocol 1: Discovery of Human Skeletal Remains must be followed.
Possible archaeological objects are encountered during the approved Action.	In the event of the discovery of possible archaeological objects during the approved Action, then the Chance Finds Protocol 2: Discovery of Possible Archaeological Objects must be followed.
Unexpected finds	Ground disturbing activities (including earthworks and/or excavating material) have the potential to encounter chance finds. A chance finds protocol is provided in this annexure as a contingency measure to manage such situations. Other unexpected finds will be managed by a protocol to be developed by the Contractor. This may include, but is not limited to: – previously unknown underground services or assets – significant levels of gross contamination and hazardous materials (for example, potential asbestos-containing material). Contingencies and procedures will outline the management requirements to ensure that the health and safety of onsite personnel is protected, and unexpected finds are managed appropriately with local jurisdictional requirements. In general, the chance find will be managed as follows: 1. Stop work, make sure the work area is safe and follow emergency procedures as per CEMP, if unexpected find presents a potential safety risk (such as live utilities). 2. Inspect unexpected find and manage according to type: a. Items of potential cultural heritage and/or Aboriginal significance: follow the Chance Finds Protocol in this annexure.

10. Reporting and documentation requirements

All reporting requirements of the CEMP with reference to the EPBC Act approval 2024/10031 are detailed in Section 7 of the CEMP.

All compliance documents and records required by this Heritage Management Annexure must be maintained and stored in accordance with the document control requirements specified in Section 12.2 of the CEMP. Compliance records may be subject to audit and/or be used to verify compliance with the conditions of approval in accordance with Section 12 of the CEMP.

11. Ongoing engagement with Traditional Owners

Defence's acknowledgement and actions in recognising and maintaining the importance of the Traditional Owners in respect of its activities on Garden Island/*Meeandip* remains consistent. Defence is committed to ongoing engagement with Traditional Owners in close partnership with the HMAS Stirling Indigenous Liaison team. Investigations to inform the values within the proposed action area and further consultation with Traditional Owners to manage indigenous heritage related matters will continue through the delivery of works.

12. Continuous improvement and review

If monitoring determines that the management controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused by the SEO. Alternative management measures will be determined in accordance with the environmental management framework set out within the CEMP and in accordance with the measures identified in Table 7 above. Once these management measures have been determined and approved by the SEO, they will be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP.

Environmental management annexures such as this Heritage Management Annexure are not static documents. They will be updated as works activities progress during the course of the approved Action to reflect new information and changes to management controls in accordance with the adaptive management triggers and processes described in Section 12.3 of the CEMP.

In accordance with Section 12.3.2 of the CEMP, a working Change Notice Register will be maintained to capture continuous improvements to this annexure of the CEMP, arising from but not limited to outcomes of incident reviews, corrective actions, and adaptive management responses that are identified. The Change Notice Register will be used to inform future CEMP reviews.

Australian Government
Defence

SRF-W Priority Infrastructure Works
Construction Environmental Management Plan Version 2

A3

Terrestrial Soil and Water Quality Management Annexure



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A3 Soil and Water Quality Management Annexure Version 2

SRF-West Priority Infrastructure Works Document Version Control								
Project name		SRF-W Priority Infrastructure Works						
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Table 1 Change register

Change register			
Version	**Revision**	**Date**	**Reason for revision**
1	Rev 1	13/08/25	Published version for establishing approved Action monitoring programs, and for activities required under the early works activities.
2	Rev 0	20/02/26	Draft for DEPAC review Updates made to incorporate activities required for enabling works, construction of landside facilities including the CIF, and maritime trial piling exercise. This includes provisions for managing contaminated soils which were not required in version 1, and consideration of groundwater in relation to the controlled modulus column installation at the CIF area. Changes include: – Figure 1 – update to include hydrocarbon impacted areas – Figure 2 – update to include additional activities and locations – Section 7.3 and 7.3 – revision of management controls monitoring requirements relevant to excavation and sub-surface works (including construction area landside of Diamantina Pier) – Section 8.2 and 8.3 – revision of monitoring requirements to provide clarity and readability. Addition of continuous dust monitor in 8.2.2

1. Objectives

The primary objective of this Soil and Water Quality Management Annexure is to provide management controls and procedures that prevent or minimise risks to protected matters associated with contamination in soils and water, fuel and oil spill management, waste management, dust and water quality management during construction of the Submarine Rotational Force - West (SRF-West) Priority Infrastructure Project. The management measures are designed to facilitate compliance with relevant guidelines and regulations.

This annexure supports the Construction Environmental Management Plan (CEMP), which fulfils a requirement under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2024/10031 and as identified by the environmental risk assessment (refer to Section 10.2 of the CEMP) to mitigate impacts to specific environmental and heritage values of the Action area. The specific approval conditions relevant to this annexure and how they have been addressed are detailed in Section 3.

The CEMP defines terms used and activities managed by this annexure. The CEMP must be referred to for additional context, including:

– approved Action details including document control, the EPBC Act Action and person accepting responsibility for the CEMP and all associated environmental management annexures, including this annexure
– approved Action description, including environmental setting and values
– emergency contacts, procedures, and specific exemptions that may apply
– potential environmental risks and impacts of the approved Action
– auditing and review requirements
– glossary
– abbreviations
– references.

This annexure must be read in conjunction with the CEMP, and all other annexures. A physical copy of this annexure will be kept on-site for use should an incident occur.

2. Reference documents

This annexure has been prepared in accordance with the following regulations and guidance documents:

Commonwealth:

– *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
– Environment Protection and Biodiversity Conservation Regulations 2025 (Commonwealth)
– *Contaminated Sites Act 2003* (CSA)
– Contaminated Sites Regulations 2006
– National Environmental Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM)
– Safe Work Australia (2016a) Model Code of Practice: How to Manage and Control Asbestos in the Workplace
– Safe Work Australia (2016b) Model Code of Practice: How to Safely Remove Asbestos
– Heads of EPA (HEPA) Australia and New Zealand and the Australian Government Department of the Environment and Energy (DoEE), PFAS National Environmental Management Plan, Version 3, 2025 (PFAS NEMP)

– Environmental Health Standing Committee (enHealth) (2002) Environmental Health Risk Assessment Guidelines for Assessing Human Health Risks from Environmental Hazards.

State (Western Australia):

– *Biodiversity Conservation Act 2016* (State)
– Biodiversity Conservation Regulations 2018 (State)
– *Dangerous Goods Safety Act 2004* (State)
– *Work Health and Safety Act 2020* (State)
– WA Department of Environment and Conservation: A Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and Other Related Activities (DEC, 2011)
– WA Department of Health (2006) Health Risk Assessment in Western Australia.
– Department of Mines, Industry Regulation and Safety *Confined spaces: Code of Practice* (DMIRS, 2022)
– WA Department of Water and Environmental Regulation (DWER) (2019), Landfill Waste Classification and Waste Definitions 1996 (as amended 2019)
– DWER (2021a), Guideline – Dust Emissions (draft)
– DWER (2021b), Assessment and Management of Contaminated Sites, 2014 revised and updated November 2021 (DWER, 2021b)
– DWER (2015), *State Environmental Policy for Cockburn Sound*, 2015 (DWER, 2015)
– Western Australian Department of Health (2021) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

Departmental (Defence):

– Contamination Management Manual (as amended 2021) (Defence, 2018)
– Pollution Prevention Management Manual (Defence, 2017)
– Environment and Heritage Manual (Defence, 2019a)
– Smart Infrastructure Handbook (Edition 2) (Defence, 2019b)
– Per- and Polyfluoroalkyl Substances (PFAS) Management Framework for Construction and Maintenance Version 3.0 (Defence, 2021)
– Security and Estate Group (SEG) Asbestos Management Plan (AMP) (version 6.2) (Defence, 2025)
– HMAS Stirling Oil Spill Contingency Manual (OSCM) (RAN, 2026)
– HMAS Stirling First Strike Oil Spill Response Plan 2024 (RAN, 2024).

The following documents should be consulted for additional context and details on the requirements outlined in this annexure where required:

– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
– Environment and Heritage Assessment (GHD, 2025a)
– SEA1010-1 USW Support Facilities and Infrastructure Program SRF-W Priority Works, Priority Precincts SAQP – Sampling and Analysis Quality Plan (GHD, 2025c)
– PFAS Groundwater Risk Assessment, Technical Memorandum (GHD, 2025l)
– Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f)
– Baseline Dust Deposition Monitoring Report (GHD, 2025g)
– Biodiversity Values Report (GHD, 2024g).

The relevant published Australian Standards associated with water quality aspects of this annexure at HMAS Stirling are listed below:

– AS 5667.1-1998: Water Quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1-1998)

- AS 5667.6-1998: Water quality – Sampling – Guidance on sampling of rivers and streams (AS 5667.6-1998)
- AS 5667.11-2009: Water Quality – Sampling, Part 11: Guidance on sampling of groundwaters
- AS 5667.12-1999: Water Quality – Sampling, Part 12: Guidance on sampling of bottom sediments (AS5667.12-1999)
- AS 4482.1 (2005) Guide to the investigation and sampling of sites with potentially contaminated soils
- AS 3580.10.1 (2016) Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method
- Fuel and Oil Spill Management aspects of this annexure are to be read in conjunction with the HMAS Stirling OSCM (RAN, 2026).

3. Conditions of approval

The requirements outlined in this annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to contamination in soils and water, fuel and oil spill management, waste management, dust, and water quality management, during construction. Table 2 summarises how each relevant condition has been addressed in this Annexure.

Table 2 Conditions of approval applicable to the Soil and Water Quality Management Annexure

Condition number	Requirement	How it is addressed in this annexure	Relevant section of this annexure
EPBC Act Approval 2024/10031			
1 a-c	*The approval holder must not:* *a) Clear outside of the Action area.* *b) Construct outside of the Action area.* *c) Harm protected matters within the avoidance area.*	Controls are detailed in the CEMP and the Flora and Fauna Management Annexure (Annexure A1)	Section 3 of the CEMP. Sections 6, 7 and 8 of the Flora and Fauna Management Annexure (Annexure A1).
8 c	*The CEMP must include a water quality monitoring program that is sufficient to detect daily changes in water quality parameters and any exceedance of water quality threshold levels attributable to construction from the commencement of the Action until completion of construction. The water quality monitoring program must:* *i) Include the monitoring of comparable control sites to determine the value of water quality parameters not subject to construction.* *ii) During construction, require comparison on a daily basis of both the Action area monitoring site water quality parameter results and the control site water quality parameter results against the water quality threshold levels.* *iii) Specify values for the water quality threshold levels based on the range of values recorded at the control sites.* *iv) Trigger a stop-works procedure if water quality threshold levels are exceeded.*	This annexure identifies the water quality management controls and monitoring requirements.	Sections 7 and 8 of this annexure.
8 v	*The CEMP must include:* *i) measures to prevent leaks and spills during construction, including but not limited to hydrocarbons, and* *ii) appropriate measures to respond to leaks and spills in a timely and effective manner to prevent and minimise impacts to protected matters.*	Management measures outlined in Table 11 and Table 12.	Section 7 of this annexure.

Condition number	Requirement	How it is addressed in this annexure	Relevant section of this annexure
17	*The approval holder must ensure that no little penguins are harmed as a result of runoff, leaks and spills, including but not limited to hydrocarbons, caused by the taking of the Action.*	Performance criteria are detailed in Section 6. Management measures outlined in Table 11 and Table 12. This document relates to terrestrial-based work only and does not incorporate measures for maritime activities. This annexure references the HMAS Stirling OSCM that includes the restrictions on the use of high-pressure hoses in spill response near little penguin nesting areas.	Sections 6 and 7 of this annexure.

4. Induction and training

Induction and training requirements are identified in Section 8 of the CEMP. Key management controls from this annexure relating to water (surface water runoff and surface water) and soil quality (including existing soil contamination and spoil management), dust, fuel and oil spill occurrences that will be included in induction and training material include (but are not limited to):

Water quality

– Water management (specifically relating to incidental surface water accumulation from rainfall and/or generated from construction activities such as water applied for dust suppression) and including procedures and work practices to ensure best practices for water management and surface water run-off generation.
– Instructions on environmental emergency response procedures contained in the CEMP.
– The nature and extent of existing groundwater contamination, predominantly comprising elevated concentrations of PFAS, heavy metals and/or hydrocarbons.
– Responsibilities under the CEMP for implementing management controls and monitoring requirements, reporting environmental incidents and overseeing corrective actions.

Dust and soils

– Dust management, including procedures and work practices to minimise and report dust generation.
– Soil management, including procedures and work practices to ensure best practices for soil management and spoil generation, including:
  - instructions on environmental emergency response procedures contained in the CEMP.

    awareness of the nature and extent of existing soil contamination issues.
  - awareness of responsibilities under the CEMP for implementing management controls and monitoring requirements, reporting environmental incidents and overseeing corrective actions.

Contamination (soil)

– Contamination exposure risk management (including personal protective equipment expectations and chance find protocol).
– Management of soil vapour exposure risk for intrusive contractor workers undertaking excavation works within areas landside of Diamantina Pier where known hydrocarbon impacted soil and groundwater is present.
– Asbestos management (if encountered) including suspected asbestos-containing material (ACM) in accordance with an unexpected finds protocol, handling and disposal requirements.
– Management measures for spoil stockpiling and necessary material waste classification requirements.

Fuel and oil spill

– Awareness of the nature of fuel and oil contamination issues, identifying examples of when a leak or spill may occur without appropriate management.
– Leak and spill prevention practices and controls, including identification of bunded storage, spill kit and/or fire extinguisher locations on site, Safety Data Sheet (SDS) use, personal protective equipment (PPE) expectations, and hazard notification and response.
– Storage and handling of fuels and oils, and requirements for managing spill risks associated with refuelling.
– Bund requirements for storage of fuel, oils and chemicals.
– Awareness of the responsibilities of all construction personnel under this annexure for implementing management controls and monitoring requirements, reporting fuel and oil leak or spill incidents and corrective actions as directed.

- Instructions on spill response and environmental emergency response procedures contained in this annexure, including protection of sensitive receptors (such as little penguin nesting areas and burrows, sea and shorebirds. watercourses, etc.) where leaks or spills originating on land has the potential to spread or transport toward the marine environment.
- Awareness that this annexure also refers to the HMAS Stirling OSCM, which details extant incident response requirements, and that the two documents are relevant.
- The requirement of the Construction Contractor to keep records of all training/inductions conducted and make those records available to Defence.

5. Responsibility

The key roles and responsibilities for implementation of the CEMP, including the associated environmental management annexures, are provided in Section 6 of the CEMP. As specified in the CEMP, the SEO is responsible for oversight and monitoring the implementation of the environmental management annexures on behalf of Defence for the approved Action. Table 3 below outlines roles and responsibilities specific to this annexure. Responsibility for the specific management controls and monitoring requirements in this annexure are provided in Tables 7-15.

Table 3 Responsibilities for the Soil and Water Quality Management Annexure

Role	Responsibility
Site Environment Officer (SEO)	In addition to responsibility to report incidents to the PMCA outlined in the CEMP, the SEO has the following responsibilities: Specifics for water quality: – Where external stakeholder consultation is required, such as from DWER to obtain permits for wastewater disposal, the SEO is responsible for consultation with Directorate of Environmental Planning, Assessment and Compliance (DEPAC) (via PMCA) to inform of the requirement for external stakeholder consultation. No interaction with external stakeholder is permitted without prior consultation with DEPAC. Specifics for oil and chemical spill: – The SEO is responsible for notifying the Fleet Base West (FBW) Emergency Operations Centre (EOC) according to the requirements of the HMAS Stirling OSCM Section 2.1.
Construction Contractor	Implement and comply with management measures as outlined in the CEMP and this annexure. This is a requirement for all aspects covered under this annexure relating to soil and water quality, dust, and fuel, oil and chemical spill. Specifics for oil and chemical spill: – Maintain availability of spill response equipment onsite and train all construction personnel in its use. – Brief all construction personnel on the fuel and oil spill risks, management measures relevant to their work, and incident response procedures. – Review that controls are in place in areas including fuel and oil storage and/or use, and refuelling areas. Maintain records of review and implementation as required by Section 12.2 of the CEMP.
All construction personnel	First response in the event of an incident relating to fuel, oil or chemical spill and/or noncompliance of management requirements relating to soil and water quality, and dust.

6. Performance criteria

The performance criteria have been developed based on SMART principles, including specific measurable, achievable, relevant and time bound objectives.

6.1 Water quality performance criteria

The water quality performance criteria relate to surface water runoff generation originating from or passing through the Action area and groundwater within the Action area. There is no known active or permanent surface water source within the Action area; however, the works are immediately adjacent to the marine environment in Careening Bay.

Groundwater assessments

Based on the findings of previous contamination investigations undertaken to date, the depth to groundwater ranges between ~3.2 – 4m bgl within the Controlled Industrial Facility (CIF) area, shown in Figure 1. Contamination has been identified in groundwater (predominantly by hydrocarbons, PFAS, and heavy metals) within the landside areas of the CIF (PFAS and heavy metals) and the hardstand areas adjacent to Diamantina Pier within the Action area (hydrocarbons, PFAS, and heavy metals). A synthesis of contamination information is outlined in reports prepared by GHD, including:

– PBR_004 HMAS Stirling, Item 4 Fuel Spill Support – Review of Fuel Spill Remediation, Technical Memorandum (GHD, 2023)
– Priority Precincts SAQP – Sampling and Analysis Quality Plan (GHD, 2025c)

Contractor activities within the CIF construction boundary involving excavation to and/or beyond 3.0 m bgl has the potential to encounter contaminated groundwater. As such, a groundwater risk assessment is required for all sub-surface works or excavations below 3 m bgl. With respect to contractor activities covered under this iteration of the CEMP, excavation beyond 3.0 m bgl is understood to be limited to Controlled Modulus Column (CMC) drilling within the proposed foundation pad footprints of the CIF, Pure Water Plant (PWP), and Fire Water Compound (FWC).

A groundwater risk assessment (technical memorandum) has therefore been prepared by GHD to evaluate risks associated with excess spoil saturated by PFAS contaminated groundwater anticipated to be generated from CMC drilling through the contaminated groundwater aquifer. A copy of the technical memorandum, PFAS Groundwater Risk Assessment, Technical Memorandum (GHD, 2025l).

Although excess groundwater is not expected to be generated from CMC installation works, the CMC installation methodology is expected to introduce PFAS impacts to otherwise uncontaminated soil within the soil profile above the groundwater table. This is anticipated to occur through the process of retracting the auger from the target depth (between 6 – 10 m bgl) within the saturated zone up through the otherwise uncontaminated soil profile above the water table by direct contact with residual saturated material on the drilling rod. This process is expected to generate minor volumes of excess saturated spoil on return of the drill to the ground surface. Management measures applicable to management of potential contamination during CMC installation include management performance criteria, management control, monitoring requirements and adaptive management measures applicable to surface water runoff and management of spoil.

No excess groundwater is anticipated to be generated from CMC installation and as such management through implementation of groundwater management performance criteria, management control, monitoring requirements and adaptive management measure is not applicable.

Performance criteria

Performance criteria for this annexure are summarised in Table 4.

Table 4 Water quality performance criteria

Objective	Performance criteria
Water quality management objectives and performance criteria	
Prevention of contaminant transport through surface water and/or surface water infrastructure	Compliance with all surface water management measures identified in this annexure and the Construction Contractor's CEMP.
Prevention of contaminant transport through groundwater to the receiving environment	No excavation works exceeding 3.0 m bgl are undertaken (except for CMC installation) unless a risk assessment has been completed and adequate controls have been identified.
Compliance with relevant State and National Guidance	Works at the construction site during development are managed in accordance with the following: DWER, Assessment and management of contaminated sites, 2014 revised and updated November 2021 (DWER 2021) HEPA Australia and New Zealand and DoEE, PFAS National Environmental Management Plan, Version 3, 2025 (PFAS NEMP) National Environment Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (ASC NEPM) *Work Health and Safety Act 2020* (WHS Act) and *Dangerous Goods Safety Act 2004* (DGS Act)
Protection of ecological and human health receptors	No release of any surface water or groundwater to the receiving environment (including overtopping of the rock wall) prior to testing for Contaminants of Potential Concern (CoPC).
	No release of contaminated surface water from bunded areas.
	No release of contaminated surface water or excessive silt to the marine environment.
	No release or reuse (via infiltration of the site surface) of contaminated groundwater.
Compliance with regulatory requirements	Appropriate segregation, categorisation and disposal of all wastes (including contaminated surface water or groundwater) in accordance with the waste hierarchy and the Environmental Protection (Controlled Waste) Regulations 2004.
Protection of water quality objectives	No exceedance of water quality objectives due to surface water management (when developed as part of the water quality monitoring program).

6.2 Dust performance criteria

From review of previous contamination investigations undertaken within the Action area, ground disturbing construction activities including excavation (trenching in preparation of new subsurface service infrastructure) and works within excavations (installation of subsurface service infrastructure) within the landside area adjacent to Diamantina Pier have the potential to encounter contamination in soil. Hence, dust generated during site works has the potential to contain contaminants.

Management of dust generated from the works will need to consider a range of CoPC identified within the Action Area, including heavy metals. Soil testing in the Action area has included testing for asbestos as a precautionary measure. No monitoring of asbestos in dust is required at this time.

Dust risk assessment

A site risk assessment has been conducted based on activities that generate dust (refer to Appendix A). This approach has been adopted because soils in the approved Action area cannot be definitively identified as 'uncontaminated'. However, it is not deemed necessary, at this time, to incorporate a more rigorous health risk assessment (HRA) in accordance with the WA Department of Health guidelines (DOH, 2006) (enHealth, 2002). Such a HRA would only be required should dust monitoring (see Section 8.2) detect elevated levels of heavy metals, or if asbestos is detected in soils in the Action area.

A site classification assessment was completed to identify the provisions and contingency arrangements for dust management, discussed in this annexure. The completed site classification chart is provided in Appendix A.

According to the site classification assessment chart (Appendix A), the site received a classification score of 552, placing it in Classification 3 (i.e. a score between 400 and 799, considered medium risk). However, DEC (2011) stipulates that during the construction dry period (1 October to 31 March), the site will be automatically classified as Classification 4 (i.e. a score 800 and above, considered a high risk), due to the potential dust generated under dry conditions. Monitoring requirements have also been developed based on the potential presence of heavy metals.

Performance criteria

Performance criteria are based on construction dust monitoring to monitor and measure the impacts of dust, which will then inform management actions, including dust control measures, corrective actions, and adaptive measures. There will be two measures for performance criteria:

– Continuous monitoring of total suspended particulates – to monitor 15-minute averages for 'corrective action' or 'stop work' trigger levels in accordance with DEC (2011).
– Dust deposition - measuring total dust deposition levels every 30 days, and the increase in dust deposition over the existing baseline deposition levels, calculated using a rolling average in accordance with DWER (2021b).
– In addition, dust deposition samples are analysed for the presence of heavy metals.

The dust monitoring performance criteria are given in Table 5. The monitoring requirements are discussed further in Section 8.2.

Table 5 Dust performance criteria

Particulate	Performance criteria trigger	Criteria category	Frequency
Total suspended particulates (TSP)	250 µg/m^3	Corrective action	15-minutes
	400 µg/m^3	Stop work	15-minutes
Dust deposition	4 g/m^2/30 days (maximum) 2 g/m^2/30 days (above background)	DWER (2021b)	Monthly

6.3 Contaminated soil performance criteria

This document provides additional controls for the management of contaminated soil and spoil handling during activities as outlined in Section 3.3 of the CEMP.

Contaminated soil assessments

From review of previous contamination investigations undertaken within the Action area, ground disturbance construction activities including excavation (e.g. trenching in preparation of new subsurface service infrastructure) and works within excavations (e.g. installation of subsurface service infrastructure) within the landside area adjacent to Diamantina Pier (shown on Figure 1) has the potential to partially intersect existing contaminated site record (CSR) areas of known contamination in soil and groundwater. These include:

– **CSR_WA_000214 – Building 54 Group of USTs oil.**
  - Hydrocarbon impacted soil, vapour and groundwater as a result of historical fuel leaks from former underground fuel storage infrastructure (primary source since removed).
  - PFAS (per- and poly-fluoroalkyl substances) and heavy metal impacted groundwater (migration from off-site source areas).

– **CSR_WA_000255 – Leak from underground fuel line (diesel fuel)**
  - Hydrocarbon impacted soil (residual smear zone secondary source).
  - Hydrocarbon impacted groundwater (Light Non-Aqueous Phase Liquid (LNAPL) and dissolved phase plume).

On this basis, there is the potential to encounter contamination in soil during contractor activities thus requiring management of risks associated with direct contact and vapour exposure from underlying hydrocarbon impacted groundwater.

Excess construction spoil will need to be appropriately managed with respect to handling, and temporary placement within a designated area within the Action area. Management of contaminated spoil generated from works will need to consider the full range of CoPC identified within the Action area (including, hydrocarbons (TRH/BTEX/PAH), PFAS, asbestos, heavy metals). Spoil will either be subject to reuse or disposal off-site at a suitably licensed waste receiving facility (to be determined by the lead contractor), in accordance with the results of the Spoil Waste Classification Assessment and Spoil Reuse Assessment reports.

Performance criteria

Table 6 includes the performance criteria relevant to the management of contaminated soil and spoil handling.

Table 6 Contaminated soil performance criteria

Objective	Performance criteria
Protection of ecological and human health receptors	Compliance with all contaminated soil management controls identified in this annexure and the Construction Contractor's CEMP.
	No stockpiles outside designated areas (including spoil generated from CMC installation).
	No cross-contamination of stockpiles.
	Appropriate segregation, classification and disposal of all wastes (including contaminated soil) in accordance with the waste hierarchy and the Environmental Protection (Controlled Waste) Regulations 2004, and compliance with relevant State and National regulatory guidance and Defence manuals and guidance.
Compliance with relevant State and National Guidance	Works at the construction site during development are managed in accordance with the following: – DWER, Assessment and management of contaminated sites, 2014 revised and updated November 2021 (DWER 2021a) – DWER Landfill Waste Classification and Waste Definitions 1996 (amended in 2019) (DWER, 2019) – HEPA Australia and New Zealand and DoEE, PFAS National Environmental Management Plan, Version 3, 2025 (PFAS NEMP) – National Environment Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended May 2013 (ASC NEPM) – *Work Health and Safety Act 2020* (WHS Act) – *Dangerous Goods Safety Act 2004* (DGS Act)
Compliance with regulatory requirements	
Compliance with Defence manuals and guidance	Works at the construction site during development are managed in accordance with the following: – Defence (2018) Contamination Management Manual (as amended 2021)

Objective	Performance criteria
	– Defence (2017) Pollution Prevention Management Manual – Defence (2019) Environment and Heritage Manual – Defence (2019) Smart Infrastructure Handbook (Edition 2) – Defence (2025a) Per- and Polyfluoroalkyl Substances (PFAS) Management Framework for Construction and Maintenance (PFAS CMF) – Defence (2023) Security and Estate Group (SEG) Asbestos Management Plan (AMP) (version 6.2)

If the contamination risk profile of soil changes to indicate higher risk, relevant contamination control measures as set out in this plan will be revised accordingly.

Applicable Defence and Commonwealth regulatory guidelines are listed in Section 2. The guidelines include general requirements for the management of potential environmental impacts relating to soil contamination during construction.

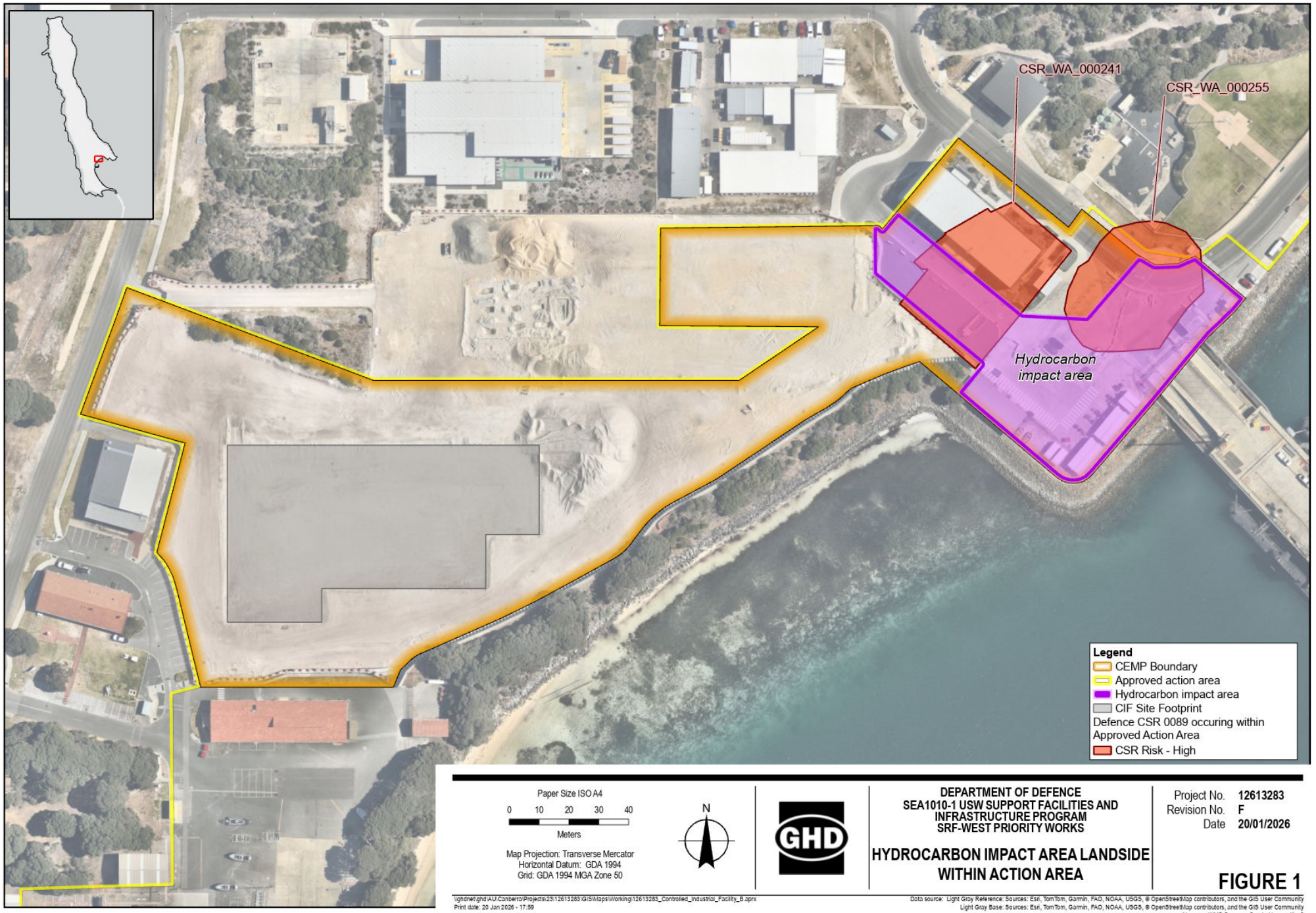


Figure 1 *Hydrocarbon impact area landside within Action area*

6.4 Fuel, oil and chemical leaks and spills performance criteria

This annexure seeks to prevent incidents related to fuel, oil and/or chemicals as a result of construction activities. Performance criteria are identified in Table 7.

Table 7 Fuel, oil and chemical spill management objectives and performance criteria

Objective	Performance criteria
Prevent leaks and spills of fuel, oil or chemicals to the environment.	Compliance with all fuel, oil and chemical management controls identified in this annexure.
	No leaks and spills of fuel, oil or chemicals enter the surface water system.
	Records of compliance with fuel, oil and chemical storage and handling requirements are kept and provided to the SEO in accordance with reporting timeframes in the CEMP.
Clean up any leaks and spills of fuel, oil or chemicals to the environment in a timely and effective manner	Spill kits are serviceable and available for use at all times.
	Containment measures are undertaken within 30 minutes of discovering a leak or spill as documented in incident records.
	Any leaks and spills of any substance identified as having the potential to cause harm to protected matters are recorded as incidents. This includes all hydrocarbon spills of greater than 2L.
	Incident reporting procedures outlined in Section 7.3 of the CEMP re complied with, including notification of the SEO within 4 hours. Documented records of clean up methods and evidence to demonstrate clean up are kept for all leaks and spills.

7. Management controls

The following sections summarise the key management controls to be implemented during construction activities to minimise potential impacts.

Each control includes reference to relevant documentation and assigns clear responsibilities to ensure effective implementation.

7.1 Water quality management controls

For any intrusive works in areas with confirmed, likely or possible contamination, where surface water run-off may be generated, all documentation generated to address management controls or produced from monitoring requirements must be recorded in accordance with Section 12.2 of the CEMP.

All works will comply with the *Work Health and Safety Act 2020* and the *Dangerous Goods Safety Act 2004*.

All liquid wastes and products are categorised and handled in accordance with DWER Landfill Waste Classification and Waste Definitions 1996 (amended in 2019) and Defence PFAS CMF (2025a).

Water quality management controls to manage surface water runoff and groundwater are included in Table 8 below.

Table 8 Water Quality Management Controls

Item	Specific Control	Reference	Responsibility
Pre-Construction			
1	The Construction Contractor must develop a site-specific Construction Water Quality Management Plan (or section within the Construction Contractor's CEMP) in accordance with Section 11.1.1.4 of the CEMP.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor

Item	Specific Control	Reference	Responsibility
Construction			
Surface water controls			
2	On commencement of works, the Construction Contractor will implement surface water management measures in accordance with the Construction Water Quality Management Plan. This must include, at a minimum, silt fences and/or absorbent socks or hay bales placed around surface water drains adjacent to the site.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
3	For activities expected to generate excess surface water, the Construction Contractor's Construction Water Quality Management Plan must include management measures for surface water containment within the CEMP boundary including temporary holding structures such as surface water traps/ infiltration basins.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
4	During ground disturbing works, surface water management measures will minimise the entry of any surface water into temporary excavations which may contain contaminated material.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
5	Prior to rainfall events stockpiles will be secured to minimise surface water runoff including: – preventing runoff from the stockpile area (for example, hay bales) as far as practicable – covering the stockpiles with plastic sheeting to prevent rainwater ingress.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
6	The works site will be inspected daily for effective operation of surface water containment structure	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
7	Where surface water is not contained by the established surface water containment structures, surface water will be diverted to an alternative containment structure for subsequent sampling and analysis by a suitably experienced professional.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
8	Where CoPC are not detected in surface water, surface water must be flocculated to reduce suspended solids prior to being discharged into the main surface water drainage system and to Careening Bay.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
9	Where CoPC are detected in the surface water, one of the below options must be implemented: – Disposal of surface water to sewer via a trade waste agreement. – On-site treatment of surface water followed by disposal to sewer via a trade waste agreement. – Waste classification, transportation and disposal of surface water off-site to an appropriately licenced treatment facility in accordance with the Environmental Protection (Controlled Waste) Regulations 2004 (DWER).	Environmental Protection (Controlled Waste) Regulations 2004 (DWER) EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
10	All incidents are reported as soon as practicable and within 4 hours to the SEO, to determine remedial action, including: – any overtopping of the rock wall pathway – any discharge of contaminated (or potentially contaminated) surface water to the surrounding	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor

Item	Specific Control	Reference	Responsibility
	sensitive environment (outside of the construction site boundary) – any overtopping of bunded areas.		
Groundwater controls			
11	Prior to any sub-surface works or excavations below 3.0 m bgl a desktop groundwater risk assessment must be undertaken by a suitably qualified professional.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor

7.2 Dust management controls

Dust management controls are outlined in Table 9.

Table 9 Dust management controls

Item	Specific control	Reference	Responsibility
Construction			
General			
1.1	Ground disturbance works should be undertaken over the winter months (1 April to 30 September) in preference to the summer months (1 October to 31 March) wherever possible.	EPBC Approval 2024/10031 8 (b)	Construction Contractor
1.2	The Construction Contractor must use a staged approach to vegetation clearing wherever possible.	EPBC Approval 2024/10031 8 (b)	Construction Contractor
1.3	Stockpiles will be minimised throughout construction through planning and delivery timing.	EPBC Approval 2024/10031 8 (b)	Construction Contractor
1.4	Any vehicles entering or exiting the site area carrying materials with the potential to generate dust will always be covered, except during loading and unloading.	EPBC Approval 2024/10031 8 (b)	Construction Contractor
1.5	Vehicle movements will be confined to designated areas specific to the CEMP boundary as defined in the Construction Contractor's traffic management plan (refer to Section 11 of the CEMP).	Section 11 of the CEMP	Construction Contractor
1.6	Wastes will be managed in accordance with the Construction Contractor's waste management plan with all waste disposed of in designated areas and not overloaded to minimise dust generation.	Section 11 of the CEMP	Construction Contractor
1.7	Surface stabilisation equipment must be available to commence operation on-site within 48 hours during all stages of works (all year-round).	DEC (2011) Classification 3 and 4	Construction Contractor
1.8	During weather conditions conducive to dust generation including during 1 October and 31 March, exposed soil will be covered with a temporary stabiliser (for example, soil binder or water suppression).	DEC (2011) Classification 3 and 4	Construction Contractor
1.9	In the event of strong winds (>10 m/s), works onsite will be inspected by the SEO to determine if visible dust is an issue at the CEMP boundary and where specific activities are being undertaken. Where visible dust is an issue, controls will be identified by the SEO and Construction Contractor and will be implemented immediately. Where effective controls cannot be identified by the SEO and the Construction Contractor then the activity generating the dust will cease. Where forecast winds exceed 10 m/s for periods where site is unattended, the SEO will make a determination on any additional soil stabilisation requirements (see adaptive management measures Section 9.2).	DEC (2011) Classification 3 and 4	Construction Contractor
1.10	A surface bonding agent will be used on all areas cleared of vegetation or hardstand to prevent dust generation whilst unattended for 3 or more days.	DEC (2011) Classification 3 and 4	Construction Contractor
Wind fencing			
2.1	Prior to any works commencing (applicable all year round), an appropriate amount of wind fencing must be stored on-site or available within one hour when required.	DEC (2011) Classification 3 and 4	Construction Contractor
2.2	For works between 1 October and 31 March, prior to any part of the site surface being disturbed, wind fencing must be erected to the	DEC (2011) Classification 4	Construction Contractor

Item	Specific control	Reference	Responsibility
	south and east of the site. The nominated wind fencing is to remain in position until the disturbed surface is stable.		
2.3	If directed by the SEO, wind fencing must be erected within 18 hours. Dust generating works on the site must cease in the interim.	DEC (2011) Classification 3 and 4	Construction Contractor
Water cart operation			
3.1	The Construction Contractor must include an allowance for water cart operation during the construction period to suppress dust.	DEC (2011) Classification 3 and 4	Construction Contractor
3.2	Between 1 April and 30 September, watercarts in good working condition, with a capacity of 10,000 L for every 7.5 ha of disturbed site, or other appropriate alternatives, must be available to commence watering on the site within 18 hours of request.	DEC (2011) Classification 3	Construction Contractor
3.3	Between 1 October and 31 March, watercarts in good working condition, with a capacity of 10,000 L for every 5 ha of disturbed site, must be available to commence immediate watering on the site.	DEC (2011) Classification 4	Construction Contractor

7.3 Contaminated soil management controls

For any intrusive works in areas with confirmed, likely or possible contamination, all documentation generated to address management controls or produced from monitoring requirements must be recorded in accordance with Section 12.2 of the CEMP.

All works will comply with the *Work Health and Safety Act 2020* and the *Dangerous Goods Safety Act 2004*.

All waste products must be categorised and handled in accordance with DWER Landfill Waste Classification and Waste Definitions 1996 (amended in 2019) and Per- and Polyfluoroalkyl Substances (PFAS) Management Framework for Construction and Maintenance (PFAS CMF) (Version 4.0) (Defence, 2025a), with:

– waste spoil either re-used within the Project area (if deemed suitable) or disposed offsite to an appropriately licensed, accepting and lawful place
– appropriate segregation and disposal of wastes in accordance with the waste hierarchy
– recycled materials used where appropriate

Contaminated soil management controls are provided in Table 10.

Table 10 Contamination management controls during construction

Item	Specific control	Reference	Responsibility
Construction			
Concrete and hardstand management			
2.1	Maintenance work that requires penetration or removal of sections of concrete will be planned by the Construction Contractor to limit the duration and extent of exposure of underlying soils and prior to commencement will be discussed with the SEO.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
2.2	Additional controls at the discretion of the SEO will be implemented to ensure water ingress is managed and containment of contaminated soils is maintained during the works.	EPBC Approval 2024/10031 8	Construction Contractor
2.3	Where a sealed ground surface (asphalt and/ or concrete) is required to be stripped/ removed during earthworks, the placement of backfill material over the underlying surface soil must cover the entire surface area to ensure no underlying surface soil is exposed.	EPBC Approval 2024/10031 8	SEO
2.4	Visible cracks or defects in concrete or hardstands will be repaired and sealed as soon as reasonably practicable.	EPBC Approval 2024/10031 8	Construction Contractor
Asbestos			
3.1	There has been no previous assessment specifically relating to asbestos contamination in the Action area. Due to the known widespread asbestos contamination across the Defence Estate the potential for ACM cannot be precluded. For unexpected finds of potential ACM in soil during construction activity, the Security and Estate Group (SEG) Asbestos Management Plan (AMP) (V 6.2, 2025b) Annex A Asbestos in soils and surface contamination and Attachment 1: Asbestos Incident Management should be followed by the Contractor including (but not limited to): – The area of asbestos impact should be cordoned off to prevent inadvertent access and have clear asbestos hazard warning signage placed around them to clearly. designate the area as containing asbestos. – Entry must be prohibited until it has been assessed by a suitably experienced contaminated sites specialist (CSS) and licensed asbestos assessor (LAA).	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor

Item	Specific control	Reference	Responsibility
	In addition, the PMCA and ESM must be immediately notified of the find.		
3.2	Prior to recommencing work, a CSS or LAA must be engaged to determine the level of risk and advise on the appropriate risk management controls (such as developing a management plan for the site). The degree and extent of the control measures will be designed by the CSS/LAA to be commensurate with the Asbestos in Soils and Surface Contamination (ASBINS) relative exposure and risk.	EPBC Approval 2024/10031 8	Construction Contractor
Spoil management (Stockpiling, waste classification for re-use/ offsite disposal options)			
4.1	If ground disturbance work results in the generation of soil stockpiles, the stockpiles must be managed to prevent the loss of soil caused by wind (dust) or surface water run-off, including protection of nearby surface water drains, sumps and waterways.	EPBC Approval 2024/10031 – 8) a) EPBC Approval 2024/10031 – 8) b)	Construction Contractor
4.2	Prior to the excavation of any material for stockpile storage, the Construction Contractor will consider possible stockpile locations and select an appropriate location. Stockpile locations must be identified on site plan/s in the Construction Contractor's CEMP.	EPBC Approval 2024/10031 8	Construction Contractor
4.3	Suspected and known hydrocarbon impacted spoil (including visibly stained and/or odorous soils) must be segregated from non-impacted hydrocarbon material and stockpiled separately from all other excavated spoil and managed separately and accordingly. (Note: hydrocarbon impacted soils may be encountered at depths greater than 1.5 m bgl within the landside area adjacent to Diamantina Pier.)	EPBC Approval 2024/10031 8	Construction Contractor
4.4	The soil stockpiling area must be prepared to ensure that no cross contamination occurs either to the stockpile area or to the stockpiles when handling contaminated or suspected contaminated soils.	EPBC Approval 2024/10031 8	Construction Contractor
4.5	The length of time that soil will be stockpiled onsite will be kept to a minimum. Prior arrangement of any stockpiled soil, the agreed duration for stockpiling must be agreed with Base Management. When soils are proposed for off-site disposal, soil sampling, if required, will occur as soon as practicable following the creation of the stockpile.	EPBC Approval 2024/10031 8	Construction Contractor
4.6	Stockpiles of contaminated, or suspected contaminated, soils must be located on a stable, low permeability/lined surface with appropriate engineering controls to control leaching, run-off etc.	EPBC Approval 2024/10031 8	Construction Contractor
4.7	All suspected contaminated soil must be sampled by a suitably qualified professional. Appropriate laboratory analysis for CoPC and interpretation by suitably qualified professional will be conducted on the stockpiled material to determine waste classification to inform suitability for reuse and/or offsite disposal requirements.	EPBC Approval 2024/10031 8	Construction Contractor
4.8	The source area, volume and visual anthropogenic inclusions (such as bitumen, concrete fragments within soil) or olfactory indictors of contamination (such as odours or staining) of stockpiled soil must be recorded to satisfy the requirements of Section 12.2 of the CEMP to enable the movement of contaminated soil to be tracked for reuse or off-site disposal.	EPBC Approval 2024/10031 8	Construction Contractor
4.9	The Construction Contractor will keep records of evidence of off-site disposal of soil to an appropriately licenced waste facility.	EPBC Approval 2024/10031 8	Construction Contractor
Sub-surface works			

Item	Specific control	Reference	Responsibility
5.1	All sub-surface works including excavation and confined space activities are to be undertaken by qualified personnel with an entry permit issued by the appropriate specialist (WH&SC, code of confined spaces, 2022).	EPBC Approval 2024/10031 – 8) (a) EPBC Approval 2024/10031 – 8) (b)	Construction Contractor
5.2	Areas which are known to be underlain by hydrocarbon impacted soils and groundwater (shown on Figure 1) must be managed by health and safety protocols documented in the Construction Contractor's CEMP. Management measures to be included in the Construction Contractor's CEMP for implementation during all sub-surface works must include (at a minimum): – appropriate protocols for management of exposure risks to intrusive workers from dermal contact and inhalation of vapours from hydrocarbon impacted soil (including measures to avoid direct contact) – a site-specific health and safety plan (HSE Plan) for all intrusive works – PID and Lower Explosive Level (LEL) monitoring for all sub-surface works including trigger levels and adaptive management measures. Measures to segregate, stockpile and manage any visibly stained and/or odorous soils encountered, away from other soils which do not exhibit visual/ olfactory indication of contamination.	EPBC Approval 2024/10031 8	Construction Contractor
5.3	Smoking, and other sources of ignition must not be present in the vicinity of sub-surface works undertaken within the area of known hydrocarbon contamination (shown on Figure 1).		

7.4 Fuel, oil and chemical leaks and spills management controls

Management controls are outlined in Table 11.

The little penguin avoidance area is presented in Figure 3 of the CEMP. Any storage and handling of fuels and oils must occur outside this avoidance area.

Spill response instructions are outlined in Table 12.

Table 11 Fuel, oil and chemical spill management controls

Item	Specific control	Reference	Responsibility
Construction			
1	Storage of fuel, oil and chemicals in the Action area must contained in a bunded area sufficient to contain 110% of the contents of storage containers.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) The storage and handling of flammable and combustible liquids, AS 1940:2017 Pollution Prevention Management Manual Annex 1D	Construction Contractor
2	Product Safety Data Sheets must be kept on site and be readily available for all fuels, oils and chemicals (including fire extinguishers for fuel fires (fluorine-free foam or dry chemical powder)). All containers used for storage are to be sealed when not in use and labelled correctly.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) Pollution Prevention Management Manual Annex 1C and Annex 1D	Construction Contractor

Item	Specific control	Reference	Responsibility
3	Hydrocarbon (fuel and oil)/chemical storage areas must be adequately separated from environmentally sensitive areas (storm water drains and the little penguin avoidance area (refer to Figure 3 in the CEMP)). An adequate separation distance is one that a leak or spill would reasonably not reach the little penguin avoidance area (within 100 m).	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) The storage and handling of flammable and combustible liquids, AS 1940:2017	Construction Contractor
4	Refuelling and servicing of plant, equipment and machinery, and handling of fuel, oils and chemicals in the Action area must be undertaken on impervious surfaces using drip trays or equivalent leak and /or spill containment methods to reduce risk of leaks and spills.	EPBC Approval 2024/10031 – 8) v) i) and ii) The storage and handling of flammable and combustible liquids, AS 1940:2017 Pollution Prevention Management Manual Annex 1D	Construction Contractor
5	Stationary plant and equipment must have appropriate containment to prevent fuel or oil spill or leakage to the environment (for example, placed in impervious bunded area or on drip trays).	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) The storage and handling of flammable and combustible liquids, AS 1940:2017	Construction Contractor
6	Spill kits must always be serviceable and available for use.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) Pollution Prevention Management Manual Annex 1D HMAS Stirling OSCM	Construction Contractor
7	Spill kits must be identified on site plans.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii)	Construction Contractor
8	Bunded storage areas must be identified on site plans.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii)	Construction Contractor
9	High pressure hoses are not to be used in spill response or clean up within proximity to little penguin nesting areas.	Section 2.3.1.5 and Annex A of the HMAS Stirling OSCM	Construction Contractor
10	Portable surface water drain covers must be available for use at all times for construction activities limited to works within hardstand areas where existing or newly constructed surface water drainage infrastructure is present (including the Fleet 2 carpark and hardstand area adjacent to Diamantina Pier). Portable surface water drain covers will be deployed (where required) to prevent any leaks and spills from entering stormwater drains and as a precautionary measure during refuelling and maintenance activities.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) Pollution Prevention Management Manual Annex 1D HMAS Stirling OSCM	Construction Contractor
11	Spill kits will be stocked with containment equipment appropriate to the work being undertaken. This can include absorbent booms, absorbent pads and loose oil absorbent material (such as Peat Sorb or similar).	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) Pollution Prevention Management Manual Annex 1D HMAS Stirling OSCM	Construction Contractor

Item	Specific control	Reference	Responsibility
12	A maintenance schedule must be developed and maintained for plant, equipment and machinery.	EPBC Approval 2024/10031 – 8)(v) (i) and (ii)	Construction Contractor
13	Plant, equipment and machinery must be maintained in accordance with the maintenance schedule.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii)	Construction Contractor

Table 12 Spill response actions

Item	Specific control	Reference	Responsibility
1	In the event of leaks and spills the source of the leak and/or spill must be isolated/stopped as soon as it is safe and possible to do so.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) HMAS Stirling OSCM	All construction personnel
2	In the event of leaks and spills, the leak and/or spill must be contained with absorbent material from spill kits if it is safe and possible to do so. Personal protective equipment will be utilised when responding to a leak or spill.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii) HMAS Stirling OSCM	All construction personnel
3	In the event of leaks and spills, the SEO must be notified as soon as possible after initial isolation and containment of the leak and / or spill or on discovery of the leak and/or spill if it cannot be isolated or contained. Notification should not exceed 4 hours after the event is identified.	EPBC Approval 2024/10031 – 8) (v) (i) and (ii)	All construction personnel
4	On discovery of a fuel, oil or chemical leak or spill the following information must be recorded to the maximum extent possible for notification and reporting purposes: – date and time of incident – source and likely cause – type of fuel or oil involved – estimated volume of the leak or spill The details to be recorded during and post-response are outlined in item 8 of this table.	HMAS Stirling OSCM	All construction personnel
5	The SEO must commence the notification procedure identified in the CEMP and the HMAS Stirling OSCM. Onshore spills of fuels and oils are to be notified to the FBW EOC within 30 minutes of discovery.	CEMP Section 7 (GHD, 2025) HMAS Stirling OSCM	SEO
6	The SEO must notify the PMCA and ESM as soon as possible (within 4 hours) on notification of the spill and facilitate notification to DEPAC within 24 hours.	CEMP Section 7	SEO and PMCA
7	With approval from the PMCA, the SEO must notify external agencies as required to coordinate a spill response.	HMAS Stirling First Strike Oil Spill Response Plan 2024 (Royal Australian Navy, 2024) HMAS Stirling OSCM	SEO and PMCA
8	Incident reporting must be undertaken in accordance with the CEMP and the HMAS Stirling OSCM. The key information to be reported include the details in item 4 of this table, and: – response actions taken – potential impacts of spill – assistance obtained from Base personnel or external agencies Assessment of the effectiveness of response actions taken, to review lessons learned and any updates to the CEMP and annexure for continuous improvement.	Section 7.3 of the CEMP Section 3.5 of the HMAS Stirling OSCM	Construction Contractor PMCA SEO

8. Monitoring requirements

Regular Construction Contractor CEMP site inspections and compliance audits will be undertaken by the Construction Contractor and SEO, respectively, in accordance with the CEMP and at the frequencies specified in the sections below. The frequency may be adjusted based on the compliance records and relative risk of each requirement.

8.1 Water quality monitoring requirements

The water quality monitoring requirements for this phase of works is provided in Table 13.

The monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna in the Action area.

– Flora and Fauna Management Annexure (Annexure A1)
– Heritage Management Annexure (Annexure A2)
– Noise and Vibration Management Annexure (Annexure A4)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

Table 13 Water quality monitoring program

Location	Monitoring requirement	Frequency	Record	Responsibility
Construction area	Monitor weather conditions (rainfall, refer to Section 8.2.4).	Daily	Site records	Construction Contractor
Construction area	Monitor standing water levels in any open excavation pit for overflow.	During and after any rain events or upon groundwater intrusion	Contractor site records	Construction Contractor
Surface water discharge point to marine environment	Visual check of adjacent marine environment for turbid water.	During and after any rain events.	Contractor site records	Construction Contractor
Construction area	Sampling and analysis of surface water for CoPC by a suitably qualified professional.	As required (prior to release of surface water)	Contractor site records	Construction Contractor
Construction area and immediately adjacent area	Check condition of any sediment and erosion management controls, such as diversion drains and the use of silt fences and/or absorbent socks/hay bales placed around surface water drains.	After a rain event	Contractor site records	Construction Contractor
Construction area	Check for evidence of excess construction related water use.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Check for the effectiveness of the surface flow system	During and after a rainfall event of greater than 40mm	Contractor site records	Construction Contractor

Location	Monitoring requirement	Frequency	Record	Responsibility
Penguin nesting sites (identified in the Little Penguin Monitoring and Management Plan (RPS 2026) (Appendix A5) – shown on Figure 1.	Check for evidence of surface water damage/scouring to the penguin colony area and burrows.	During and after a rainfall event of greater than 40mm	Compliance checklist	SEO
Stockpiles (identified on site plan/s)	Inspection of stockpile areas to check that stockpiles are: – in designated areas as shown on site plan/s – located away from surface water drainage if required (in preparation for rainfall or wind) – secured including bunding (hay bales) and covering as far as practicable.	Daily and when required including during rain events	Contractor site records	Construction Contractor
		Weekly and when required including during rain events	Compliance checklist	SEO
Parking areas (identified on site plan/s)	Inspection of vehicles and parking areas for spills/leaks and the surface water runoff to surface water and drainage lines offsite.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Post-construction groundwater investigation by qualified contaminated land personnel (if spill occurred).	Post construction activities	One report	Construction Contractor

8.2 Dust monitoring requirements

8.2.1 Trigger levels

The dust monitoring requirements at each of the seven directional dust depositional gauges (D) and one real time monitor (RT) shown in Figure 2, are outlined in Table 14.

Table 14 Construction dust monitoring program

Location	Monitoring requirement	Frequency	Record	Responsibility
During construction				
D1- D7	Directional dust deposition gauge monitoring (refer to Section 8.2.3).	Monthly	Monthly dust report	SEO
D1-D7	Sampling and analysis of dust for Heavy metals (refer to Section 8.2.3.1).	Monthly	Monthly dust report	SEO
RT2	Continuous total suspended particulates monitoring (refer to Section 8.2.1).	Continuous monitoring for TSP – with alerts set to 15-min and 1-hour averages	Telemetry with remote access and dashboard Alerts sent to SEO Monthly dust report	SEO
Construction area	Complaints register to document the number of dust complaints received.	As required	Site complaints register	Construction Contractor

Location	Monitoring requirement	Frequency	Record	Responsibility
Construction area	Monitor weather conditions (wind, temperature).	Daily	Site records	Construction Contractor

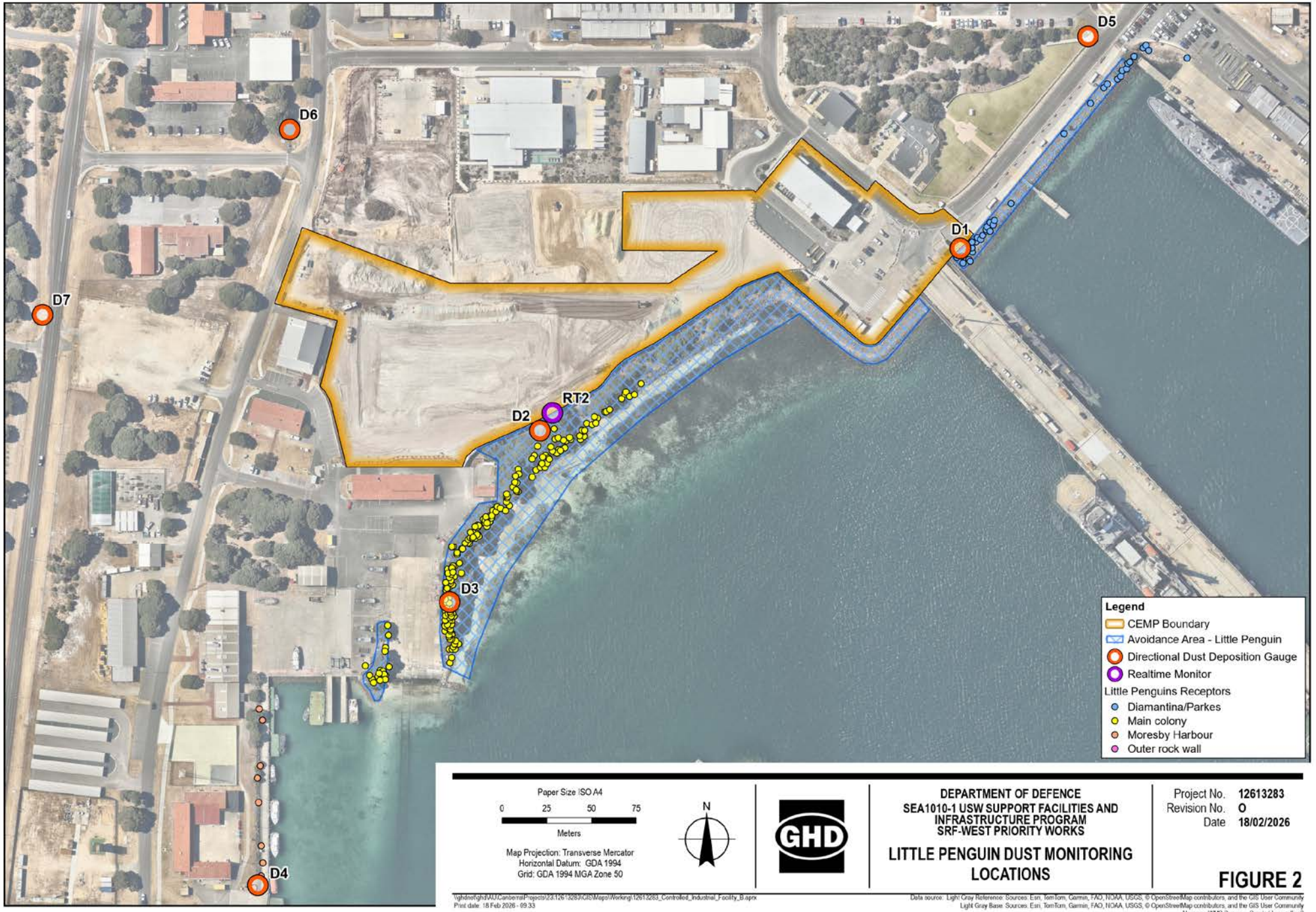


Figure 2 *Little penguin dust monitoring locations*

8.2.2 Continuous total suspended particulates monitoring

Continuous total suspended particulates monitoring (TSP) will be established for the purpose of monitoring dust emissions at location RTS (refer Figure 2). This monitoring station is for the primary purpose of monitoring exposure to dust at the little penguin nesting sites.

TSP can be measured with a type of nephelometer (such as the Oizon Dustroid). The monitor will include telemetry, in order to provide dust monitoring data via a dashboard (as per noise and vibration monitoring), remote access and allow alarms when trigger levels are exceeded to be set. Alerts will be set to SMS text notification to nominated site personnel.

Dust performance criteria are listed in Table 5 in Section 6.2. A 'corrective action' trigger level of 250 µg/m^3 refers to the ambient dust concentration that, when exceeded, requires measures to reduce dust emissions until levels drop below it. The 'stop work' trigger level of 400 µg/m^3 is the concentration at which work is required to cease (stop work) until dust levels decrease to below the stop work trigger level.

If these trigger levels are frequently exceeded (more than twice per week), review and assessment of the effectiveness of dust control measures and trigger values may be required (refer to adaptive management actions in Table 18).

8.2.3 Directional dust deposition gauge monitoring

Directional dust deposition gauge (DDG) monitoring will be established at 7 sites for the purpose of monitoring the composition of the particulate matter to which little penguins may be exposed to through the duration of the construction activities. (Refer to Figure 2).

Directional dust deposition gauge monitoring will be conducted in accordance with AS/NZS 3580.10.1 (2016) Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method and sent to a National Association of Testing Authorities-accredited laboratory.

A single DDG sample will be comprise dust collected over a month-long period. Following retrieval of the sample, an additional 4 weeks is typically required for laboratory analysis to be completed and for results provided to the SEO. As such, with a total lag time for receiving monitoring results of up to 8 weeks, DDG monitoring is not suitable for real time adaptive management of dust impacts, rather it provides a longer term via of the quantity and composition of particulate matter deposited at sites of interest, including little penguin nesting sites.

Dust performance criteria are listed in Table 5 in Section 6.2. If any exceedance of dust performance criteria is detected, adaptive management actions will be required (refer to Table 18).

Exceedance of dust performance criteria relating to DDG results will be reported per Section 10.1.2.

8.2.3.1 Analysis of dust deposition samples for heavy metals

The deposition gauges are collected every month and sent to a NATA-accredited laboratory for analysis. The samples are analysed in accordance with *AS/NZS 3580.10.1:2016 - Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method,* and analysed for:

– Directional dust deposition
  - Total soluble matter (TSM)
  - Total insoluble matter (TIM)
  - Total suspended solids (TSS)
– Metals and metalloids:
  - Aluminium
  - Antimony
  - Arsenic^

- Barium
- Beryllium
- Boron
- Cadmium
- Chromium
- Cobalt
- Copper
- Magnesium
- Manganese
- Molybdenum
- Nickel
- Phosphorus^
- Potassium^
- Silver
- Sodium
- Strontium
- Sulfur as S^
- Thallium
- Tin
- Titanium
- Zinc
- Vanadium
- Iron
- Calcium^
- Lead
- Selenium

^ Non-metal

Noting that the metals are insoluble, the amount of weight is measured on a filter in micrograms (µ). Although there is no trigger levels set for heavy metals, if heavy metals are detected further assessment would be required (refer to adaptive management measures in Table 18.

8.2.4 Weather

The primary meteorological factors that may affect dust are wind speed and wind direction. Rainfall can also influence dust.

There are three Bureau of Meteorology (BoM) meteorological stations on Garden Island/*Meeandip*:

– Armament Jetty (BoM station #9254)
– Colpoy Point (BoM station #9255)
– Garden Island HSF (BoM station #9256).

The Garden Island HSF BoM station was selected because it records rainfall, wind speed, and wind direction. Armament Jetty and Colpoy Point do not measure rainfall. Additionally, Garden Island HSF is an officially recognised BoM station confirmed to be AS

compliant, unlike Colpoy Point and Armament Jetty BoM stations, whose AS compliance status is still unknown.

The BoM stations are shown in Figure 3.

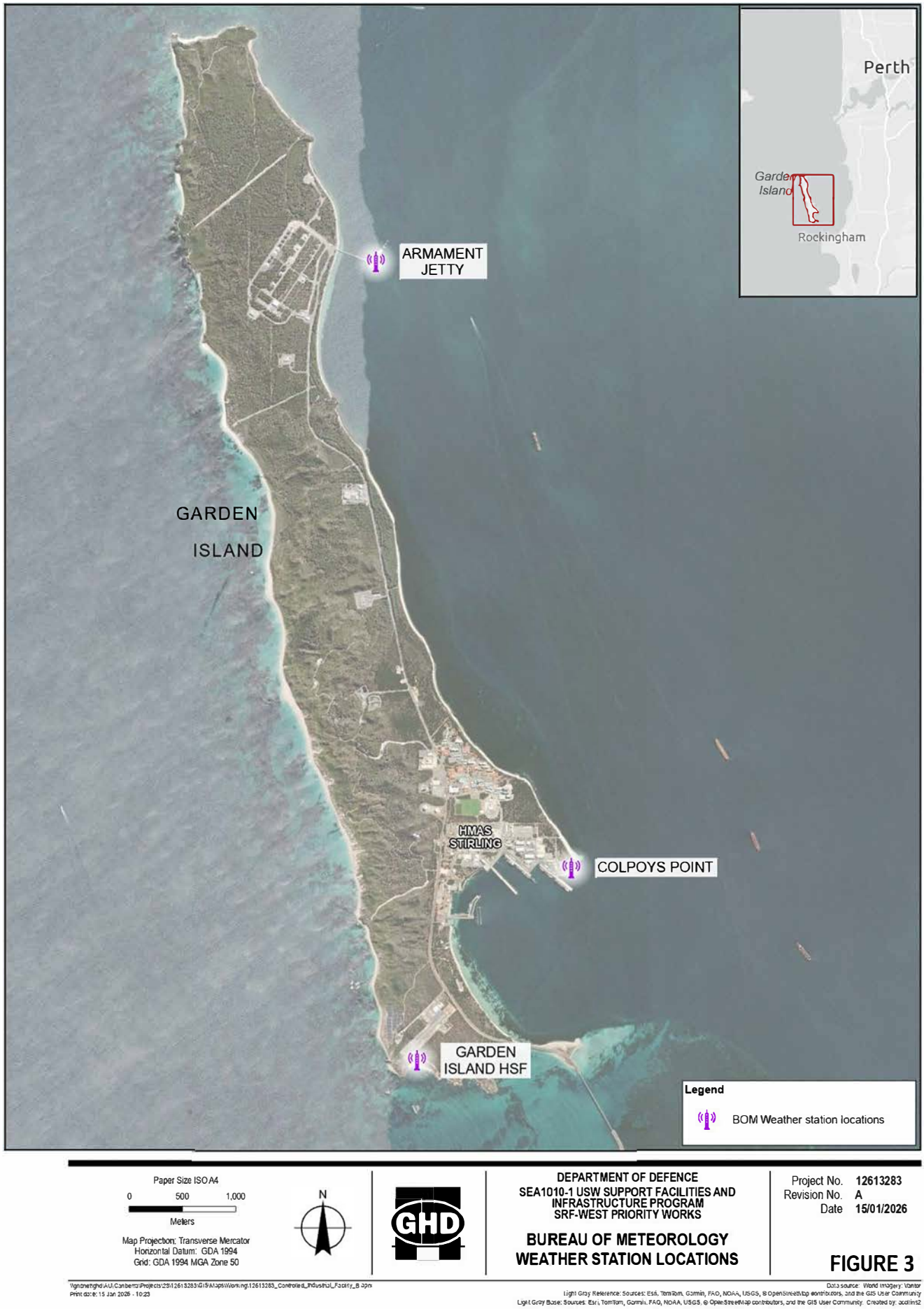


Figure 3 Bureau of Meteorology weather station locations

Heavy rainfall (>40mm) and high wind speeds (>10m/s) are triggers for additional inspections for water quality (refer to Table 13) and adaptive management measures for dust control (refer to Table 18) respectively.

Complaints register

Complaints from the local community relating to dust incidents will be registered, the cause identified, and adaptive management actions will be taken and documented accordingly (refer Table 18 and section 11.2.2 of the CEMP).

8.3 Contaminated soil monitoring requirements

Soil contamination monitoring requirements are provided in Table 15.

Table 15 Soil contamination monitoring requirements

Location	Monitoring requirement	Frequency	Record	Responsibility
During construction				
Exit/entry point (as marked on site plan/s)	Plant, equipment and vehicle movements transferring contaminants off-site: – inspect leaving plant and vehicles for tracking of excess soil/mud on to roadways – check access roads for sediments.	Every instance of contaminated material being transferred offsite	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Parking areas	Oil, grease or fuel spills/leaks from the use of plant, equipment and vehicles on-site: – regularly monitor vehicles and parking areas for spills/leaks.	Daily	Contractor site records	Construction Contractor
		Weekly	Compliance checklist	SEO
Construction area	Backfilling with imported fill material: – uncontaminated fill material certification required prior to importation – testing of soil or fill material to ensure it is classified as fill material under DWER, Landfill waste classification and waste definitions (2019). Advice must be sought from a suitably qualified professional.	Daily (when backfilling)	Contractor site records	Construction Contractor
		Weekly (when backfilling)	Compliance checklist	SEO
Construction area landside of Diamantina Pier	Excavation and sub-surface works – PID and Lower Explosive Level (LEL) monitoring must be implemented for all sub-surface works undertaken within the area of known hydrocarbon contamination.	Daily during sub-surface works	Contractor site records	Construction Contractor
Construction area landside of Diamantina Pier	Excavation and sub-surface works – Prior to any confined space entry gas test atmospheres	Prior to confined space entry	Contractor site records	Construction Contractor
Construction area and immediately adjacent areas	Generation and storage of demolition waste: – monitor the site for misplaced/escaped waste or litter – monitor the contents of the bins on-site to ensure the correct waste is being deposited in the appropriate bins.	Daily	Records of waste removal and disposal	Construction Contractor
		Weekly	Compliance checklist	SEO

8.4 Fuel and oil leaks and spills monitoring requirements

Monitoring requirements related to leaks and spills of fuel and oil are provided in Table 16.

Any works undertaken which require monitoring of management controls in accordance with this annexure will be recorded to meet the requirements of Section 12.2 of the CEMP. This will include works in areas with fuel and oil storage and/or use, refuelling areas, and any other works that involve oils, fuels or other hydrocarbons. The Construction Contractor must sign off on any such works to verify that the required controls are implemented.

Table 16 Fuel and oil spill management monitoring requirements

Location	Monitoring requirement	Frequency	Record	Responsibility
During construction				
Spill kit locations (as marked on site plan/s)	Spill kits checked for appropriate stock levels, condition of absorbent material.	Weekly	Contractor site records	Construction Contractor
Construction area	Records must be kept and provided to the PMCA of refuelling including where refuelling has been undertaken and the time of day.	Daily (for each refuelling event)	Contractor site records/ Construction Contractor monthly report	Construction Contractor
Construction area	Records must be kept and provided to the PMCA of fuel, oil and chemical storage areas. Evidence of effective containment controls such as bunds, impervious surfaces etc. must be provided.	Monthly	Contractor site records/ Construction Contractor monthly report	Construction Contractor
		Monthly	Compliance checklist	SEO
Construction area	A maintenance schedule must be maintained by the Construction Contractor. The schedule will include (at minimum) dates of future maintenance activities for all applicable plant and equipment and when maintenance activities actually occur. This must be provided to the SEO monthly.	Monthly	Maintenance schedule	Construction Contractor

9. Adaptive management measures

This annexure is intended to be dynamic and may be updated to reflect changes in management practices and the natural environment with time. This will also allow flexibility to adopt new technologies and management controls. Amendments to management controls and monitoring requirements will be completed on an as-needed basis. The review and updates to this annexure may include, but are not limited to:

– updates to management controls that are identified as not achieving the desired outcome and/or to achieve a greater environmental outcome
– additional management controls that are required as a result of additional impacts being identified
– amendments to relevant legislation that may affect the implementation of management controls
– improvements to practices, achieving a greater environmental outcome.

If monitoring results, instances of non-conformances or audit results determine that the management controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused. Alternative management controls and monitoring requirements will be determined in accordance with the environmental management framework set out within the CEMP and associated annexures. Once these

management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP. Monitoring will continue to determine if the alternative management controls ad monitoring requirements are effective.

9.1 Water quality adaptive management measures

As the construction activities progress, if the contamination risk profile of water changes to indicate a higher risk, relevant contamination management controls and monitoring requirements as set out in this plan will be revised accordingly.

Table 17 below identifies triggers and adaptive management measures for water quality management and contingencies for the approved Action.

Table 17 Water quality management adaptive management triggers and responses

Trigger	Adaptive management measure
Landside construction has resulted in water channelling toward the rock wall	Cease construction related water use (such as site dust suppression) on detection of water channelling. Investigate cause. This will include inspections of all surface water management features as well as other water management controls such as frequency of dust suppression water application. Undertake repairs of these features as required within 24 hours of discovery. Review any changes in processes required (e.g. more frequent surface water management feature inspection) and update controls if necessary.
Turbid surface water discharging to marine environment due to construction works	Investigate cause. This will include inspections of all surface water management features as well as other water management controls such as frequency of dust suppression water application. Undertake repairs of these features as required within 24 hours of discovery. Review any changes in process required (e.g. more frequent surface water management feature inspection) and update controls if necessary. Undertake daily checks of the marine environment until water quality improves.
Uncontained contaminated surface water	Cease construction related water use on detection of uncontained contaminated surface water. Divert contaminated surface water to excavation or alternative containment structure for testing to be undertaken. Investigate cause. This will include inspections of all surface water management features including containment structures. Update controls if necessary.
Surface water comes into contact with potentially contaminated material	Capture and retain surface water on-site to be tested before disposal to an appropriately licenced treatment facility in accordance with the Environmental Protection (Controlled Waste) Regulations 2004 (DWER) (refer to management controls for surface water with CoPC in Table 8).
Groundwater is encountered	Capture and retain groundwater. Follow item 10 in Table 8 in Section 7.4. Investigate cause, review any changes in processes required and update controls if necessary.

9.2 Dust adaptive management measures

Table 18 identifies dust management triggers and adaptive management measures for this annexure.

Table 18 Dust management triggers and adaptive management measures

Trigger	Adaptive management measure
Exceedance of dust deposition performance criteria (4g/m^2/30 days, or 2g/m^2/30 days above background)	Apply water directly to the dust source to suppress dust until the dust concentrations are below the corrective action level. Review site dust generating activities and implement additional controls in consultation with the SEO if required.

Trigger	Adaptive management measure
Exceedance of TSP corrective action trigger levels (250µg/m^3)	A review will be initiated to determine the cause of the exceedance. Dust management approach will also be reviewed for improvements.
Exceedance in TSP stop work trigger levels (400µg/m^3)	Cease all site activities generating visible dust. Apply water directly to the dust source to suppress dust. Do not recommence work until the dust concentrations are below the corrective action level. A review will be initiated to determine the cause of the exceedance. Dust management approach will also be reviewed for improvements.
Frequently (more than once a week) exceeding trigger levels (either corrective action or stop work performance criteria)	Trigger levels will be periodically reviewed to determine issues and revised accordingly. Dust management approach will also be reviewed for improvements.
Forecasted winds >10 m/s	Where winds on site are forecasted to exceed 10 m/s, the SEO will make a determination on any additional management measures and soil stabilisation requirements (e.g. additional wind fencing, use of water carts).
Visible dust due to construction activity	Where visible dust is an issue from a construction activity (eg during strong winds >10m/s), **c**ontrols will be identified by the SEO and Construction Contractor and will be implemented immediately. Where effective controls cannot be identified by the SEO and the Construction Contractor then the activity generating the dust will cease.
Dust complaints	The Construction Contractor must inform the SEO within 4 hours of receiving any complaints. A Complaints register is to be maintained by the Construction Contractor and complaints are to be investigated by the Construction Contractor and SEO immediately to review the dust management methods used. Action will be taken accordingly. Dust management approach will also be reviewed by the SEO 24 hours after initial implementation and then weekly for improvements.
Heavy metals detected in dust monitoring results	Complete a health risk assessment (HRA) in accordance with the WA Department of Health guidelines to determine any risk to human health and associated management measures and monitoring requirements that need to be developed (DOH, 2006) (enHealth, 2002).
Asbestos detected in soils in the Action area (refer unexpected finds trigger in Table 19)	Complete a HRA in accordance with the WA Department of Health guidelines to determine any risk to human health and associated management measures and monitoring requirements that need to be developed (DOH, 2006) (enHealth, 2002).

9.3 Contamination adaptive management measures

Table 19 identifies soil contamination management triggers and adaptive management measures.

Table 19 Soil contamination management triggers and adaptive management measures

Trigger	Adaptive management measure
Unexpected finds	Earthwork activities have the potential to encounter unexpected finds while breaking ground and/or excavating material. An unexpected finds protocol is to be developed by the Construction Contractor as a contingency measure to manage such situations. Unexpected finds may include, but are not limited to: – previously unknown underground services or assets – significant levels of gross contamination and hazardous materials (for example, potential ACM). Contingencies and procedures will outline the management requirements to ensure that the health and safety of on-site personnel is protected, and unexpected finds are managed appropriately with local jurisdictional requirements. In general, the unexpected find will be managed as follows: 1. Stop work, make sure the work area is safe and follow emergency procedures as per CEMP, if unexpected find presents a potential safety risk (such as live utilities). 2. Inspect unexpected find and manage according to type: a. Previously unknown services or assets. Do not approach if live electricity is suspected. Check for indications that the service is in use and contact local management and/or utility owner/service provider. Attempt to switch off or isolate the utility if safe to do so. If the service appears redundant, check available Dial Before you Dig information to determine its provenance. Redundant services may be removed if practical b. Gross contamination and/or hazardous materials (such as ACM). Evacuate the area if hazardous levels of vapours and/or hazardous materials present a risk to personnel. Apply PPE (for example, P2 dust mask or respirator) and clear excavation/work area with gas detectors prior to approaching suspect material. Consult with a suitably qualified environmental practitioner and/or occupational hygienist. A Chance Finds Protocol is included in the Heritage Management Annexure (Annexure A2) to manage actions relating to Items of potential cultural heritage and/or Aboriginal significance. Where unexpected finds change the risk profile for surface water or dust management measures these must be reviewed in accordance with adaptive management measures identified in Table 17 and Table 18.
PID and Lower Explosive Level (LEL) trigger levels identified in the Contractor CEMP exceeded	Adaptive management measures identified in the Contractor CEMP must be followed.

9.4 Fuel and oil spill adaptive management measures

Table 20 identifies triggers and contingency actions for this annexure.

Table 20 Fuel and oil spill management triggers and adaptive management measures

Trigger	Adaptive management measure
Leak or spill of fuel, oil, or chemicals occurs onsite	Follow incident response, notification and reporting procedure in the CEMP and the HMAS Stirling OSCM. SEO will identify and review causes and implement measures to prevent a recurrence, such as activity siting or amended works procedure. Include case study in relevant briefings, weekly toolbox talks and training to raise awareness and improve prevention.
Daily site inspection identifies unreported fuel or oil spill	Follow incident response and reporting procedure in the CEMP. SEO will identify and review causes and implement measures to prevent a recurrence, such as a refresher briefing on induction material and spill response protocols for all construction personnel. Activity-specific inspections of spill prevention controls to be implemented by the Construction Contractor may be required.

Trigger	Adaptive management measure
Injured or deceased wildlife found in vicinity of spill	Follow incident response and reporting procedure in the CEMP. SEO will identify and review causes and implement measures to prevent a recurrence, including discussion with the relevant ESM, seabird ecologist or field ecologist on any improvement opportunities or additional controls.

10. Reporting and documentation requirements

All reporting requirements of the CEMP with reference to the EPBC Act approval 2024/10031 are detailed in Section 7 of the CEMP.

All compliance documents and records required by this annexure must be maintained and stored in accordance with the document control requirements specified in Section 12.2 of the CEMP. Compliance records may be subject to audit and/or be used to verify compliance with the conditions of approval in accordance with Section 12 of the CEMP.

10.1 Monthly reporting requirements

10.1.1 Water quality (surface water)

All data collected for surface water quality monitoring (as and when required) will be summarised into a monthly report that will support annual compliance reporting requirements of the CEMP.

The report will include:

– the scope of monitoring carried out
– sampling and analytical methods followed
– field sampling records and data collected
– reports for exceedances against the criteria
– conclusions and recommendations
– chain of custody forms, laboratory analysis results and certificates appended to the report.

Table 21 Minimum water quality reporting requirements

Reporting requirement	Frequency
Waste classification report of surface water sampling results to determine appropriate waste classification and disposal requirements.	As required (should surface water come into contact with potentially contaminated material).

10.1.2 Dust

All data collected for dust monitoring (TSP and DDG) will be summarised into a monthly report, that will support reporting requirements of the CEMP. For each monthly report, TSP results will be reported for the current reporting period. DDG results, as discussed in Section 8.2.3 will be reported on a 2-month lag, as a consequence of the month - long sample collection period and a further 4-week requirement for laboratory processing.

The report will include:

– monitoring methodology
– reports for exceedances against the criterion
– comparison to previous dust monitoring results
– actions undertaken as a result of any recorded exceedances
– chain of custody forms, laboratory analysis results and certificates appended to the report
– The minimum dust management reporting requirements are provided in Table 22.

Table 22 Minimum dust reporting requirements

Reporting requirement	Frequency
Dust deposition and analysis results	Monthly
Total suspended particulates	Recorded continuously (15 minutes) Reported monthly
Any instances of TSP exceedances that constitute an environmental event or incident must be reported in accordance with the CEMP	As required
Any instances of DDG exceedances that constitute an environmental event, or incident must be reported in accordance with the CEMP. As per Section 8.2.3, there will be a typical 8-week lag period from the commencement of sample collection to receiving monitoring results from the laboratory. As such, reporting incidents and events per Section 7.3.3 and Section 7.3.6 of the CEMP for DDG exceedances will be taken from the time of receipt of monitoring results by the SEO	As required

10.1.3 Soil

All data collected for soil sampling (anticipated to primarily include stockpile sampling for waste classification on an as needed basis) will be summarised into a monthly report that will support reporting requirements of the CEMP.

The report will include:

– the scope of monitoring carried out
– sampling and analytical methods followed
– field sampling records and data collected
– reports for exceedances against the criteria
– conclusions and recommendations
– chain of custody forms, Laboratory analysis results and certificates appended to the report.

The minimum soil contamination reporting requirements are provided in Table 23.

Table 23 Minimum soil contamination reporting requirements

Reporting requirement	Frequency
Waste classification report of spoil stockpile sampling results to determine appropriate waste classification and suitability for reuse/offsite disposal requirements	As required
Report presenting the outcomes of testing of clean fill material sourced for use as fill material during construction to ensure it is classified as uncontaminated fill material under DWER, Landfill waste classification and waste definitions (2019)	As required

10.1.4 Fuel and oil spill

Table 24 outlines record keeping requirements relevant to fuel and spill management that will be provided to support reporting requirements of the CEMP.

Table 24 Minimum fuel and oil spill management reporting requirements

Reporting Requirement	Frequency
Construction Contractor will provide the PMCA maintenance records, compiled daily inspection checklists, refuelling records and records illustrating storage area compliance as outlined in Table 16	Monthly
Construction Contractor will fulfil notification, reporting and investigation as required by the HMAS Stirling OSCM, either directly or via the SEO	As required
Any instances of spills or leaks that constitute an environmental event or incident must be reported in accordance with the CEMP	As required

Reporting Requirement	Frequency
The Construction Contractor must report any fauna removals, deaths, or injuries within the approved Action fauna register to the PMCA	As required At the completion of the approved Action
Investigation and remediation reporting will be completed by the Construction Contractor and supported by the SEO. The reporting will outline the investigation conducted, remediation activities undertaken, the outcomes of remediation, and any ongoing monitoring requirements. All sampling data will be provided to the ESM via the PMCA for upload to the Defence ESdat platform.	As required, where investigation and/or remediation of a leak or spill is conducted

11. Continuous improvement and review

If monitoring determines the controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused by the SEO. Alternative management controls will be determined in accordance with the environmental management framework set out within the CEMP and in accordance with the measures identified in Table 24 above. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP.

Environmental management plans such as this annexure are not static documents. Environmental management annexures will be updated during the course of the approved Action to reflect new information and changes to management controls in accordance with the adaptive management triggers and processes described in Section 12.3 of the CEMP

In accordance with Section 12.3.2 of the CEMP, a working Change Notice Register will be maintained to capture continuous improvements to this annexure of the CEMP, arising from but not limited to outcomes of incident reviews, corrective actions, and adaptive management responses that are identified. The Change Notice Register will be used to inform future CEMP reviews.

Appendix A

Site risk assessment/classification for activities generating uncontaminated dust (DEC, 2011)

Table A.1 Nature of the site

Item	Score option	Allocated score
Nuisance potential of soil, when disturbed	Low Material is of coarse particulates	2
Topography and protection provided by undisturbed vegetation	Little screening Native vegetation west of the site, small patch of native vegetation to the east	12
Area of site disturbed by the works	Between 1 and 5 ha Only 1.78 ha will be excavated at any time	3
Type of work being done	Roads, drains, sewers and partial earthworks Partial earthworks, including cut-to-fill excavation, earthworks and grading and compaction to prepare building foundations	6
	TOTAL score for Part A	**23**

Table A.2 Proximity of site to other land uses

Item	Score option	Allocated score
Distance of other land uses from site	Less than 100 m	18
Effect of prevailing wind direction (at time of construction) on other land uses	Isolated land uses affected by one wind direction	6
	TOTAL score for Part B	**24**

Site classification score (A x B)	552	Site classification 3 — 400 to 799

Australian Government
Defence

SRF-W Priority Infrastructure Works
Construction Environmental Management Plan Version 2

A4

Noise and Vibration Management Annexure



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A4 Noise and Vibration Management Annexure Version 2

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S4	0	M. Velasco C. Doyle	P. Pandey	On File	17/02/2026	S. Orr	On File	17/02/2026

Table 1 Change register

Change register			
Version	**Revision**	**Date**	**Reason for revision**
1	1	12/08/25	Published version for establishing management controls and monitoring requirements activities required under the early works activities of the approved Action.
2	0	20/02/26	Updates made to incorporate activities required for enabling works, and construction of landside facilities including the CIF. Changes include: – Figure 4 – updated to include additional areas – Section 2, 3, 5 and 6 – amendments and additions to include content for construction activities and equipment not included in Version 1. Management controls for review, assessment and approval of use of new equipment, including monitoring requirements have been added. – Section 4 – amendments and additions to include noise and vibration impacts, management controls, and safe working distances for the new activities – Section 6.1 – updated NV4 to include specific distances – Appendices – Former Appendix A Out-of-hours works permit has been moved to the main CEMP Appendix G. A new appendix, Appendix A has been added to include a noise and vibration management plan template.

1. Introduction

1.1 Objectives

The primary objective of this Noise and Vibration Management Annexure is to implement controls and procedures during construction to avoid, minimise, monitor and document the potential adverse impacts on the little penguin population and their nesting sites adjacent to the Action area, during construction of the Submarine Rotational Force - West (SRF-West) Priority Infrastructure Project.

Specifically, this annexure aims to:

- avoid noise and vibration-related harm to little penguins and their nesting habitats at Careening Bay
- achieve compliance with the statutory requirements outlined in EPBC Act approval 2024/10031
- establish appropriate performance criteria and monitoring procedures for construction noise and vibration
- identify approved Action components that have the greatest potential to result in adverse noise and vibration impacts to little penguins
- guide the implementation of stop-work procedures where exceedances are detected
- support adaptive management and continuous improvement by application of improved management controls, monitoring requirements, reporting, and feedback mechanisms.

This annexure has been prepared as a supporting document for the Construction Environmental Management Plan (CEMP). The CEMP defines terms used and activities managed by this annexure. The CEMP must be referred to for additional context, including:

- approved Action details including document control, the *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act) approved Action and person accepting responsibility for the CEMP and all associated annexures including this Noise and Vibration Management Annexure
- approved Action description
- emergency contacts, procedures and specific exemptions that may apply
- potential environmental risks and impacts of the approved Action
- auditing and review requirements
- glossary
- references.

This Noise and Vibration Management Annexure must be read in conjunction with the CEMP and all other annexures.

A physical copy of this annexure will be on-site for use should an incident occur.

1.2 Reference documents

This Noise and Vibration Management Annexure fulfils a requirement under Condition 8 (i) of EPBC Act approval 2024/10031 to mitigate terrestrial construction noise and vibration impacts to little penguins and little penguin nesting sites.

In the absence of formal national or state guidelines on acceptable airborne noise or vibration levels for little penguins, or seabirds more broadly, this Noise and Vibration Management Annexure and associated Noise and Vibration Monitoring Program draws on relevant scientific literature and technical standards. Further detail on the approach adopted by this annexure, in applying precautionary and adaptive management principles while aligning with construction noise monitoring practices, is provided in section 3.2.

Commonwealth:

- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

– Environment Protection and Biodiversity Conservation Regulations 2025 (Commonwealth)

State (Western Australia)

– *Biodiversity Conservation Act 2016* (State)

– Biodiversity Conservation Regulations 2018 (State)

Departmental (Defence):

– Defence Environment and Heritage Manual (2019a)

Table 2 below summarises the key reference documents and published standards used to inform the assessment and management of potential noise and vibration impacts to little penguins during construction activities.

Table 2 Key reference documents

Annexure component	Referenced document
Measurement of environmental noise	– *AS 1055 – Acoustics – Description and Measurement of Environmental Noise* – *IEC 61672-3 – Electroacoustics – Sound Level Meters*
Measurement of vibration	– *DIN 45669-1 Measurement of vibration immissions - Part 1: Vibration meters - Requirements and tests*
Estimation of noise levels from construction equipment	– *AS 2436 – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* – *Construction Noise and Vibration Guideline* (TfNSW, 2024)[1] – *Construction Noise and Vibration Strategy* (TfNSW, 2017)[2]
Estimation of vibration levels from construction equipment	– *Environmental Noise Management Manual* (RTA, 2001) – *Ground vibration from road construction* (NZ Transport Agency, 2012) – SRF-W HMAS Stirling – Attended Noise and Vibration Monitoring Report (9/10/25) (GHD, 2025e) – SRF-W HMAS Stirling – Attended Noise and Vibration Monitoring Report (18/12/25) (GHD, 2025g)
Basis of 'review' and 'stop work' vibration thresholds	– *DIN 4150-3: Structural Vibration – Effects of Vibration on Structures* – *BS 7385-2 – Evaluation and Measurement for Vibration in Buildings – Guide to Damage Levels from Groundborne Vibration*
Basis of 'review' and 'stop work' thresholds	– *Penguin Care Manual* (Penguin Taxon Advisory Group, 2024) – *Model Work Health and Safety Regulations* (SafeWork Australia, 2023) – *Effects of Traffic Noise and Road Construction Noise on Birds* (Dooling and Popper, California Department of Transportation Division of Environmental Analysis 2016) – *Kennedy Point: Little Penguins and Construction Noise* (Marshall Day Acoustics, 2021) – *Effect of Piling on Little Blue Penguins* (Lawrence et al, 2023)

The following reports were prepared as part of the EPBC referral documentation and must be referred to for additional context and supporting detail. These documents provide the basis for the terrestrial noise and vibration management approach outlined in this annexure and include:

– Terrestrial Fauna Noise Impact Assessment (GHD, 2024i) (provided with the EPBC referral documentation as Attachment 7).

– Terrestrial Noise and Vibration Modelling Assessment (GHD, 2024j) (provided with the EPBC referral documentation as RFI Attachment G)

[1] Note: This reference contains detailed sound power level data in Appendix F, based on typical plant and equipment used in road construction projects.

[2] Note: Table 2 provides maximum allowable noise levels for construction equipment.

A baseline noise and vibration monitoring report has been prepared to inform the development of this annexure. The report characterises the existing acoustic environment at and adjacent to little penguin nesting sites.

– SRF-West Baseline Noise and Vibration Monitoring Report (GHD, 2025d)

The following documents will be consulted for additional context and details on the requirements outlined in this annexure where required:

– HMAS Stirling Little Penguin Survey and Management Report (RPS, 2024a)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
– Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f)
– Environment and Heritage Assessment (GHD, 2025a)
– Biodiversity Values Report (GHD, 2024g).

1.3 Conditions of approval

The requirements outlined in this Noise and Vibration Management Annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to terrestrial noise and vibration impacts on little penguins. Table 3 summarises how each relevant condition has been addressed in this annexure.

Table 3 Conditions of approval applicable to the Noise and Vibration Management Annexure

Condition number	Requirement	How it is addressed in this Noise and Vibration Management Annexure	Relevant section
EPBC Act approval 2024/10031 Vibration and Terrestrial Noise			
Vibration and Terrestrial Noise			
8 h	*The CEMP must include measures to undertake a pre-construction survey of the structural condition of all little penguin nesting sites prior to the commencement of construction, to determine any structural reinforcement measures that need to be implemented to prevent collapse or damage arising from construction.*	A (pre-construction) structural condition assessment of little penguin nesting sites has been completed. The geotechnical inspection of the revetments did not identify areas or individual rocks that could be considered as precarious and readily prone to dislodgement from vibrations generated by the anticipated construction works.	Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) (Section 6.3)
8 i	*The CEMP must include a noise and vibration monitoring program, prepared by a suitably qualified acoustic expert in consultation with a suitably qualified seabird conservation ecologist. The noise and vibration monitoring program must:*	A Noise and Vibration Monitoring Program has been developed for the duration of construction activities. The Program has been developed in consultation with a seabird ecologist.	Section 5 (Noise and Vibration Monitoring Program)
8 i (i)	*The noise and vibration monitoring program must specify terrestrial noise threshold levels (dB) and vibration threshold levels (mm/s) that will not be exceeded at any little penguin nesting sites during construction to avoid harm to little penguins and little penguin nesting sites, including the methodology relied on to establish these acoustic parameters. Vibration threshold levels and noise threshold levels must be specified for each of the following periods to reflect their different sensitivities (i) little penguin arrival period, (ii) little penguin departure period, (iii) little penguin day-time period and (iv) little penguin night-time period.*	Through a review of available scientific literature, relevant proxy criteria from other environmental standards, and in consultation with a seabird ecologist, two terrestrial threshold levels have been established for both noise and vibration. This approach ensures that the adopted thresholds are evidence-informed while remaining practical for implementation within a construction monitoring context.	Section 3 (Performance Criteria)
8 i (ii)	*The noise and vibration monitoring program must specify how noise and vibration levels generated by the Action during construction will be continuously monitored in order to detect any exceedance of the acoustic parameters that may harm little penguins.*	Continuous unattended noise and vibration monitoring will be undertaken at 4 locations adjacent to little penguin nesting sites. A Noise and Vibration Monitoring Program has been developed for the duration of construction activities, specifying requirements for continuous monitoring and outlining appropriate acoustic parameters.	Section 5 (Noise and Vibration Monitoring Program)
8 i (iii)	*The noise and vibration monitoring program must be capable of detecting any exceedance of the terrestrial noise threshold level or vibration threshold level at the little penguin nesting sites.*	Alerts will be triggered when the noise or vibration thresholds are exceeded: – Noise: ≥ $L_{Aeq(5min)}$ 85 dBA (A-weighted decibels) (review); ≥ $L_{Aeq(5min)}$ 93 dBA (stop work)	Section 5 (Noise and Vibration Monitoring Program)

Condition number	Requirement	How it is addressed in this Noise and Vibration Management Annexure	Relevant section
		– Vibration: Peak Particle Velocity (PPV) ≥ 5 mm/s (review); PPV ≥ 15 mm/s (stop work).	
8 i (iv)	*The noise and vibration monitoring program must trigger implementation of a stop works procedure if a noise threshold level or vibration threshold level is exceeded.*	A stop-work procedure is triggered when either the 'stop work' noise or vibration threshold is exceeded. This includes: – immediate alerts sent to the relevant stakeholders – ceasing construction work if the stop-work threshold is breached and construction source to be verified – seabird ecologist to assess for potential harm – implementation of additional mitigations – logging of all exceedances and responses before works resume.	Section 5 (Noise and Vibration Monitoring Program)
8 l	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will:* – *i) only occur under exceptional circumstances and be minimised,* – *ii) be particularly avoided or minimised during the little penguin arrival period and little penguin departure period,* – *iii) not exceed the relevant noise threshold levels and vibration threshold levels specified in condition 8i, and* – *iv) only involve the use of the quietest available equipment that is capable of doing the task.*	For noise-generating works within the period commencing at sunset and ending at sunrise, an out-of-hours works permit is required. The out-of-hours works permit process is included in Section 11.1.1.5 of the CEMP.	Section 2.1 (Construction hours of work) Section 2.3 (Exceptional circumstances works) Section 6.1 (Management controls)

1.4 Assumptions

The primary aim of this Noise and Vibration Management Annexure is to avoid harm to little penguins from construction-related noise and vibration. However, there is currently very limited scientific research directly linking specific noise or vibration levels to adverse effects on little penguins. The potential noise and vibration impact on penguin behaviour, physiology and breeding success remain largely unknown, making it difficult to establish definitive, harm-based thresholds.

While research on analogous species may offer some insights, differences in local environment, food availability and predator pressure may cause little penguins at Garden Island/*Meeandip* to respond differently to noise.

The link between specific noise/vibration levels and adverse outcomes (for example, nest abandonment, reduced breeding success) in little penguins remains unknown. Effects may be influenced by multiple interacting environmental and biological variables.

As such, the methodology for implementing noise and vibration thresholds adopted in this annexure incorporates a precautionary, adaptive management approach.

Two threshold levels have been defined for both noise and vibration:

– a '**review threshold'**, which initiates ecological monitoring and reviews to determine the need for additional noise and vibration mitigation measures
– a '**stop work threshold'**, which triggers an immediate stop work of contributing SRF-West construction activities.

1.5 Roles and responsibilities

The key roles and responsibilities for implementation of the CEMP, including the associated environmental annexures, are provided in Section 6 of the CEMP.

The roles and responsibilities of key stakeholders involved in the implementation of this Noise and Vibration Management Annexure are summarised in Table 4. These responsibilities relate specifically to noise and vibration management to ensure compliance with the annexure.

Responsibility for the specific management controls and monitoring requirements in this annexure are provided in Table 18 (Section 5.4).

Table 4 Responsibilities for this Noise and Vibration Management Annexure

Role	Noise and vibration related responsibilities
Suitably qualified acoustic expert (acoustic consultant)	The acoustic consultant (as defined in the EPBC Act approval 2024/10031) means a person who has relevant professional qualifications and has at least 3 years of work experience designing and implementing surveys and environmental management plans to manage the negative impacts of noise and vibration pollution in construction settings on native fauna (either in-air and/or underwater as relevant to the context). Responsibilities include: – implementing the Noise and Vibration Monitoring Program in accordance with this annexure – establishing the terrestrial noise and vibration thresholds in consultation with a seabird ecologist, allowing for revisions – advising the SEO and Construction Contractor on mitigation options when noise and/or vibration thresholds are exceeded – managing and maintaining the noise and vibration monitoring program for the duration of construction works, including daily charts, monthly reports and biannual review of the noise and vibration thresholds.
Suitably qualified seabird conservation ecologist (seabird ecologist)	The seabird ecologist as defined in the EPBC Act approval 2024/10031) (for the purpose of preparing and implementing monitoring programs to detect changes in little penguin population and correlating these changes with environmental variables) means a person who has relevant professional qualifications and: – at least 5 years of work experience with little penguins

Role	Noise and vibration related responsibilities
	– has an in-depth understanding of little penguin ecology, threats to little penguins and their conservation – can give an independent, authoritative assessment and advice on the little penguin species and its habitat using relevant protocols, standards, methods and/or literature – has implemented monitoring programs and analysed and reported on monitoring results to better understand little penguin ecology, population dynamics and correlations between population/breeding success with environmental and other variables. Responsibilities include: – collaborate with an acoustic consultant to develop appropriate noise and vibration thresholds – define and assess indicators of harm to little penguins during construction – respond to threshold exceedances to assess potential immediate harm – conduct little penguin behavioural monitoring and correlate exceedances with observed changes in behaviour – perform physical inspections of little penguin nests and, where available, use remote monitoring tools (for example, cameras) to detect behavioural responses or nest disturbance – review data every 6 months from relevant inspection, field, quarterly and annual reports (where applicable) to determine whether threshold adjustments are warranted and provide relevant feedback to the acoustic consultant.

1.6 Induction and training

Induction and training requirements are identified in Section 8 of the CEMP. Noise and vibration aspects from this annexure that will be included in induction and training material are:

– **Sensitive receptors**: Locations of little penguin nest sites (including which segments of the revetment they are in, as referred to in the HMAS Stirling Little Penguin Survey and Management Report (RPS, 2024a)) and their behavioural sensitivity during arrival, departure, daytime and night periods.
– **Roles and responsibilities**: Clear explanation of individual responsibilities for managing noise and vibration impacts and implementing management controls.
– **Monitoring equipment**: Purpose and location of noise and vibration monitors, understanding real-time alert systems and appropriate responses to threshold exceedances.
– **Response procedures**: What to do if a threshold level is triggered, including notification and ecological inspection protocols.
– **Adaptive management:** Overview of 6-monthly reviews and the potential for earlier reviews if thresholds are exceeded or approached (for example, $L_{Aeq(5min)} \geq 80$ dBA on 3 occasions). Site personnel will be made aware that reviews may lead to updated controls or mitigation requirements, and that these reviews are undertaken with input from the acoustic consultant and the seabird ecologist.
– **Communication tools:** Daily prestart and weekly toolbox talks must facilitate communication between management and site workers to ensure that relevant responsibilities for noise and vibration management and controls are clearly understood.

2. Relevant construction activity and site context

2.1 Construction hours of work

The approved construction hours are defined in Section 3.4 of the CEMP

Works outside of these hours may only occur under exceptional circumstances and where approved through an Out-of-hours Work Permit in accordance with Section 2.3.

2.2 Little penguin activity periods

The penguin activity periods outlined in the EPBC Act approval 2024/10031 include the arrival, departure, daytime and night-time periods, which correspond to key behavioural phases of the little penguin's daily cycle. Specifically:

- the arrival period begins at sunset and typically extends for around 40 minutes, during which penguins return to their nesting sites
- the departure period commences approximately two hours before sunrise, as penguins leave their burrows to head out to sea
- the night-time period spans the interval between the end of the arrival period and the beginning of the departure period
- the daytime period extends from sunrise to sunset.

Construction activities for the early works, enabling works, and landside facilities including the Controlled Industrial Facility (CIF) will be limited to the daytime period only, specifically from sunrise to sunset. Accordingly, no construction is proposed to occur during the more ecologically sensitive arrival, departure or night-time periods, except under exceptional circumstances and where approved through an out-of-hours Work Permit in accordance with Section 2.3.

2.3 Exceptional circumstances works

Any works proposed within the period commencing at sunset and ending at sunrise (that is, the ‘arrival, ‘night period’ and ‘departure’ periods) must be supported by an out-of-hours work permit, which must demonstrate that:

- the works are necessary due to exceptional circumstances
- activities will be avoided or minimised during the little penguin arrival and departure periods, as much as practically possible
- applicable noise and vibration thresholds (refer to Section 3) will not be exceeded
- only the quietest available equipment capable of performing the task will be used.

An out-of-hours work permit must also be prepared and formally approved by the SEO prior to undertaking such works (see CEMP Section 11.1.1.5 and Appendix G).

2.4 Construction activities and equipment (early works)

The key construction activities to be undertaken during the early works activities are summarised in Table 5, along with the construction equipment expected to be used for each activity. The table forms the basis for the assessment of potential noise and vibration impacts associated with the early works construction phase.

Table 5 Construction activities and equipment (early works)

Construction activities	Mulcher	Front End Loader WA 300	D6 Wheel Loader	Bobcat Skidsteer	D6 Dozer	Excavator 30T	Excavator 20T	Excavator 5T	Vac Truck	Roller 10T (Static)	Plate Compactor	Tip Truck 10T	Tip Truck 25T	Water Cart 15kL	Franna / Telehandler	Elevated Work Platform (EWP)
Early works																
Earthworks – cut and fill		✓			✓		✓			✓			✓	✓		
Vegetation clearing	✓	✓	✓			✓	✓	✓					✓	✓		
Civil works		✓		✓	✓					✓	✓		✓	✓		
External services								✓	✓		✓	✓		✓	✓	✓

2.5 Construction activities and equipment (enabling works and CIF construction)

For the purposes of considering noise and vibration impacts, enabling works and CIF construction activities have been categorised based on whether they occur across the broader approved Action area (site-wide) or are localised within the CIF area.

Early works, enabling works and construction works including construction of the CIF are detailed in the CEMP Section 1.4 and Section 3.4

Table 6 presents a summary of the plant/equipment associated with both enabling works and construction of the CIF. Activities are categorised according to whether they occur site-wide across the approved Action area or are localised within the CIF footprint. The table forms the basis for the assessment of potential noise and vibration impacts associated with each construction phase.

Table 6 Construction activities and equipment (enabling works and construction of the CIF)

Construction activities	600kg Plate Compactor	6W Tipper	6W Water Cart	Agi Truck	Concrete Pump	Crane (<100t)	Crane (>100t)	EWP	Excavator (14t)	Excavator (30t)	Excavator (5t)	Franna (25t)	Grader 120M	Light Truck	Loader (950)	Pad Foot (12t)	CMC Displacement Auger Rig	Posi Trac	Post Rammer	Scissor Lift	Semi-Trailer	Service Truck	Smooth Drum (12t)	Smooth Drum (16t)	Telehandler	Vacuum Truck
Enabling works																										
Site-wide construction activities				✓	✓	✓	✓	✓				✓								✓						
CIF construction activities	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
Construction of the CIF																										
Site-wide construction activities		✓		✓					✓						✓	✓	✓	✓			✓					
CIF construction activities	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓	✓	✓

2.6 Construction timeline

Refer to Section 3.6 of the CEMP for construction timeline.

2.7 Little penguin nesting sites

Careening Bay has a resident population of little penguins, which nest within the rock walls of Careening Bay and Moresby Harbour. Locations of the nests have been identified by RPS for the HMAS Stirling Little Penguin Survey and Management Report (RPS, 2024a) and include the following areas:

– Area A (Outer rock wall)
– Area B (Moresby Harbour)
– Area C (Main colony)
– Area D (Diamantina Pier and Parkes Wharf)
– Area E (Parkes Wharf and Oxley Wharf)
– Area F (Oxley Wharf Colpoys Point)

Typical little penguin nesting sites within rock wall habitats, as observed in Careening Bay, are shown in Figure 1 to Figure 3. Table 7 summarises the minimum distances between the CEMP boundary area and the nearest little penguin nesting sites. The nesting site locations are shown in Figure 4.

These examples help illustrate the types of crevices and conditions preferred by nesting little penguins in the area. Prior to construction works commencing, a survey of the structural integrity of Main Colony areas has been undertaken as described in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). The geotechnical inspection of the revetments did not identify areas or individual rocks that could be considered as precarious and readily prone to dislodgement from vibrations generated by the anticipated construction works.

Further details are provided in the Management Controls Table 18 (Section 5.4 – NV8).



Figure 1 Nesting site example 1



Figure 2 Nesting site example 2



Figure 3 Nesting site example 3

Table 7 Distance between construction areas and little penguin nesting sites (metres)

Closest distance to work area	Area A	Area B	Area C	Area D	Area E	Area F
	Outer Rock Wall	Moresby Harbour	Main Colony	Diamantina Pier / Parkes Wharf	Parkes Wharf and Oxley Wharf	Oxley Wharf and Colpoys Point
	235 m	144 m	8 m	2 m	347 m	601 m

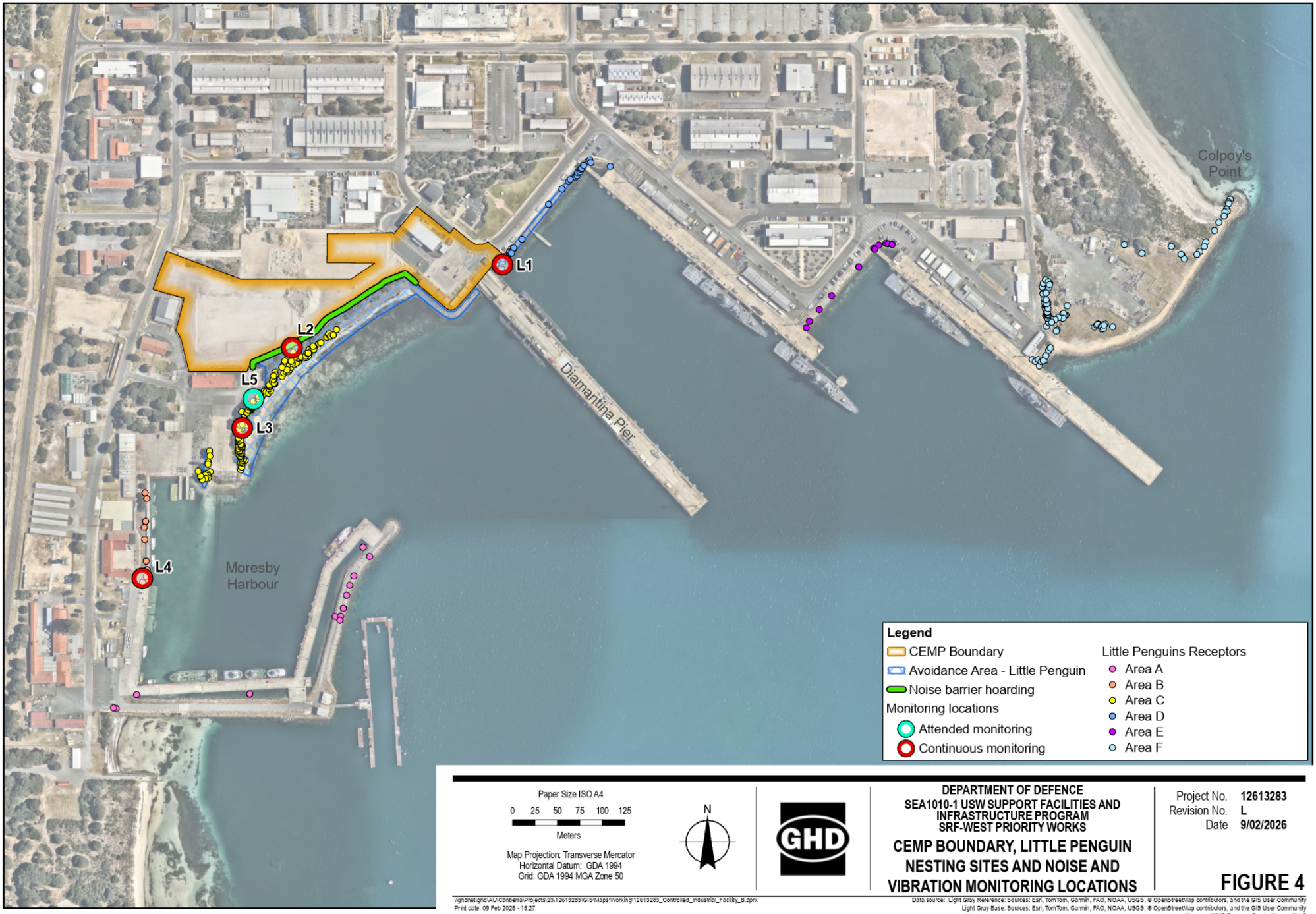


Figure 4 *CEMP boundary, little penguin nesting sites and noise and vibration monitoring locations*

3. Performance criteria

3.1 Source noise characteristics

Noise sources associated with the Submarine Rotational Force-West construction program can generally be categorised as either *intermittent* or *impulsive*:

– **Intermittent sources** include mobile construction plant such as excavators, graders, trucks and dozers. These sources vary in intensity and duration but are typically continuous or fluctuating over a short time frame without distinct acoustic transients.
– **Impulsive sources**, such as impact pile driving, are characterised by short-duration, high-energy acoustic events with rapid onset times. Generally, these have greater potential to cause auditory or behavioural disturbance and will require distinct assessment criteria.

All anticipated construction activities assessed in this annexure (early works, enabling works, and landside facilities including the CIF) will involve *intermittent noise* sources only. No impulsive equipment such as impact piling is planned for activities covered by this CEMP. As such, the noise thresholds in this annexure apply only to intermittent sources.

Separate threshold criteria for impulsive noise sources (for example, impact piling) are currently being developed in consultation with the seabird ecologist and will be finalised in future versions of this annexure prior to the commencement of maritime construction involving impulsive noise.

3.2 Noise thresholds

Due to the absence of species-specific airborne noise criteria for little penguins, thresholds have been developed through a review of relevant literature, proxy standards for avifauna, and consultation with a seabird ecologist. The approach adopts precautionary and adaptive management principles while aligning with construction noise monitoring practices.

Two threshold levels for ‘intermittent noise’ have been defined:

– **‘Review’ threshold:** 85 dBA $L_{Aeq(5min)}$

  This level triggers a formal review of site activities, potential additional mitigation measures, and further consultation with the seabird ecologist.

  The level has been adopted from the Associations of Zoos and Aquariums Penguin Taxon Advisory Group (2014), which recommends that in-air sound levels considered safe for unprotected human exposure are also suitable for penguins. In the Australian context, this corresponds to an $L_{Aeq(8hr)}$ of 85 dBA (Safe Work Australia, 2020).

– **‘Stop work’ threshold:** 93 dBA $L_{Aeq(5min)}$

  This is an upper limit that, if exceeded, would trigger an immediate stop work due to the elevated risk of harm to the local little penguin population, including stress responses, clutch abandonment, or temporary threshold shifts. Additional mitigation measures would be required to reduce noise levels to below the ‘stop work’ threshold at a minimum.

  The level has been adopted from Dooling and Popper (2016), which identifies the potential for temporary threshold shift in birds with prolonged exposure (12–24 hours).

$L_{Aeq(5min)}$ dBA is the equivalent continuous (energy-averaged) sound level measured over a 5-minute period. It represents the constant noise level that would deliver the same acoustic energy as the actual varying noise over that time. As there are no established frequency weightings for little penguins or avifauna more broadly, the A-weighting (designed to approximate human hearing sensitivity) has been applied as a precautionary proxy.

In relation to establishing the threshold level and acoustic descriptor:

– **Adopted threshold level of 85 dBA:** Species-specific research (for example, Lawrence et al., 2023) during the Kennedy Point Marina construction campaign recorded noise events exceeding $L_{Aeq(1sec)}$ 80 dBA, including multiple events lasting longer than 5 minutes, without observed impacts on burrow occupation or breeding success. This suggests that short-term exceedances of this level may not be ecologically significant. Four acoustic surveys were undertaken over 4 separate days between August and December 2021. The highest recorded noise levels were:
  - $L_{Aeq(1sec)}$ 88 to 95 dBA during drilling with mechanical banging (11 minutes across 2 events)
  - $L_{Aeq(1sec)}$ 84 to 89 dBA during vibro piling when the pile contacted the pile gate (15 minutes across 6 events)

  Additionally, baseline monitoring conducted between 27 May and 23 June 2025 (GHD, 2025d) indicated that little penguins are intermittently exposed to noise levels exceeding $L_{Aeq(1min)}$ 80 dBA, and less frequently $L_{Aeq(5min)}$ 80 dBA, from existing (unrelated) noise sources. As such, applying a threshold of 80 dBA would likely result in frequent false exceedances unrelated to SRF-West construction activities (for example, from little penguin vocalisations, other biological noise or HMAS Stirling operational sources). A threshold level of $L_{Aeq(5min)}$ 85 dBA is therefore considered a practical and precautionary approach that still offers sufficient protection to little penguins. Additionally, based on supplementary noise monitoring conducted inside and outside little penguin burrows at 2 locations, the average reduction in noise levels within burrows was approximately 10 dB relative to open-air conditions (GHD, 2025). This indicates that actual noise exposure experienced by penguins inside burrows is likely to be 10 dB lower than the predicted or monitored levels measured in open air.
– **Use of $L_{Aeq(5min)}$ acoustic descriptor:** The 5-minute averaging period represents a balance between ecological relevance and monitoring practicality. It captures elevated short-term noise events that may elicit behavioural responses, while reducing the likelihood of false exceedances typical of the $L_{Aeq(1sec)}$ metric. Compared to the $L_{Aeq(8hr)}$ descriptor used in occupational settings, $L_{Aeq(5min)}$ is a more conservative and appropriate metric for assessing potential noise impacts on little penguins during construction.

The results of the baseline (pre-construction) noise monitoring program are detailed in the SRF-West Baseline Noise and Vibration Monitoring Report (GHD, 2025d) for the period between 2 May 2025 and 23 June 2025. This includes a statistical analysis of exceedances of L_{Aeq} 80 and 85 dBA at each monitoring location for both one-minute and 5-minute averaging periods. The analysis supports the adoption of an $L_{Aeq(5min)}$ 85 dBA noise threshold as a practical and precautionary measure, minimising false exceedances (due to existing noise sources).

As such, occurrences where noise levels exceed $L_{Aeq(5min)}$ 85 dBA can be attributed with a high degree of confidence to SRF-West construction activities, subject to confirmation by the SEO.

Exceedances will trigger real-time alerts and immediate actions as defined in the ‘Review procedure’ outlined in Section 5.3.1 and the ‘Stop work procedure’ outlined in Section 5.3.2.

3.3 Vibration thresholds

There are currently no vibration criteria specific to little penguins or their nesting habitats. As such, proxy thresholds have been adopted from conservative structural vibration guidelines (DIN 4150-3 and BS7385-2) to reduce the risk of physical damage or disturbance to burrows.

Two threshold levels have been defined for vibration:

– **‘Review’ threshold:** 5 mm/s PPV

  To prompt site inspection for signs of potential behavioural disturbance or physical damage (for example, cracks or instability in rock wall burrows).

  This threshold is adapted from DIN 4150-3:2016, Line 2, which provides conservative vibration limits for short-term exposure to avoid cosmetic damage in unreinforced or light-weight structures as defined in the standard. It is used here as a precautionary proxy for nesting habitats.
– **‘Stop work’ threshold:** 15 mm/s PPV

To reduce the risk of structural movement or damage to penguin nesting sites.

This threshold is based on BS 7385-2:1993, Line 2, which defines conservative structural vibration, the vibration level below which cosmetic damage to structures defined in the standard is unlikely. While not developed for ecological structures, this value is used in the absence of penguin-specific vibration criteria.

The results of the SRF-West Baseline Noise and Vibration Monitoring Report (GHD, 2025d) indicate that background vibration levels at all monitoring locations are typically below one mm/s, with only 2 isolated instances where vibration levels exceeded PPV 5 mm/s. As such, occurrences where vibration levels exceed 5 mm/s PPV can be attributed with a high degree of confidence to SRF-West construction activities, subject to confirmation by the SEO.

Exceedances will trigger real-time alerts and immediate actions as defined in the 'Review procedure' outlined in Section 5.3.1 and the 'Stop work procedure' outlined in Section 5.3.2.

3.4 Threshold levels

To minimise the potential for noise-related impacts on little penguins during construction, airborne noise and vibration threshold levels have been established.

While Condition 8 (i) (i) requires thresholds to reflect the different sensitivities of little penguins across 4 time periods - arrival, departure, daytime and night-time - it is important to note that there is currently no scientific evidence demonstrating increased sensitivity to noise or vibration during these ecologically defined periods compared to the daytime period.

On this basis and following consultation with the seabird ecologist, consistent thresholds have been adopted across all periods. This approach is:

– precautionary, as the thresholds themselves are conservative and based on limited available avian and penguin-specific studies
– scientifically supportable, given the lack of evidence supporting period-based variation in acoustic sensitivity.

These thresholds will still apply during all little penguin activity periods, thereby meeting the intent of the condition to avoid harm to little penguins and their nesting sites.

These thresholds have been established in consultation with a seabird ecologist and are presented in Table 8.

Table 8 Terrestrial noise and vibration threshold levels

Terrestrial noise threshold level	Acoustic parameter - vibration	Acoustic parameter - noise	Action
'Review' level	5 mm/s PPV (1 second)	$L_{Aeq(5min)}$ 85 dBA	Trigger 'Review procedure'. See Section 5.3 for further details.
'Stop work' level	15 mm/s PPV (1 second)	$L_{Aeq(5min)}$ 93 dBA	Trigger 'Stop work procedure'. See Section 5.3 for further details.

Thresholds will be formally reviewed near the commencement of early works construction activities (once SRF-West related noise approaches $L_{Aeq(5min)}$ 85 dBA) and at 6-monthly intervals thereafter to assess their ongoing suitability considering monitoring results and observed little penguin behaviour. Threshold levels will be formally reviewed in accordance with the requirements in Table 17.

These reviews may act as hold points and could require adjustments to construction methods or mitigation measures if thresholds are no longer deemed appropriate.

Further details are provided in Section 5.3.

4. Noise and vibration aspects and impacts

A terrestrial fauna noise impact assessment was previously undertaken for early works activities to support the EPBC Referral for the SEA1010-1 Submarine Rotational Force-West Priority Works Project (GHD, Oct 2024). A re-assessment of predicted noise levels has since been completed for the early works activities, enabling works, and construction of landside facilities including the CIF. Updated information in the modelling includes:

– revised construction activities and equipment
– updated construction footprints
– a 3.0 m noise barrier hoarding (see Figure 4 for extent)
– acoustic screening from surrounding buildings.

Revised predicted noise levels are provided in the sections below.

4.1 Equipment noise and vibration levels

A qualitative emission rating matrix for construction equipment based on sound pressure and vibration levels measured at a distance of 10 m is shown in Table 9.

Table 9 Qualitative emission rating matrix for construction equipment

Emission type	Low emission	Moderate emission	High emission	Very high emission
Sound Pressure Level at 10 m	≤70 dBA	>70 dBA and ≤80 dBA	>80 dBA and ≤90 dBA	> 90 dBA
Vibration Level at 10 m	≤ PPV 1 mm/s	>PPV 1 mm/s and ≤PPV 5 mm/s	>PPV 5 mm/s and ≤PPV 10 mm/s	>PPV 10 mm/s

Noise and vibration levels from construction plant and equipment selected for use in the early works activities, enabling works and construction of landside facilities including the CIF have been estimated based on the documents summarised in Table 2 and are considered to be achievable limits when selecting plant and equipment for use in the construction activities. The assessment of noise and vibration impacts for the activities covered by this CEMP, have been based on these limits.

All plant and equipment used throughout the works must have operating sound pressure levels and vibration levels less than, or equal to, those shown in Table 10. Certain plant and equipment, as indicated by an (*) in Table 10 have been selected to undergo attended noise and /or vibration monitoring prior to being put into use.

Source data for CMC displacement auger rig was not available online; however, given that it is a type of augured pile, it is expected that noise and vibration levels from the rig will be similar to a typical bored pile. The noise and vibration levels of the displacement auger rig must be confirmed at the commencement of CMC activities.

Table 10 Construction equipment and associated sound pressure level and vibration levels

Equipment	Sound Pressure Level (SPL) at 10 m	Typical vibration level at 10 m, PPV mm/s
Agitator truck	81	<1
Bobcat skidsteer	82*	3.25
Mulcher	88*	<1
CMC displacement auger rig	83	2*
Concrete pump	80	<1
Crane (>100t)	82	<1
D6 dozer	80	3.25

Equipment	Sound Pressure Level (SPL) at 10 m	Typical vibration level at 10 m, PPV mm/s
D6 wheel loader	77	3.25
Elevated works platform (EWP)	69	<1
Excavator 5T	67	2.5
Excavator 20T	77	3.25
Excavator 30T	82	3.25
Franna/telehandler	70	<1
Front end loader WA 300	85*	3
Grader 120M	82	3.25
Light truck	78	<1
Loader (950)	85	3
Mobile screener	75	2
Mulcher	88	<1
Plate compactor	80	5*
Posi track	85	3
Post rammer	87	8* (no data – assumed level)
Roller 10T (static)	80	<1
Roller 12T (low vibration)	80	2.3
Roller 12T roller (high vibration, low frequency)	80	5.8
Roller 12T (high vibration, high frequency)	80	6.4
Roller 16T	80	8
Scissor lift	76	<1
Semi-trailer	79	<1
Service truck	79	<1
Tip truck 10T	75	<1
Tip truck 25T	79	<1
Vacuum truck	81	<1
Water cart 15kl	79	<1

Note: Asterisks (*) indicate equipment for which noise and/or vibration levels will be confirmed in situ through attended measurements at the commencement of construction activities.

4.2 Predicted noise levels

Noise modelling was undertaken to predict construction noise levels at little penguin nesting sites based on construction activities proposed in the approved Action area for the activities covered by this CEMP as identified in Table 5 and Table 6. Noise modelling was undertaken in SoundPLAN 9.1 using the noise prediction algorithm ISO 9613-2 (ISO, 1996). For each modelled construction activity, a constructive worst-case scenario has been modelled assuming the loudest item of equipment associated with each activity is operating for a full 5-minute period at the closest point within the modelled footprint and the nearest little penguin nesting site.

The modelled construction activities and associated footprint are presented in Table 11, along with the loudest item of equipment and associated activity sound power level.

Table 11 Construction scenario activity sound power levels

Construction activities	Modelled footprint	Loudest equipment	Activity $L_{Aeq(5min)}$ sound power level (SWL), dBA
Early works			
Earthworks – cut and fill	Site-wide	Front end loader	113
Demolition	Site-wide	Mulcher	116
Civil works	Site-wide	Front end loader	113
External services	Site-wide	Vacuum truck	109
Enabling works			
Site-wide construction works	Site-wide	Post rammer	115
CIF works	CIF footprint	Agitator truck + Concrete pump simultaneously	112
Construction of the CIF			
Site-wide construction works	Site-wide	CMC displacement auger (bored pile assumed) (3 assumed as operating simultaneously)	115
CIF works	CIF footprint	Loader (950)	113

The maximum predicted $L_{Aeq(5min)}$ noise levels at little penguin nesting sites for the early works enabling works and construction of landside facilities including the CIF are presented in Table 12. For each little penguin area (Areas A to F), Table 12 presents the noise level predicted at the most-affected nesting site within that area.

The cells highlighted in orange indicate an exceedance of the 'review' threshold of $L_{Aeq(5min)}$ 85 dBA at the nearest nesting site. Cells highlighted in red would indicate an exceedance of the 'stop-work' threshold of $L_{Aeq(5min)}$ 93 dBA at the nearest nesting site. No stop-work exceedances were identified based on this modelling.

Table 12 Maximum predicted noise levels, $L_{Aeq(5min)}$

Scenario	Area A	Area B	Area C	Area D	Area E	Area F
Early works						
Earthworks – cut and fill	55	51	75	61	39	37
Demolition	58	54	78	64	42	40
Civil works	55	51	75	61	39	37
External services	51	47	71	57	35	33
Enabling works						
Site-wide works	58	57	85	92	43	43
Works within CIF footprint	51	54	68	51	42	39
Construction of the CIF						
Site-wide works	58	57	85	92	43	43
Works within CIF footprint	51	54	68	51	42	39

Early works (site wide works - whole of area covered by the CEMP)

For the early works activities, the demolition phase is expected to generate the highest noise levels, with levels predicted up to $L_{Aeq(5min)}$ 78 dBA at Area C (Main Colony) and $L_{Aeq(5min)}$ 64 dBA at Area D.

Based on the modelling completed, construction noise levels are not predicted to exceed 78 dBA $L_{Aeq(5min)}$ at any little penguin nesting site for any of the early works construction activities. As such, no further noise mitigation controls are recommended, provided the 3.0 m high noise barrier hoarding remains in place.

CIF related enabling and construction works (works limited to the CIF footprint)

Construction activities within the CIF footprint are not expected to generate noise levels at or above the 'review' threshold of $L_{Aeq(5min)}$ 85 dBA at any little penguin nesting site. During worst-case activities as identified in Table 11, noise levels are predicted to reach $L_{Aeq(5min)}$ 68 dBA at the closest little penguin nesting site, being Area C (Main Colony). At all other little penguin nesting areas (i.e. Area A, B, D, E and F), noise levels are predicted to be below $L_{Aeq(5min)}$ 55 dBA.

Enabling works and landside facility construction works (site wide works - whole of area covered by the CEMP)

Construction activities relating to enabling works and the construction of the CIF that are outside of the CIF footprint, near Area C (Main Colony) and Area D (Diamantina Pier) are expected to generate noise levels at or above the 'review' threshold of $L_{Aeq(5min)}$ 85 dBA at little penguin nesting sites. Any noise generating works within 16 m of the little penguin nests near Area D (Diamantina Pier), could result in noise levels above $L_{Aeq(5min)}$ 85 dBA. Modelling exceedances of the 'review' threshold at Diamantina Pier (Area D) of $L_{Aeq(5min)}$ 92 dBA are due to construction works in close proximity to the little penguin nesting sites, using 'high' noise generating equipment (refer Table 6 and Table 10). The noise levels at Diamantina Pier (Area D) of $L_{Aeq(5min)}$ 92 dBA, are closely approaching the 'stop-work' threshold of $L_{Aeq(5min)}$ 93 dBA, and close attention to the permanent noise monitoring installation will be sustained by the SEO during works in this area.

At all other areas (i.e., Area A, Area B, Area E and Area F), noise levels during enabling works are predicted to be below the 'review' threshold of $L_{Aeq(5min)}$ 85 dBA.

Near Area A (Main Colony), the following activities could result in noise level of up to $L_{Aeq(5min)}$ 85 dBA.

– Simultaneous CMC displacement auger rig activities (i.e. up to 3 rigs) in close proximity to the noise barrier hoarding / Area C.
– The use of a post rammer in close proximity to the noise barrier hoarding.

Given noise levels are not predicted to exceed $L_{Aeq(5min)}$ 85 dBA at Area C, no additional management controls or monitoring requirements have been recommended at this stage.

Management controls to reduce the noise levels in close proximity to the little penguin nesting sites at Diamantina Pier during enabling works have been recommended in Section 4.3.

4.3 Specific noise management controls near Area D

Construction activities undertaken near Area D (Diamantina Pier), where construction activities may occur within 16 m and in line of sight of nesting sites, are expected to generate noise levels above the 'review' threshold of $L_{Aeq(5min}$ 85 dBA. Additional noise management controls are required, as outlined in Section 4.3.1.

Enabling works and CIF construction works near Area C (Main Colony) are separated from little penguin nesting sites by continuous noise barrier hoarding, and noise levels during enabling and construction works in this area are predicted to remain at or below the $L_{Aeq(5min}$ 85 dBA review threshold. At all other little penguin nesting sites, there is sufficient distance from the construction area and little penguin nesting sites.

4.3.1 Noise management controls for works near Area D

The noise management controls (in order of hierarchical priority) recommended to reduce noise levels when working in Area D in line of sight of little penguin nests, include:

– Separation distance
– At source controls
– In-transmission controls

4.3.1.1 Separation distance

As a first priority the Construction Contractor will implement the separation distances in Table 13 between construction equipment and the nearest penguin receptors:

Table 13 Separation distances from nearest little penguin nest in Area D to comply with 85 dBA

Equipment			Required separation distance to comply with 85 dBA
Mulcher	CMC displacement auger rig	Post-rammer	16 m
Front end loader WA 300	Loader (950)	Posi-track	12 m
Bobcat skidsteer D6 dozer Excavator 30T Vacuum truck Mobile screen	Roller 10T Agitator truck Concrete pump Crane (>100T)	Plate compactor Grader 120M 12T roller 16T roller	8 m
Excavator 20T D6 Wheeled loader Tip Truck 25T	Light truck Semi-trailer	Service truck Water Cart 15kL	6 m
Tip truck 10T	Scissor lift	-	4 m
Franna/telehandler	Excavator 5T	EWP	2 m

4.3.1.2 At-source controls

Where it is not feasible to maintain the separation distances nominated in Table 13 above, at-source controls will be considered as a second priority. Prior to implementing at-source controls within the separation distance, a noise and vibration management plan will be required to be prepared by the Construction Contractor detailing what at-source control is being considered. The noise and vibration management plan template provided in Appendix A will be used.

At-source controls may include substituting the equipment or construction method with a less noise-intensive alternative or applying engineering controls such as noise attenuators, silencers, or acoustic shrouds.

The noise attenuation of the applied at-source controls will be validated by the acoustic consultant with attended noise monitoring

4.3.1.3 In-transmission controls

Where the implementation of separation distance and at-source controls has not successfully reduced the noise levels at the penguin nesting sites in Area D at or below $L_{Aeq(5min}$ 85 dBA, in-transmission controls will be considered as a third priority. Prior to implementing in-transmission controls within the separation distance, a noise and vibration management plan will be required to be prepared by the Construction

Contractor detailing what at-source control is being considered. The noise and vibration management plan template provided in Appendix A will be used

In-transmission controls may include installing temporary barriers such as noise curtains, or noise attenuation hoarding between the construction activity and the little penguin nesting sites, shielding line of sight to sensitive receptors.

The noise attenuation of the applied in-transmission controls will be validated by the acoustic consultant with attended noise monitoring.

4.4 Vibration safe working distances

4.4.1 Safe working distances

The minimum safe working distances for vibration-intensive construction equipment based on the adopted vibration 'stop work' threshold of PPV 15 mm/s (in line with BS7385) and review threshold of PPV 5 mm/s (in line with DIN 4150-3) are provided in Table 14. This includes equipment categorised as having a 'moderate' vibration emission or greater in Table 10.

The safe working distances represent the minimum setback (in metres) required between the equipment and little penguin nesting sites to avoid exceeding the relevant vibration criteria.

The safe working distance should be measured from the location of the equipment to the closest little penguin nesting site. For works undertaken in proximity to Area C, this distance should, in the first instance, be measured from the equipment location to the noise barrier hoarding to provide a conservative assessment.

Table 14 Vibration safe working distances, m

Activity	Adopted vibration safe working distance	
	PPV 15 mm/s (Line 2 BS7385)	PPV 5 mm/s (Line 2 DIN 4150-3)
Excavator 5T	2 m	5 m
Grader 120M	2 m	6 m
Bobcat skidsteer	2 m	6 m
D6 dozer / traxcavator[1]	2 m	6 m*
Excavator 20T	2 m	6 m
D6 wheel loader / Loader (950) / Front end loader WA 300	2 m	6 m
Plate compactor	5 m	10 m*
Excavator 30T	3 m	12 m*
12T roller (low vibration) 12T roller (high vibration, low frequency) 12T roller (high vibration, high frequency)	3 m 4 m 6 m	6 m 14 m 17 m
16T roller	7 m*	20 m*
CMC displacement auger rig[2]	2 m (nominal) *	6 m*

Notes:

1) Source data was not available for the traxcavator and has been assumed to have similar vibration levels as the D6 Dozer as it is also a tracked earthmoving equipment.

2) Source data for CMC displacement auger piling rig was not available online; however, given that it is a type of augured pile, it is expected that vibration levels from the rig would be similar to a typical bored pile, and the safe working distances have been defined assuming a bored piling rig.

For items marked with an asterisk (*), site-specific vibration levels must be verified in the field through attended measurements of vibration propagation prior to the use of the plant and equipment in construction activities, to confirm compliance with the threshold levels and refine working distances as necessary.

The noise and vibration levels of the CMC displacement auger piling rig and the traxcavator will be confirmed by attended monitoring prior to the commencement of construction activities.

4.4.2 Works within a safe working distance

If the use of vibration-intensive equipment is required within a safe working distance, an alternative method (with lower or no vibration) must be investigated prior to use.

The nearest little penguin nesting site is located 8 metres from the CEMP boundary (refer to Table 7 and Figure 4). Accordingly, the Construction Contractor must ensure the nominated working safe working distances for the plate compactor (10 metres), 30T excavator (12 metres), and vibratory rollers (up to 20 metres) are strictly maintained for all construction works undertaken within the CEMP boundary.

5. Noise and Vibration Monitoring Program

5.1 Monitoring requirements

5.1.1 Selection of monitoring locations

The selection of the noise and vibration monitoring locations will be undertaken collaboratively by an acoustic consultant in consultation with a seabird ecologist. A joint site inspection will be held to ensure monitoring stations are appropriately located to meet both the technical monitoring requirements and the ecological sensitivities of little penguin nesting sites.

Sites will be selected based on the following criteria:

– Proximity to onshore construction noise and vibration producing works.
– Physical suitability of the site to safely mount the monitoring station without impeding little penguin ingress or egress from the colony.
– The closest point near to each nesting area and to the source of potential noise and vibration to provide an early warning of noise and vibration levels that are representative of levels potentially received within the rest of the colony.

5.1.2 Monitoring locations

Noise and vibration monitors will be positioned based on sensitive receptor locations identified in the HMAS Stirling Little Penguin Survey and Management Report (RPS, 2024a).

Four continuous noise and vibration monitors will be installed to capture construction noise and vibration levels at the most sensitive penguin sites during the enabling works, as well as construction of landside facilities including the CIF. Monitors will be installed at the commencement of construction works and will remain in place throughout the works.

Prior to the commencement of each new work activity, attended noise monitoring will be undertaken at the southernmost extent of the noise barrier hoarding to confirm that noise levels at Location 5 are below the thresholds.

Table 15 outlines the monitoring locations, coordinates and installation requirements.

The locations are shown in Figure 4 (Section 2.7).

Table 15 Noise and vibration monitoring locations

Location		Coordinates	Location requirements
Location 1	Area D (Diamantina Pier)	-32.2268, 115.6917	To be installed in free-field conditions To be installed at a height 50 to 100 cm from the ground.
Location 2	Area C (Main Colony - central)	-32.2277, 115.6892	
Location 3	Area C (Main Colony - boat ramp)	-32.2285, 115.6886	
Location 4	Area B (Moresby Harbour)	-32.2300, 115.6874	
Location 5	Area C (Main Colony - end noise barrier hoarding)	-32.228210, 115.688738	

5.1.3 Monitoring equipment

Noise and vibration monitoring equipment requirements and acoustic parameters for the duration of the monitoring program are summarised in Table 16. During construction, equipment must be routinely

checked to ensure it remains within calibration limits, functions as intended and complies with the annexure requirements.

Checks must confirm equipment drift, battery condition, weatherproofing and proper coupling.

Table 16 Noise and vibration monitoring equipment requirements and parameters

Equipment	Technical requirements	Acoustic parameters
Noise logger	– Class 1 Sound Level Meter (SLM) (IEC 61672-3:2013 compliant) – Outdoor-rated microphone with windshield – Trigger-level capability to send alerts to stakeholders – Telemetry-enabled for remote data access – Solar/mains power with backup battery – IP66 weatherproof components	– A-weighted, fast time response sound level results – Support an $L_{Aeq(5min)}$ integration period calculation – Support the continuous logging of data at a one-second resolution for the following parameters: • L_{AFeq} • L_{AFmax}
Vibration logger	– Three-channel triaxial geophone (x, y, z) – Trigger-level capability to send alerts to stakeholders – Telemetry-enabled for remote data access – Solar/mains power with backup battery – IP66 weatherproof components – Ground spikes or secure coupling per manufacturer specifications	– Continuous one-second PPV logging (x, y, z) – Support 5-minute summary data output – Compliant with DIN 45669-1 and DIN 4150-3

5.1.4 Noise and vibration threshold levels

Threshold levels for noise and vibration are provided in Section 3.1, along with the supporting rationale. In the event of an exceedance of either threshold, notifications will be automatically sent to relevant stakeholders identifying the monitor, exceedance level and time of exceedance.

The appropriate response procedure - either ‘review’ or ‘stop work’ - must then be followed, as outlined in Section 5.3.

5.1.5 Data management and transmission

Monitoring equipment must store and transmit data in near real-time to support threshold exceedance alerts. All data must be hosted on Australian servers and meet Defence security requirements.

Near real-time monitoring data must be viewable remotely via a dashboard or similar interface.

Daily summary charts must display monitoring data for the previous 24 hours, including:

– $L_{Aeq(5min)}$
– PPV (x, y, z) values (with time)
– rainfall and wind speed data
– any threshold exceedances.

Daily summary charts are to be retained by the acoustic consultant and appended to the monthly report, which is to be submitted to the SEO within a fortnight of the following month.

5.1.6 Monthly reporting

Monthly noise and vibration monitoring reports will be prepared to compare measured levels against the performance criteria.

Reports will include:

– a summary of construction activities undertaken

- charted noise and vibration data ($L_{Aeq(5min)}$, PPV) for all monitoring locations
- equipment settings and confirmation of operational status
- details and analysis of any exceedances of review or stop-work thresholds
- a summary of correspondence with the seabird ecologist
- management actions implemented and any updates required to monitoring thresholds
- records of any environmental incidents and corrective actions taken.

5.1.7 Calibration requirements

Monitoring equipment must be calibrated by a National Association of Testing Authorities-certified facility before deployment.

During setup, field calibration must be completed using an acoustic calibrator (SLMs) and shaker (geophones).

Periodic checks must be conducted during monitoring to confirm calibration remains within ±1 dB tolerance for sound level meters and geophones.

If the monitoring program extends beyond 2 years, all equipment must also be re-calibrated at least every 2 years in accordance with the requirements of AS IEC 61672-3 (for SLMs) and DIN 45669-1 (for vibration monitoring systems).

5.2 Technical competency requirements

The noise and vibration monitoring program will be undertaken by an acoustic consultant.

Acoustic consultant means a person who has relevant professional qualifications and has at least 3 years of work experience designing and implementing surveys and environmental management plans to manage the negative impacts of noise and vibration pollution in construction settings on native fauna (either in-air and/or underwater as relevant to the context).

5.3 Adaptive management measures

This annexure is intended to be dynamic and may be updated to reflect changes in management practices and the natural environment with time. This will also allow flexibility to adopt new technologies and management controls. Amendments to management controls and monitoring requirements will be completed on an as-needed basis. The review and updates to this annexure may include, but are not limited to:

- feedback from noise, vibration and behavioural data collected during monitoring to adapt controls and threshold levels
- updates to management controls that are identified as not achieving the desired outcome and/or to achieve a greater environmental outcome
- additional management controls that are required as a result of additional impacts being identified
- amendments to relevant legislation that may affect the implementation of management controls
- improvements to practices, achieving a greater environmental outcome.

If monitoring results, instances of non-conformances or audit results determine that the management controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused. Alternative management controls and monitoring requirements will be determined in accordance with the environmental management framework set out within the CEMP and associated annexures. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP. Monitoring will continue to determine if the alternative management controls and monitoring requirements are effective.

Table 17 identifies triggers and adaptive management responses for this annexure.

Table 17 Noise and Vibration Management Annexure adaptive management triggers and responses

Trigger	Adaptive management measure
Exceedance of the 'review' and/or 'stop work' threshold levels	A two-tier management procedure has been developed to guide the application of noise and vibration thresholds during onshore construction activities and to ensure compliance with the Environmental Outcome. This process supports timely decision-making regarding mitigation requirements and includes 2 escalating response levels: 'Review', and 'Stop work', triggered by exceedances of defined threshold values. These response levels are designed to assess and minimise the risk of disturbance to little penguins and nesting sites through monitoring, investigation, and, if necessary, a temporary cessation of works. The key responsibilities for each stakeholder and the required actions related to each threshold exceedance are detailed in Section 5.3.1 (review) and Section 5.3.2 (stop work) and illustrated in Figure 5.
Noise and vibration levels approach the 'review' thresholds after commencement of early works construction works	A formal review of the thresholds will be undertaken at the earliest occurrence of the three triggers below. – SRF-West construction-related noise levels have exceeded 80 dBA $L_{Aeq(5min)}$ on 3 occurrences, or – Vibration levels have exceeded 3 mm/s on 3 occurrences, or – Six months after the commencement of early works activities. During each monthly compliance reporting phase, the number of exceedances will be verified to confirm whether a formal review of the thresholds is required. This review will be undertaken to confirm the appropriateness and effectiveness of the adopted thresholds via remote inspections undertaken by the seabird ecologist. The review will be undertaken in consultation between the acoustic consultant and the seabird ecologist. A further formal review will be conducted after 6 months, incorporating findings from the little penguin monitoring (for example, camera footage of little penguin behaviour and fortnightly field monitoring) to determine whether any refinements to the thresholds or associated mitigation measures are required. The need to continue 6-monthly reviews beyond this point will also be evaluated following the first 2 formal reviews.
Noise-generating works required outside of the approved construction hours	In the case that noise or vibration generating works are required between sunset and sunrise, the Construction Contractor will submit an out-of-hours work permit in accordance with Section 3.4.2 of the CEMP. In the case that noise or vibration-generating works are required between sunset and sunrise, the Construction Contractor will submit an out-of-hours work permit in accordance with Section 3.4.2 of the CEMP.
New construction activities	Prior to commencing any new construction activities not addressed in this annexure, updates to this annexure will be made including: – that the Construction Contractor, in consultation with the SEO and the acoustic consultant, will assess new equipment using the noise and vibration emissions matrix and submit results to the SEO and acoustic consultant for review. – that a defined work area and activity description will be provided to the SEO and acoustic consultant. – that if the new works introduce different noise source characteristics (for example, impulsive noise), the relevant noise thresholds will be reviewed and adjusted to reflect the potential for increased impact. – that the acoustic consultant will update noise predictions, confirm or revise vibration-safe working distances, and identify whether thresholds are likely to be exceeded. – where exceedance of noise or vibration thresholds is predicted, reasonable management control and monitoring requirements will be prepared and on standby for implementation prior to works commencing – that the construction works for the new construction activities will not be commenced until the SEO, in consultation with the acoustic consultant and seabird ecologist, has approved the final noise and vibration control measures

Trigger	Adaptive management measure
	– that all updates will be documented into a change notice form per the process documented in Section 12.3.2 of the CEMP.

5.3.1 'Review' threshold level exceedance

This section and Figure 5 below outlines the actions to be taken when the 'Review' threshold for noise or vibration is exceeded, to assess potential behavioural impacts on little penguins and determine the need for additional mitigation measures:

– Review threshold: Defined as > $L_{Aeq(5min)}$ 85 dBA or PPV 5 mm/s
– Trigger: A notification is sent to the acoustic consultant, seabird ecologist and the SEO.
– Initial action: The SEO and the acoustic consultant assess whether the exceedance is attributable to SRF-West construction.
– If SRF-West related:
  - The SEO notifies the seabird ecologist to undertake a remote inspection of the camera footage of penguin behaviour.
  - If no behavioural change is observed, the seabird ecologist reports back to the SEO, and no further action is taken.
  - If behavioural change is observed, the seabird ecologist conducts a site inspection to assess for measurable change to breeding or nest integrity.
  - Based on findings:
    – If the imagery demonstrates that little penguins are not disturbed, this will be reported to the SEO and the acoustic consultant. Findings will be documented in a post-trigger inspection report (refer Appendix D of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).
    – If the imagery demonstrates that little penguins are disturbed to the point of changing normal behaviour, the SEO will be alerted immediately. The seabird ecologist will conduct an onsite inspection as soon as possible to record any measurable changes to breeding status and/or nest integrity. These findings will be reported to the SEO as soon as possible. Where a measurable change to breeding status or nest integrity is detected the SEO, and the acoustic consultant will conduct an immediate review of onsite activities and potential further noise and vibration management controls and monitoring requirements. Findings will be documented in a post-trigger inspection report using the template in Appendix D of the Little Penguin Monitoring and Management Plan (RPS, 2026 (Annexure A5)).
– If not SRF-West related, the exceedance event should be documented including the source of the exceedance, if able to be determined.

5.3.2 'Stop work' threshold level exceedance

This section and Figure 5 below describes the response procedure when the 'Stop work' threshold is exceeded, including immediate cessation of work and ecological assessment to evaluate the risk of harm to penguin breeding or nesting activity:

– Stop work threshold: > $L_{Aeq(5min)}$ 93 dBA or PPV 15 mm/s
– Trigger: An automatic 'Stop work' is enacted by the Construction Contractor in consultation with SEO and acoustic consultant.
– Initial action: The acoustic consultant and SEO assess whether the exceedance is attributable to SRF-West construction. If so, the seabird ecologist is notified and undertakes a remote inspection of the camera footage.
– If the camera footage shows no observable change in penguin behaviour this will be advised to the SEO. The SEO will review and revise management controls as necessary and will advise the Construction Contractor when works can recommence. The SEO will advise the seabird ecologist once

work has restarted. The seabird ecologist will continue to remotely inspect camera footage at several biologically relevant intervals following the exceedance as specified in Section 7.43 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Appendix A5).

– If the camera imagery demonstrates there has been a change to normal penguin behaviour:

  - a reportable incident has occurred and should be documented in accordance with the requirements of Section 7.3 of the CEMP.
  - the seabird ecologist conducts a site inspection as soon as possible and reports findings to the SEO.
  - if the on-site inspection shows no measurable change in the breeding status or structural integrity of nests (as relevant) since the last inspection or routine monitoring event, the SEO will be advised. On-site management controls will be reviewed and revised by the SEO and used to inform restart procedures. The SEO will advise the seabird ecologist once work has restarted.
  - and if the onsite inspection shows measurable changes to breeding status and/or structural integrity of nests (as relevant) since the last inspection or monitoring event, the seabird ecologist will advise the SEO of the potential for harm to the little penguin population. The SEO in consultation with the acoustic consultant and seabird ecologist revise management controls and monitoring requirements to achieve levels are below the stop work threshold at a minimum and advise Construction Contractor. The SEO advises the Construction Contractor that works may recommence. The seabird ecologist will be notified when work recommences. A follow-up remote inspection will be conducted by the seabird ecologist, and findings will be communicated to the SEO. Findings will be documented in a post-trigger inspection report (refer Appendix D of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

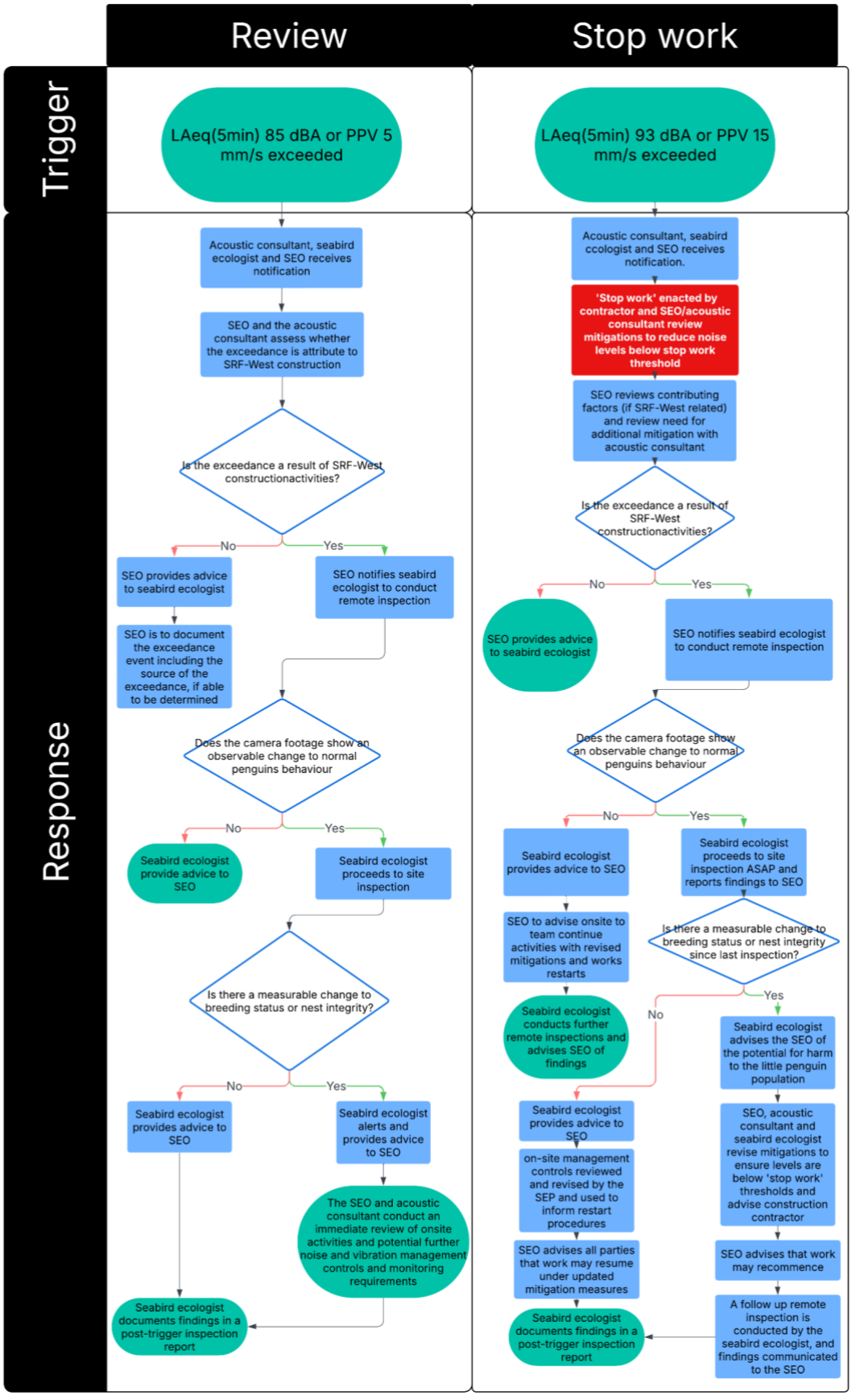


Figure 5 *Triggers and responses to exceedances of 'review' and 'stop work' thresholds*

5.4 Continuous improvement and review

If monitoring determines that the management controls identified in in this annexure are not effective, the construction process generating the adverse outcome will be paused by the SEO. Adaptive management measures will be determined in accordance with the environmental management framework set out within the CEMP and in accordance with the measures identified in Section 5.4 of this annexure. Once these management measures have been determined and approved by the SEO, they will be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP.

Environmental management annexures such as this Noise and Vibration Management Annexure are not static documents. They will be updated as works activities progress during the course of the approved Action to reflect new information and changes to management controls in accordance with the adaptive management triggers and processes described in Section 12.3 of the CEMP.

In accordance with Section 12.3.2 of the CEMP, a working Change Notice Register will be maintained to capture continuous improvements to this annexure of the CEMP, arising from but not limited to outcomes of incident reviews, corrective actions, and adaptive management responses that are identified. The Change Notice Register will be used to inform future CEMP reviews.

6. Management controls

6.1 Management controls

The following table summarises the key noise and vibration management controls to be implemented during construction activities to minimise potential impacts on little penguins and their nesting sites.

Each control includes reference to relevant documentation and assigns clear responsibilities to ensure effective implementation.

Table 18 Noise and Vibration Management Annexure management controls

Item	Specific control	Reference	Responsibility
General management controls			
NV1	Construction hours for the activities covered by the CEMP are defined in Section 3.4 of the CEMP. All construction works will be limited to the defined daytime period (that is, between sunrise and sunset) to align with penguin noise management requirements (refer section 2.1 and 2.2). Works outside this period will occur only where the requirements of Condition 8 (l) are met, as per Item NV2.	EPBC Approval 2024/10031 – 8) (i) (i) EPBC Approval 2024/10031 – 8) (l)	Construction Contractor
NV2	Any works proposed outside of the 'daytime' period (that is, before sunrise or after sunset) will only be undertaken under exceptional circumstances and must be supported by an out-of-hours work permit prepared by the Construction Contractor and approved by the SEO demonstrating that applicable noise and vibration thresholds will not be exceeded.	EPBC Approval 2024/10031 – 8) (l)	Construction Contractor
NV3	All key personnel (SEO, acoustic consultant, seabird ecologist, and Construction Contractor) will be briefed on their noise and vibration responsibilities prior to the commencement of construction.	EPBC Approval 2024/10031 – 8) (b)	SEO

Item	Specific control	Reference	Responsibility
	The SEO will coordinate a prestart meeting and issue a roles and responsibilities summary to each party. Confirmation of understanding will be recorded and kept on file.		
NV4	Landside construction and high-noise activities within 50 m of sensitive receptors will be scheduled by the Construction Contractor at times to avoid peak burrow attendance during breeding and moulting months. This will be scheduled in consultation with the SEO and the seabird ecologist.	CEMP Section 8 - Flora and Fauna Management Annexure. Table 15	Construction Contractor
NV5	Activities with moderate to high noise and vibration emissions will be scheduled by the Construction Contractor to only occur during the day period (between sunrise and sunset) when penguins leave their burrows to feed.	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor
NV6	The Construction Contractor will not schedule simultaneous high noise activities in close proximity to sensitive receptors, in order to reduce cumulative impacts.	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor
Monitoring requirements			
NV7	Prior to construction works commencing, engage an acoustic consultant to confirm noise and vibration monitoring locations in consultation with the seabird ecologist.	EPBC Approval 2024/10031 – 8) (i)	SEO
NV8	Prior to construction works commencing, engage a suitably qualified professional to conduct a survey of the structural integrity of Main Colony areas will be undertaken. The survey will categorise the penguin nesting sites from low risk (stable) to high risk (potentially unstable).	EPBC Approval 2024/10031 – 8) (h)	SEO
NV9	Prior to the commencement of construction works, an acoustic consultant will install the long-term noise and vibration monitors. The acoustic consultant will maintain the monitors for the duration of construction works, in accordance with the Noise and Vibration Monitoring Program (Section 5).	EPBC Approval 2024/10031 – 8) (i)	Acoustic consultant
NV10	For the duration of construction works, the acoustic consultant will continuously log construction noise and vibration levels to detect any exceedances of the acoustic parameters. In the case of exceedances, they will trigger the stop works procedure. Daily and monthly noise and vibration monitoring and reporting will be undertaken in accordance with the Noise and Vibration Monitoring Program (Section 5).	EPBC Approval 2024/10031 – 8) (i) (ii) EPBC Approval 2024/10031 – 8) (h) (iii)	Acoustic consultant
NV11	Attended noise and vibration measurements will be conducted by the acoustic consultant on the day that construction equipment classified as high or very high emission (i.e. >81 dBA or >5 mm/s PPV at 10 m) is first used within 25 m of a little penguin nesting site. These measurements will be undertaken to: – confirm the effectiveness of adopted management controls and monitoring	EPBC Approval 2024/10031 – 8) (i)	Acoustic consultant

Item	Specific control	Reference	Responsibility
	requirements including any noise barriers implemented – validate the noise and vibration levels of any construction equipment classified as high or very high emissions (i.e. >81 dBA or >5 mm/s PPV at 10 m) – verify site specific vibration ground attenuation to review and revise the vibration safe working distances – determine whether additional at-source management controls are required for specific equipment (for example, high-performance silencers or mufflers). The results of the monitoring and any additional controls will be summarised in an attended noise and vibration monitoring report.		
Vibration safe working distances			
NV12	Construction equipment and methods will be selected to ensure compliance with the vibration-safe working distances specified in this annexure. The Construction Contractor will uphold minimum buffer distances between vibrating plant and sensitive receptors based on the applicable vibration thresholds (5 mm/s and 15 mm/s). If these safe working distances cannot be achieved, additional controls (such as alternative equipment or construction method) will be implemented to demonstrate that vibration levels do not exceed 5 mm/s PPV at the nearest active little penguin site.	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor
NV13	For works occurring within the vibration safe working distance, and where alternative construction methods are not feasible, attended vibration monitoring will be undertaken by an acoustic consultant prior to and during works to confirm and ensure that vibration threshold levels are not exceeded under site-specific conditions. A construction method statement with the results of the attended vibration monitoring is to be prepared by the Construction Contractor and acoustic consultant and approved by the SEO prior to works being undertaken within the safe working distance.	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor
At-source controls			
NV14	All equipment used will be maintained in good working condition and fitted with high performance exhaust silencers and mufflers.	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor
In-transmission controls			
NV15	A temporary noise barrier hoarding will be constructed and maintained for the duration of construction works to the extent shown in Figure 4 (Section 2.4), to reduce noise transmission from the early works construction boundary to the main colony. The barrier will be installed to a minimum height of 3.0 m above ground level and constructed from a material with a minimum surface density of 10 kg/m².	EPBC Approval 2024/10031 – 8) (i)	Construction Contractor

Item	Specific control	Reference	Responsibility
Adaptive management measures			
NV16	A two-tier management procedure has been established to manage exceedances of the noise and vibration thresholds during onshore construction activities. This framework ensures compliance with the performance criteria as described in Section 3 and supports an effective management control and monitoring requirement and stakeholder coordination. The procedure comprises two escalating response levels: – 'Review' threshold: triggered when $L_{Aeq(5min)}$ 85 dBA or PPV 5 mm/s is exceeded. – 'Stop work' threshold: triggered when $L_{Aeq(5min)}$ 93 dBA or PPV 15 mm/s is exceeded. Each response level prompts a defined course of action involving notification, behavioural monitoring of little penguins, inspection (remote or onsite) and, where required, modification of site activities or implementation of additional management controls or monitoring requirements measures. The process, including roles and responsibilities for each stakeholder, is detailed in Section 5.3.1 ('review' threshold) and Section 5.3.2 ('stop work' threshold) and is illustrated in Figure 5. The SEO will implement the procedure and co-ordinate with the Construction Contractor, the acoustic consultant and the seabird ecologist.	EPBC Approval 2024/10031 – 8) (i)	SEO
NV17	If the seabird ecologist provides feedback on current control measures recommending revision to the management measures, the SEO will in consultation with the acoustic consultant undertake a review of documentation of management measures and will implement any necessary corrective actions or adaptive management measures. Corrective actions or adaptive management measures will be SMART.	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	SEO
NV18	At least 5 days prior to the proposed use of any equipment not included in Table 10 and Table 11, the Construction Contractor will provide details to the SEO and the acoustic consultant, for review, assessment and approval for use by the acoustic consultant.	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	Construction Contractor
NV19	Prior to the commencement of any new construction activities, noise and vibration levels of required construction equipment will be assessed by the acoustic consultant. The Construction Contractor will implement any additional controls as required. Further details are provided in Section 5.3.	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	Acoustic consultant
NV20	Where construction equipment (e.g. D6 dozer) is identified as generating noise levels higher than expected or previously measured, the following management controls and monitoring requirements will be implemented: – Inspect and service the equipment to address potential sources of excessive noise	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	Construction Contractor

Item	Specific control	Reference	Responsibility
	– Conduct post-maintenance noise verification testing to confirm that noise levels are within acceptable limits – If elevated noise levels persist following maintenance, restrict concurrent operation of the construction equipment with other high-noise plant near sensitive receptors.		
Additional noise management measures			
NV21	Maintain the required separation distances between construction equipment and little penguin nesting sites at Area D wherever feasible. Where works are required within these separation distances, a noise and vibration management plan (Refer Appendix A) is to be prepared by the Contractor and approved by the SEO in consultation with the seabird ecologist prior to commencing works. The plan is to demonstrate how noise levels will be managed to ensure they do not exceed $L_{Aeq(5\ min)}$ 85 dBA at the nesting sites. Measures may include substituting for quieter equipment or methods, applying engineering noise controls (e.g. attenuators, acoustic shrouds), and/or installing temporary noise barriers between the activity and nesting sites.	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	Construction Contractor
NV22	As part of NV11, attended noise monitoring will also be undertaken at Location L5 (Area C (Main Colony - end noise barrier hoarding) to check whether $L_{Aeq(5min)}$ noise levels are below 85 dBA. The results of the monitoring will be summarised in the attended noise and vibration monitoring report.	EPBC Approval 2024/10031 – 8) (i) EPBC Approval 2024/10031 – 8) (n)	Acoustic consultant

6.2 Reporting and documentation requirements

All compliance documents and records required by this Noise and Vibration Management Annexure, including daily noise monitoring charts, monthly reporting deliverables and biannual reporting deliverables, must be maintained and stored in accordance with the document control requirements specified in Section 12.2 of the CEMP. Compliance records may be subject to audit and/or be used to verify compliance with the conditions of approval in accordance with Section 12 of the CEMP.

Accurate and complete details of how each annexure of the CEMP required by the EPBC Act approval 2024/10031 is implemented must be included in the Annual Compliance Report (ACR) as detailed in Section 7.2.2 of the CEMP. The ACR must include:

– a summary of the monthly results and outcomes
– accurate and complete details of compliance and any non-compliance with this plan
– for any incident that occurred, accurate and complete details of each incident, including corrective and adaptive management actions (in accordance with Section 11.4.1 of the CEMP).

Appendix A

Noise and vibration management plan

Noise and vibration management plan	
Details	
Applicant details	
Applicant name	
Position	
Company	
Phone	
Email	
Description of works, including	
Work methodologies	
List of plant and equipment to be used	
Location of works	
Timing and duration of works	
Justification for selected construction activity and equipment as the quietest available capable of achieving the task	
Closest distance to little penguin nesting site (m) and co-ordinates	
Assessment	
Are the proposed works and equipment consistent with those assumed in the CEMP and Noise and Vibration Management Annexure	
Identify any vibration-intensive equipment proposed and the relevant safe working distance as shown in Table 15 of the Noise and Vibration Management Annexure.	
Confirm whether the nearest little penguin nesting site is located outside the corresponding vibration safe working distance/s	
With reference to the construction equipment Sound Pressure Levels (SPLs) in Table 10 in the Noise and Vibration Management Annexure, what is the greatest equipment SPL at 10 m?	

Noise and vibration management plan	
Is the equipment considered Low, Moderate, High or Very High noise emissions with respect to Table 9 in the Noise and Vibration Management Annexure?	
Is the equipment considered Low, Moderate, High or Very High vibration emissions with respect to Table 9 in the Noise and Vibration Management Annexure?	
Is the equipment to be used expected to maintain noise levels below the review threshold at the nearest little penguin nesting site? Predictions and prediction methodologies are required to be provided here and may require consultation with an acoustic consultant and a seabird ecologist.	
Management controls and monitoring requirements	
Additional noise and vibration management controls and monitoring requirements to be adopted to ensure that noise threshold levels are not exceeded.	
Additional noise and vibration management controls and monitoring requirements to be adopted for works occurring during little penguin arrival or departure periods (if required).	
SEO Review	
SEO Comments / Notes: (e.g. basis of decision, any conditions that apply, any further instructions)	
Name	

Noise and vibration management plan	
Phone number & Email	
Signature	
Date	
Applicant Review	
Name	
Phone number & Email	
Signature	
Date	

Australian Government
Defence

SRF-W Priority Infrastructure Works
Construction Environmental Management Plan Version 2

A5

Little Penguin Monitoring and Management Plan Annexure



Defending Australia and its national interests in order to advance Australia's security and prosperity
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LITTLE PENGUIN MONITORING AND MANAGEMENT PLAN

SRF-West Priority Infrastructure Works, Garden Island, Western Australia



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This little penguin monitoring and management plan annexure (A5) for the Submarine Rotational Force-West, Priority Infrastructure Works, Garden Island, Western Australia (EPBC 2024/10031) has been developed in partnership with the technical expertise of Dr Belinda Cannell, University of Western Australia. We acknowledge the subject matter expertise provided towards the production of this report.

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

Acronyms, abbreviations and definitions

Acronym or abbreviation	Description
AUKUS	Australia, the United Kingdom and the United States
°C	Degrees Celsius
CEMP	Construction Environmental Management Plan
CIF	Controlled Industrial Facility
CRW	Correlated random walk
dB	Decibels
dBA	A-weighted decibels
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, Environment and Water
DWER	Department of Water and Environmental Regulation
EO	Environmental outcome
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FTP server	File transfer protocol server
GPS	Global Positioning System
h	Hour
km	kilometres
m	metres
mm	Millimetres
Mg/L	Milligrams per litre
NTU	nephelometric turbidity units
PSU	Practical salinity units
RPS	RPS AAP Consulting Pty Ltd
SMART	Specific, measurable, achievable, relevant, time bound
SRF-West	Submarine Rotational Force-West
SSN	Ship submersible, nuclear
UWA	University of Western Australia
WA	Western Australia
VLLW	very low-level radioactive waste

Definitions of key terms (verbatim, DCCEEW 2025)

Term	Definition
Action area	Means the combined area encompassed by the Armament Wharf Action area and Careening Bay Action area.
Baseline population	Relates to the little penguin population and means data that measures the annual population size and overall trend prior to commencement of the Action, which can be used for later comparison to population data obtained after commencement of the Action.
Conditions	Means the Notification of approval decision Submarine Rotational Force – West, Priority Infrastructure Works, Garden Island, Western Australia [EPBC 2024/10031] (see Appendix A),
Department	Means the Australian Government agency responsible for administering the EPBC Act.
Harm or harmed	Means to cause any measurable direct or indirect disturbance or deleterious change as a result of any activity associated with the Action.

Term	Definition
Incident	Means any: a. event which has the potential to, or does, harm any protected matter, which includes, but is not limited to: i. vessel strikes to little penguins ii. leaks and spills of any substance that can cause harm to protected matters iii. exceedance of the noise threshold level at little penguin nesting sites iv. exceedance of the vibration threshold level at little penguin nesting sites v. a decline in the little penguin population at Garden Island/*Meeandip* below the baseline population or a declining population trend that has the potential to decrease the little penguin population at Garden Island/*Meeandip* below the baseline population. b. potential non-compliance with these conditions, including the administrative requirements c. actual non-compliance with these conditions, including the administrative requirements d. potential non-compliance with one or more commitment made in a plan, and/or e. actual non-compliance with one or more commitment made in a plan.
Little penguin	Means the EPBC Act-listed marine species little penguin (*Eudyptula minor*).
Little penguin arrival area	Means the area represented in Appendix A Map 4b by the zones designated in the legend 'Arrival areas' in the Conditions [of the EPBC Act approval 2024/10031].
Little penguin breeding period	Means the period when little penguins are laying and incubating eggs and rearing chicks, which typically commences in March and ends in mid-January.
Little penguin moulting period	Means the period when little penguins are moulting, which typically commences during November and ends during February.
Little penguin departure area	Means the areas represented in Appendix A Map 4a and Map 4b by the zones designated in the legend 'Departure area' in the Conditions [of the EPBC Act approval 2024/10031].
Little penguin nesting sites	Means the areas used by little penguins for breeding and moulting, and the known nesting sites identified in [EPBC Act approval 2024/10031] Appendix A Map 4b, under the legend title 'Nesting sites' and designated in the legend 'Colpoys Point', 'Diamantina/Parkes', 'Main Colony', 'Moresby Harbour', 'Outer rock wall' and 'Parkes/Oakley'.
Little penguin population	Means the number and distribution of little penguins at Garden Island/*Meeandip*.
Little penguin departure period	Means the period of time over which little penguins depart from the little penguin nesting sites, for approximately 2 hrs before sunrise to spend the day foraging at sea.
Little penguin arrival period	Means the period of time over which little penguins raft and then return to the little penguin nesting sites, typically commencing from sunset, with most of the little penguins (80%) back to shore within 40 minutes after sunset.
Little penguin day-time period	Means the period commencing from sunrise and ending at sunset.
Little penguin night-time period	Means the period commencing immediately after the little penguin arrival period and ending immediately prior to the little penguin departure period.
Maritime works	Means any construction undertaken within the marine environment.
Monitoring data	Means the data required to be recorded under the conditions of this approval, including sensitive biodiversity data.
Noise threshold level	Means the maximum threshold of acoustic sound measured in decibels (dB) that is considered safe to operate within the Action area without harming the local little penguin population.
Permanent Threshold Shift	Means the noise level at which a permanent reduction in hearing sensitivity is caused by irreversible damage to the sensory hair cells of the ear (referred to as Permanent Temporal Shift in the conditions).
Plan	Means this little penguin monitoring plan.
Protected matter	Means a matter protected under a controlling provision in Part 3 of the EPBC Act for which this approval has effect.
Rafting avoidance area	Means the areas within the Action area, represented in Appendix A Map 3 by the zone designated in the legend 'Rafting avoidance area' in the Conditions [of the EPBC Act approval 2024/10031].
Safety zones	Mean the observation zones, low power zones and shutdown zones used to minimise the likelihood of temporary or permanent hearing injury to little penguins.

Term	Definition
Shutdown zone	Means the area that falls within a certain radius of a noise source. The radius is based on the modelled Temporary Threshold Shift value for species of concern including little penguins, such that, should an individual of these species enter or be observed within the area, the approval holder will immediately shut down the source of the noise.
Stop works procedure	Means a procedure implemented by the approval holder and its contractors that ensures the following steps are implemented in the event of an incident: • immediately cease all construction work that has potential to contribute to the exceedance or incident • investigate and undertake corrective action within 48 hours of the incident • record the incident and corrective measures • only recommence construction following completion of the above steps and upon approval of the Site Environmental Officer or the relevant environmental authority on site.
Suitably qualified seabird conservation ecologist (seabird ecologist)	For the purpose of preparing and implementing monitoring programs to detect changes in little penguin population and correlating these changes with environmental variables, this means a person who has relevant professional qualifications and: • at least 5 years of work experience with little penguins • has an in depth understanding of little penguin ecology, threats to little penguins and their conservation • can give an independent, authoritative assessment and advice on the little penguin species and its habitat using relevant protocols, standards, methods and/or literature • has implemented monitoring programs and analysed and reported on monitoring results to better understand little penguin ecology, population dynamics and correlations between population/breeding success with environmental and other variables.
Temporary Threshold Shift	Means the noise level at which a temporary reduction in hearing sensitivity occurs as a result of exposure to sound (referred to as Temporary Temporal Shift in the Conditions).
Vibration threshold level	Means the maximum threshold of vibrational sound measured in millimetres per second that is considered safe to operate within the Action area without harming little penguins.

1 EXECUTIVE SUMMARY

RPS AAP Consulting Pty Ltd (RPS) and the University of Western Australia (UWA) were commissioned to provide this Little Penguin Monitoring and Management Plan (this Plan) on behalf of Department of Defence (Defence) for the Submarine Rotational Force-West (SRF-West), Priority Infrastructure Works project (the Action). This document is an annexure to the Construction Environmental Management Plan (CEMP) SRF-West Priority Infrastructure Works HMAS Stirling, Garden Island/*Meeandip*, WA EPBC Act approval 2024/10031 (GHD 2026).

The primary objective of this Plan is to allow for the detection of changes in little penguin (*Eudyptula minor)* behaviour, habitat use and population size during the construction of the Action to inform adaptive management responses and ensure that acceptable environmental outcomes (EOs) are achieved.

This Plan describes the relevant *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) conditions of approval (EPBC Act approval 2024/10031) and EO that must be achieved during delivery of the Action in relation to little penguins. This Plan also outlines the little penguin monitoring program and adaptive management arrangements to ensure that EO continues to be achieved beyond the life of the Action, along with the relevant implementation arrangements that will be delivered as part of the plan. The CEMP contains details of the approved Action and environmental management framework governing delivery of the Action.

The overarching purpose of the monitoring and adaptive management approach outlined in this plan is to:

- record little penguin nest numbers and breeding adult pairs over the breeding season as an index for population size
- monitor the little penguin population to facilitate detection of changes in population size and breeding success over the nominated monitoring period, that is until 6 years following completion of construction (per Condition 10, DCCEEW 2025)
- observe and assess little penguin behaviour during the breeding season to detect behavioural changes that may be occurring because of construction activities and to inform adaptive management measures
- assess and monitor little penguin nest stability during construction to inform the need for adaptive management
- monitor environmental variation over time to understand the influence on breeding success and population size of little penguins
- provide the evidence to support compliance reporting against the approved Action conditions of approval, specifically to demonstrate that the little penguin EO is achieved.

Noise and vibration monitoring will also be conducted on site to allow for the detection of potential changes in the ambient environment as a result of the Action and to inform the need for additional management measures, where necessary during construction works, to ensure that noise and vibration thresholds at the little penguin nesting sites are not exceeded and the EO for little penguins will be achieved. Procedures include 2 response levels of ‘review’ and ‘stop work’ for the purpose of informing the need for additional management controls and monitoring requirements on site and to avoid harm to little penguins. Detailed arrangements for management of the Action including the noise and vibration monitoring are out of scope of this report and can be found in the CEMP and A4 Noise and Vibration Management Annexure (GHD 2026).

This Little Penguin Monitoring and Management Plan will be reviewed throughout the construction period and on an annual basis to:

- update information as new construction phases are implemented (if required)
- ensure the little penguin EO is achieved
- assess ongoing requirements for monitoring and adaptive management measures to avoid and minimise harm to little penguins
- ensure all record keeping, reporting and submission of monitoring data and fauna sightings is completed as per the requirements of the approved Action conditions of approval.

This plan has been developed to support the enabling works and construction of landside facilities including the Controlled Industrial Facility (CIF), the location and extent of which is described in Section 3 of the CEMP. Where maritime construction activities and/or management or monitoring activities for penguins in

the marine environment have been included, they are not relevant to the early works scope and may be updated in future iterations of this plan to support maritime construction.

2 INTRODUCTION

Garden Island/*Meeandip*, located ~40 km south of Perth, is an 11 km^2 nearshore island connected to the mainland via a 4.2 km causeway. The island is home to a colony of little penguin (*Eudyptula minor)*, which together with Penguin Island, represent the northwestern most breeding colonies for the species.

The Garden Island/*Meeandip* little penguin colony was established following the construction of a rock wall in 1975 in Careening Bay for HMAS Stirling. By 1986, approximately 10–15 pairs of little penguins were regularly observed inhabiting the rock wall (Wykes et al. 1999). Over a three year long monitoring program of Area C (formerly known as the main colony) from 2001–2003, the number of breeding pairs increased from 41 pairs with a further 24 nests showing evidence of prospecting or breeding activity, to 71 breeding pairs with evidence of penguin activity in a further 11 nests (Cannell 2004).

Nest sites are most numerous within Moresby Harbour towards Diamantina Pier (Area C), while scattered nesting sites occur between Diamantina Pier, Parkes and Oxley Wharves and Colpoys Point, as well as the southern, western and eastern wharves of Moresby Harbour (Areas A, D–F, Figure 2-1). Derived from the number of known and likely active nests, the estimates of baseline population size ranged from 156 breeding adults to at least 226 breeding adults between 2021–2024 (noting Area B was not monitored in 2021–2022) (Cannell 2025a).

The nesting habitat requirements of the little penguin include a solid, stable base that is relatively free of small rocks; the presence of a roof; an entrance large enough for a penguin to enter but not too large; dry and well-drained (Cannell pers. obs.; Woehler 2015). Existing nest sites at Garden Island/*Meeandip* encompass the artificial rock walls at the shoreline of Careening Bay, amongst concrete rubble and slabs and occasionally under sturdy vegetation such as *Spinifex longifolius* grass. Little penguins also breed in a small number of nest boxes placed under *M. lanceolata* trees within Areas C and others placed near tall grasses in area F - Figure 2-1). These nest sites are not all used simultaneously. Instead, little penguins establish nest sites throughout Careening Bay that are used periodically for breeding activity with penguins breeding asynchronously. Additionally, the location of a nest site may occasionally change from one breeding attempt to the next, more likely between than within years.

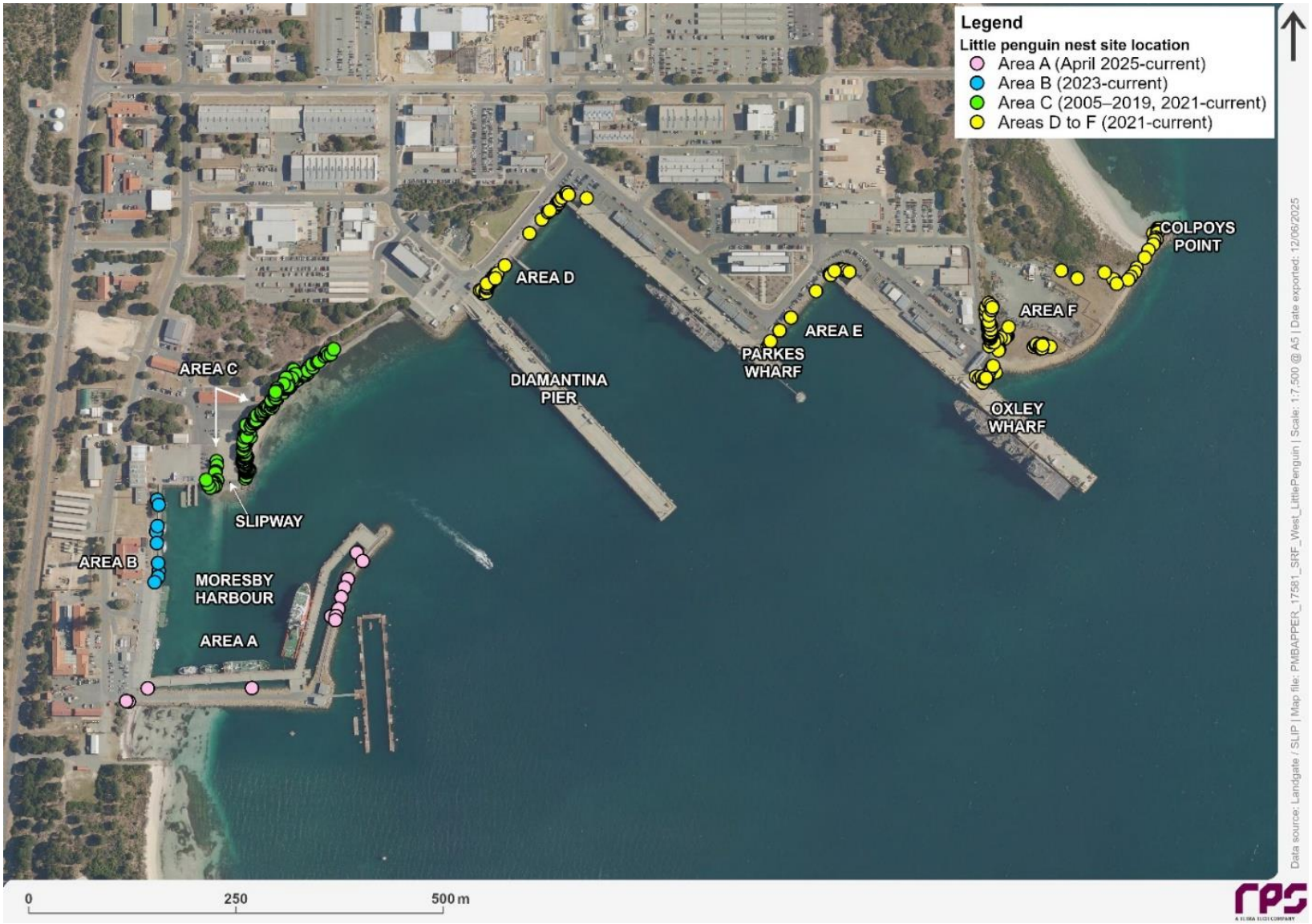


Figure 2-1 Little penguin (*Eudyptula minor)* known and previously used nesting sites within Careening Bay, Garden Island/*Meeandip*

The distribution, behaviour, habitat use, foraging patterns and breeding phenology of little penguins on Garden Island/*Meeandip* is well established (e.g. Cannell 2004, 2022, 2024, 2025b). However, population monitoring data is somewhat limited with most historical monitoring effort focused in Area C (formerly known as the main colony, monitored fortnightly from 2001–2004 then monthly between 2004–2020). Areas D–F were monitored twice annually between 2005–2016 and then fortnightly for Defence since late December 2020 (but referred to as 2021 hereafter), while Areas A and B have been monitored fortnightly for Defence since early 2025 and late 2022, respectively.

Area B was added to the monitoring program after underweight chicks were found on the road adjacent to Moresby Wharf in 2022. Reconnaissance surveys were completed in Area A in 2023 to understand the importance of this area to little penguins. A total of 13 potential sites, including 3 with nesting material, were identified; however, no further quantitative surveys were completed in Area A until April 2025 when fortnightly monitoring commenced. (Figure 2-1). As of April 2025, the little penguin monitoring program encompasses all breeding areas across Careening Bay (Areas A–F).

Fortnightly little penguin monitoring commissioned by Defence commenced in December 2020 to support design decisions and environmental approvals for infrastructure upgrade works at HMAS Stirling. The primary objective of the initial program was to quantify natural variation in the little penguin population at sites that have the potential to be affected by maritime projects in Careening Bay before, during and after construction of infrastructure upgrades.

2.1 Monitoring plan scope and purpose

RPS AAP Consulting Pty Ltd (RPS) and the University of Western Australia (UWA) were commissioned to provide this Little Penguin Monitoring and Management Plan (this Plan) on behalf of Department of Defence for the Submarine Rotational Force-West (SRF-West), Priority Infrastructure Works project (the Action). This document is an annexure to the overarching Construction Environmental Management Plan (CEMP, GHD 2026). The noise and vibration monitoring program, linked to adaptive management of onsite construction activities for the purpose of protecting little penguins, is captured in a separate plan to the CEMP and referred to throughout this plan where necessary.

The primary objective of this Plan is to describe the monitoring program that will facilitate detection of changes in little penguin behaviour, habitat use and population size during the construction of SRF-West approved Action works to inform adaptive management responses where necessary, ensuring that an acceptable EO is achieved. The CEMP describes each of the main elements of the approved Action, the EPBC Act conditions of approval and the environmental management framework that will be used to govern the delivery of the Action to meet EPBC Act requirements. This annexure to the CEMP includes the little penguin monitoring arrangements, the EO that must be achieved by the approved Action in relation to little penguins and the implementation arrangements specific to the team delivering this Plan.

3 PROJECT OVERVIEW

Only those elements of the Action relevant to the monitoring and adaptive management of little penguins are described here.

3.1 Location

The Action, described in detail in the CEMP, is situated within two areas on Garden Island/*Meeandip* - Careening Bay and Sulphur Bay (Figure 3-1; Figure 3-2). The Armament Wharf is located within Sulphur Bay, on the north-eastern shoreline of Garden Island/*Meeandip*. The wharf is used exclusively for the loading and unloading of explosive ordnances. Sulphur Bay activities are not further considered in this monitoring plan but see the CEMP for management controls and monitoring requirements that apply to penguins for maritime works (GHD 2026).

Careening Bay, located on the south-eastern coastline of Garden Island/*Meeandip*, is the main operational centre of HMAS Stirling. The marine Action area is defined in Figure 3-2. The landside Action area includes existing disturbed areas (such as roads, car parks, buildings), existing operational areas of Diamantina Pier and some areas of native vegetation (Figure 3-2; Section 2) (GHD 2026).



Figure 3-1 Location of SRF-West actions on Garden Island/*Meeandip*

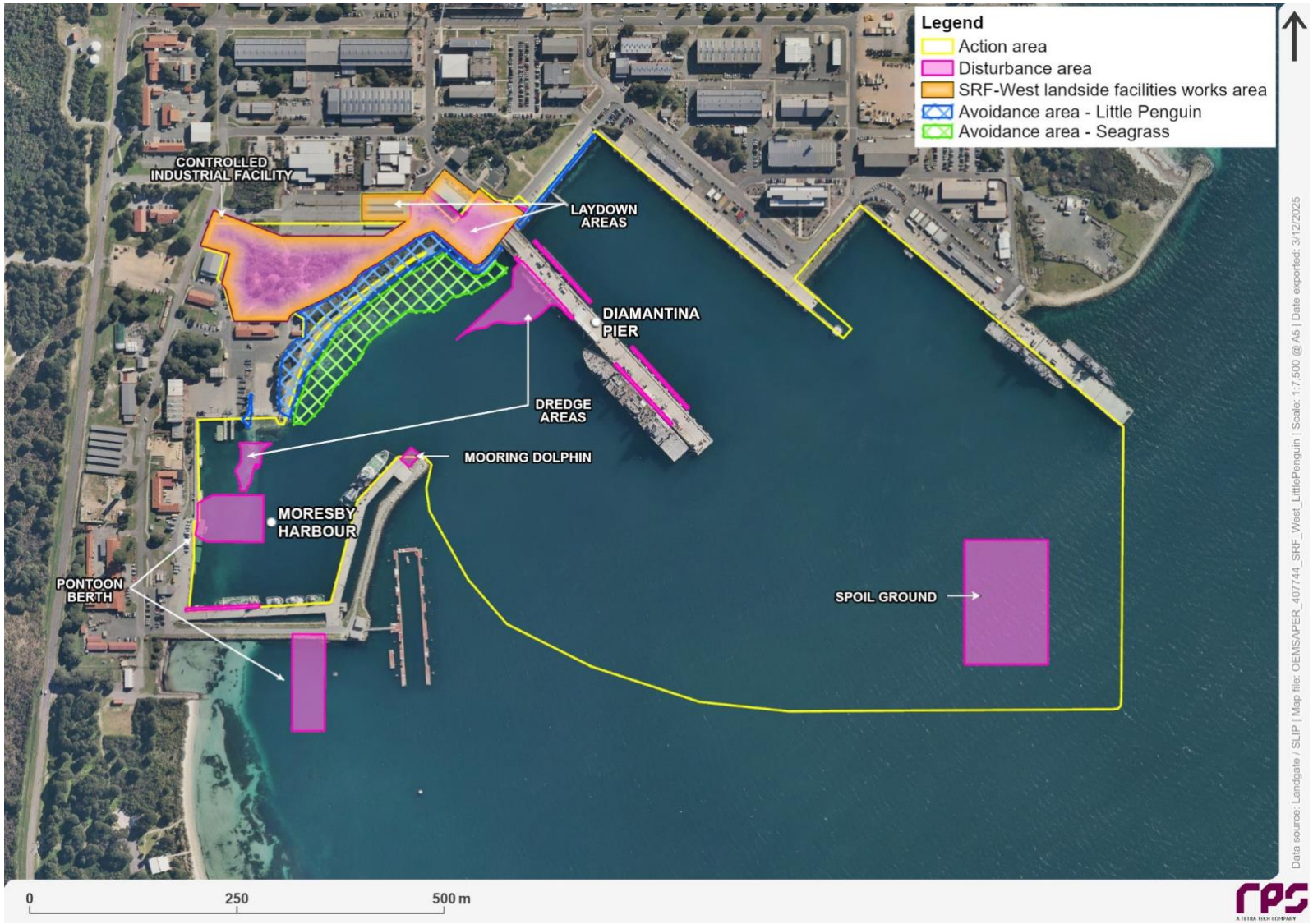


Figure 3-2 Location of SRF-West actions within Careening Bay and adjacent landside areas, Garden Island/*Meeandip*. Note: Early works area will be commenced ahead of other activities.

3.2 Timing and duration

The construction program is proposed to commence in August 2025 and be completed by December 2027. The phases of work and indicative windows for construction and construction activity durations are provided in the CEMP (GHD 2026). Where possible, works have been scheduled to avoid the most sensitive times for little penguins (and other environmental values) present in the Action area.

3.3 Working hours

Construction activities for the early works activities will occur from sunrise to sunset to avoid disturbance to little penguins at night. Sunrise and sunset times are to be taken from gazetted times from the Perth Observatory (GHD 2026).

Section 11.1.1.5 of the CEMP (GHD 2026) includes a provision for requesting permission to undertake noise, vibration or light generating construction activities outside the approved working hours, under an out-of-hours work permit process. Any construction activities that are noise generating and proposed outside of the approved working hours require a review by the SEO and approval from the SEO and PMCA via the out-of-hours work permit process (GHD 2026).

Construction activities that generate minimal or no noise may occur at any time (that is, 24 hours a day on any given day including Sundays) (GHD 2026). No auxiliary vessels and no construction vessels will operate within the Careening Bay Action area outside the period commencing 60 minutes after sunrise and ending 60 minutes before sunset (per Condition 24, DCCEEW 2025) to avoid impacts to little penguins departing or arriving back to the island.

Piling or dredging activities will, where possible, avoid or minimise periods when little penguins are likely to be breeding, feeding or resting within important habitats in the potential noise impact area (GHD 2026). Temporal restrictions will be prioritised to minimise impacts to little penguins from proposed impact piling and dredging activities. Where temporal restrictions cannot be achieved, additional management controls and monitoring requirements will be implemented (see CEMP) (GHD 2026).

3.3.1 Piling restrictions

Impact piling will not be used for construction within the Controlled Industrial Facility (CIF) (per Condition 8j, DCCEEW 2025). Piling as part of the maritime works will only commence following completion of a maritime trial piling exercise to achieve the following outcomes:

1. Validate the modelled predictions for noise levels.
2. Quantify the rate of sound attenuation with distance from the piling site to validate modelled predictions.
3. Evaluate the efficacy of adopted noise management controls and monitoring requirements to be implemented during the piling construction period at Armament Wharf Action area.
4. Based on the monitoring results, re-evaluate the dimensions of the safety zones that will prevent harm from noise to marine fauna (per Condition 8r, DCCEEW 2025).

The timing of impact piling activities for maritime works is constrained to daylight hours, commencing at least 30 minutes after sunrise and ending 30 minutes before sunset. Sunrise and sunset times are to be taken from gazetted times from the Perth Observatory (GHD 2024).

A suitably qualified acoustic expert (acoustic consultant) in consultation with a suitably qualified seabird conservation ecologist (seabird ecologist) will be engaged to provide advice and assist in optimising the piling schedule to recognise and balance operational imperatives with conservation objectives in the CEMP (GHD 2026). Management controls and monitoring requirements adopted by the approved Action are outlined in the CEMP (GHD 2026).

3.3.2 Dredging restrictions

The timing of dredging activities within the Action area is constrained to daylight hours, commencing at least 30 minutes after sunrise and ending 30 minutes before sunset (and noting that dredging vessel activities will

not occur within 60 minutes of sunrise or sunset) (GHD 2026). Scheduling of dredging activities in the Careening Bay Action area will be constrained to March, with windows either side (February and April) informed by monitoring (GHD 2026). This period was selected to coincide with the time of the year when the fewest little penguin individuals are transiting to and from nests in the rock wall and avoiding the more sensitive moulting and breeding periods.

4 MONITORING PLAN REQUIREMENTS

4.1 Conditions of approval

Each of the conditions of approval relevant to little penguins are included in Table 4-1 below with reference to the relevant sections of this Plan where those conditions are addressed. Where conditions are addressed in the CEMP this is also noted. This Plan adheres to the definitions provided in the conditions of approval which are appended in full to the CEMP.

Table 4-1 Conditions of approval requirements that are relevant to little penguins, cross referenced to where they are addressed in the CEMP, this Plan or an external report

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
Construction Environmental Management Plan (CEMP)			
4)	From the **commencement of the Action** until the **completion of the Action**, the approval holder must arrange for veterinary care or assistance from an **experienced wildlife carer** for any native terrestrial or marine animal found injured within the **Action area**.	Reporting procedures are presented in Appendix C. Also refer to the CEMP (A1 Flora and Fauna Annexure, and A6 Maritime Trial Piling Exercise Management Annexure) (GHD 2026)	Appendix C (Little penguin event report)
5)	The approval holder must ensure that, from the **commencement of the Action** until **completion of construction**, if any **little penguin**, **Perth slider** or marine mammal is found injured or killed within the **Action area**, the approval holder must immediately initiate a **stop works procedure**.	Reporting procedures are presented in Appendix C. Refer to the CEMP (Section 6.3 and Section 9.2) (GHD, 2026)	Appendix C (Little penguin event report)
8 d) ii)	A silt curtain is installed for the duration of all dredging works carried out at **Armament Wharf Action area**, unless otherwise advised by a **suitably qualified seabird conservation ecologist.**	The roles and responsibilities of the seabird ecologist captures the provision of advice. Not relevant to land-based works.	Section 9.1 (Roles and responsibilities)
8 d) iii)	No dredging and spoil disposal is carried out in the **Careening Bay Action area** during the **little penguin breeding period** or **little penguin moulting period** or as otherwise advised by a **suitably qualified seabird conservation ecologist**.	The roles and responsibilities of the seabird ecologist captures the provision of advice. Not relevant to land-based works.	Section 9.1 (Roles and responsibilities)
8 d) v)	The dredge spoil pipelines are placed to avoid **harm** to **seagrass** and **little penguins.**	Refer to the CEMP (GHD 2026) The roles and responsibilities of the seabird ecologist captures the provision of advice. Not relevant to land-based works.	Section 9.1 (Roles and responsibilities)
8 h)	The CEMP must include measures to undertake a pre-**construction** survey of the structural condition of all **little penguin nesting sites** prior to the **commencement of construction**, to determine any structural reinforcement measures that need to be implemented to prevent collapse or damage arising from **construction.**	Refer to the CEMP (GHD 2026) for details on the pre-construction survey of structural condition. The existing environment description of this Plan includes a qualitative assessment of the little penguin nesting sites. Roles and responsibilities of the seabird ecologist include providing this ongoing advice as needed.	Section 6.3 (Existing conditions) Section 9.1 Appendix A (Fortnightly little penguin monitoring report) Appendix B (Habitat degradation form)
8 i)	The CEMP must include a noise and vibration monitoring program, prepared by a **suitably qualified acoustic expert** in consultation with a **suitably qualified seabird conservation ecologist**. The noise and vibration monitoring program must:	A terrestrial noise and vibration monitoring program, including appropriate thresholds, was developed in consultation with the seabird ecologist – details of this process are captured in the	Section 7.4.2.1 (Support to noise and vibration monitoring)

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
	i) Specify terrestrial noise threshold levels (dB) and vibration threshold levels (mm/s) that will not be exceeded at any little penguin nesting sites during construction to avoid harm to little penguins and little penguin nesting sites, including the methodology relied on to establish these acoustic parameters. Vibration threshold levels and noise threshold levels must be specified for each of the following periods to reflect their different sensitivities (i) little penguin arrival period, (ii) little penguin departure period, (iii) little penguin day-time period and (iv) little penguin night-time period. ii) Specify how noise and vibration levels generated by the Action during **construction** will be continuously monitored in order to detect any exceedance of the **acoustic parameters** that may **harm little penguins**. iii) Be capable of detecting any **exceedance** of the terrestrial **noise threshold level** or **vibration threshold level** at the **little penguin nesting sites**. iv) Trigger implementation of a **stop works procedure** if a **noise threshold level** or **vibration threshold level** is exceeded.	CEMP (A4 Noise and Vibration Management Annexure) (GHD 2026). An adaptive management procedure has been developed that includes real-time alerts when the noise or vibration thresholds are reached, to trigger inspection by a seabird ecologist to allow for the early detection of change in little penguin behaviour and initiate stop works procedures where necessary. Refer to the CEMP (A4 Noise and Vibration Management Annexure) (GHD 2026)	Section 7.4.2.3 (Camera monitoring) Section 7.4.3 (Adaptive management procedure)
8 k)	The CEMP must specify that **maritime works** in the **Careening Bay Action area** only occur during the period commencing 30 minutes after **sunrise** and ending 30 minutes before **sunset**, to avoid **harm** to the **little penguins** during their arrival, departure and rafting periods.	Refer to the CEMP, A4 Noise and Vibration Management Annexure) (GHD 2026) Not relevant to land-based works.	N/A
8 l)	The CEMP must specify that terrestrial **construction** in the **Careening Bay Action area** within the period commencing at **sunset** and ending at **sunrise,** will: i) only occur under exceptional circumstances and be minimised, ii) be particularly avoided or minimised during the **little penguin arrival period** and **little penguin departure period**, iii) not exceed the relevant **noise threshold levels** and **vibration threshold levels** specified in Condition 8i, and iv) only involve the use of the quietest available equipment that is capable of doing the task.	Refer to the CEMP (Section 3, Section 11.1.1) (Sections 2 and 6 of A4 Noise and Vibration Management Annexure) (GHD 2026)	N/A
Little penguin behaviour monitoring			
8 m)	The CEMP must include a **little penguin** monitoring program to detect changes in **little penguin** behaviour and nest stability during	The little penguin monitoring program is described within this Plan to the CEMP. It details the methodology and frequency of	Section 7 (Monitoring and adaptive

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
	construction to inform adaptive management. The **little penguin** monitoring program must: i) detail the methodology and frequency of monitoring efforts that will be carried out to obtain accurate and reliable behavioural data, and ii) give overarching responsibility to a **suitably qualified seabird conservation ecologist** to coordinate and oversee monitoring efforts.	monitoring efforts and clearly articulates the responsibilities of the seabird ecologist to coordinate and oversee these monitoring efforts.	management measures) Section 9.1 (Roles and Responsibilities)
8 n)	The CEMP must specify the implementation of adaptive management measures in response to the detection of changes of behaviour in **little penguins**.	This plan, i.e. the Little Penguin Monitoring and Management Plan (Annexure A5) to the CEMP, specifies the triggers for adaptive management in response to detection of change in a range of little penguin behaviours including potential movements in and out of burrows, and changes in nesting behaviour and nesting success.	Section 7 (Monitoring and adaptive management measures)
Construction lighting			
8 bb)	The CEMP must include a **construction** lighting management **plan** that: i) is consistent with the **Light Pollution Guidelines for Wildlife,** ii) ensures all lighting from **construction** is directed away from **little penguin nesting sites** and **little penguin arrival areas**, and iii) specifies mitigation measures to minimise the impacts of spill-over light from **construction** lighting on **little penguins** and **little penguin nesting sites.**	Refer to the CEMP (A1 Flora and Fauna Management Annexure) (GHD 2026) The roles and responsibilities of the seabird ecologist captures the provision of advice. Any approval for the use of construction lighting required for undertaking of enabling works and landside facilities construction (CIF) will be subject to the completion of a Construction Lighting Management Plan that at a minimum meets the requirements of Condition 8 bb.	Section 9.1 (Roles and responsibilities)
Little penguin – population monitoring			
9)	Prior to **commencement of the Action**, the approval holder must submit to the **department** for approval, a report prepared by a **suitably qualified seabird conservation ecologist** that establishes the **baseline population** of **little penguins** detailing how it was derived from relevant historical population data and why it is suitable for comparison to data collected after **commencement of the Action**.	Refer to Cannell (2025), prepared prior to the commencement of the Action and approved by the Department.	N/A
10)	From the **commencement of the Action,** until 6 years following **completion of construction**, the approval holder must ensure that the **little penguin population** is not reduced below its **baseline population** size as a result of the Action.	The little penguin monitoring program will continue on from the baseline monitoring period until 6 years following the completion of construction. The methodology for population monitoring and index of population size has been developed with an appropriate experimental design, within the constraints of the approved Action area. The methodology will use multiple lines of evidence approach to identify the potential source of impact to little	Section 7.2 (Breeding population monitoring) Section 7.3 (Environmental monitoring)

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
		penguins that may result in a reduction in population size below baseline levels.	Section 7.4 Behaviour monitoring)
11)	The approval holder must implement from the **commencement of the Action** until 6 years following **completion of construction**, a monitoring program designed by a **suitably qualified seabird conservation ecologist** that: i) effectively tracks the **little penguin population**, ii) identifies the location of all **little penguin nesting sites** in use within the **Action area**, and iii) is undertaken at regular intervals as advised by a **suitably qualified seabird conservation ecologist**.	This plan describing the monitoring program was prepared by seabird ecologists to achieve multiple objectives, including tracking the little penguin population and identifying nesting sites in use throughout the Action area, and is undertaken at regular intervals.	Section 7 (Monitoring and adaptive management measures) Section 9 (Implementation of the plan)
12)	Annually, from **commencement of the Action** until 6 years following **completion of construction,** the approval holder must provide to the **department** a **little penguin** monitoring report prepared by a **suitably qualified seabird conservation ecologist** that compiles the **little penguin monitoring data** for the previous breeding period and compare the results to the **baseline population**. If the **little penguin population** has declined below the **baseline population**, the report must include an assessment of the underlying cause for the decline and provide recommended management measures to mitigate the **little penguin population** decline.	Responsibilities for compiling data and preparing the little penguin monitoring by a seabird ecologist are articulated in this plan. The annual report will include analysis of the population size with comparison against historical trends and assessment of potential underlying causes of any measured declines in population size.	Section 9.3 (Reporting)
Little penguin – direct disturbance and obstruction			
13)	Prior to the commencement of any dredging, the approval holder must provide the **department** with an updated Per- and polyfluoroalkyl substances (PFAS) Risk Assessment Report which has been informed by a PFAS monitoring and sampling program that includes: a) assessment of the bioaccumulation pathways in **Cockburn Sound,** b) assessment of impacts to **sensitive receptors** including **little penguins** and **Indian Ocean bottlenose dolphins,** c) biota sampling that provides evidence to support the findings of 13a and 13b, such as sampling of **little penguin** prey species, non-invasive sampling of little penguins, or sampling of other higher trophic level species, and d) details of any mitigation measures needed to maintain the current risk level as specified in Section 10 and 11 of the **PFAS Risk Assessment Report.**	Responsibilities for advising on biota sampling will be included in this Plan when the approach is further understood, prior to the commencement of any dredging. Not relevant to land-based works.	N/A

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
14)	The approval holder must ensure that, prior to commencement of **clearing** and **construction**, all **little penguin nesting sites** located within 50 m of the **Action area** are identified, clearly signed and demarcated and that signage is maintained until the **completion of the Action**.	Refer to the CEMP and A1 Flora and Fauna Annexure (GHD 2026) Responsibilities for the seabird ecologist to inform other project team members of new nesting sites throughout construction are articulated in this Plan.	Section 9.1 (Roles and responsibilities) Section 9.3 (Reporting)
15)	The approval holder must not, as a result of taking the Action, directly disturb **little penguin nesting sites**.	Refer to the CEMP and A1 Flora and Fauna Annexure (GHD 2026)	N/A
16)	The approval holder must ensure that **construction vessels** and equipment do not moor in the following areas: a) **Rafting avoidance area.** b) **Little penguin arrival areas.** c) **Seagrass avoidance areas.**	Not required for land-based works	N/A
Little Penguin leaks and spills			
18)	The approval holder must, prior to **commencement of the Action**, revise the existing **Oil Spill Contingency Manual** to: a) include specific **incident** management procedures for protecting sensitive values, including **little penguin nesting sites**, during pollution **incidents**, b) remove plans for clean-up of the rock walls using high pressure hoses (as this may push oil into the **little penguin nesting sites**), and c) include all **little penguin nesting sites** in the priority areas and mapping.	Refer to Oil Spill Contingency Manual	N/A
Little penguin – artificial lighting			
19)	To avoid and mitigate **harm** to **Little Penguins** from artificial light associated with the Action, prior to installation of any lighting, the following must be provided electronically to the **department** for approval by the **Minister**: a) Final lighting plans b) A Light Impact Assessment Report, developed in consultation with a **suitably qualified seabird conservation ecologist**, that assesses and details impacts, including cumulative impacts to **little penguins** from new light installations associated with the Action. c) A Light Management **Plan**, developed in consultation with a **suitably qualified seabird conservation ecologist**, that details measures that will be implemented to avoid (where possible) and	Responsibilities for the seabird ecologist to provide advice to the Light Impact Assessment, Management Plan and final lighting plans have been identified in this plan. Not required for the construction phase of the enabling works and landside facilities construction (CIF).	Section 9.1 (Roles and responsibilities)

Condition Number	Requirement	How requirement is / will be addressed	Plan reference
	mitigate potential impacts identified by the Light Impact Assessment Report in regard to **little penguins** and consistent with the Light Pollution Guidelines for Wildlife and details residual impacts remaining after avoidance and mitigation measures are implemented.		
Compliance records			
38)	The approval holder must maintain accurate and complete **compliance records** and document the procedure for recording and storing **compliance records**.	Refer to the CEMP (GHD 2026). Specific requirements for records relating to little penguin monitoring are included in this Plan.	Section 9.3 (Reporting) Section 9.4 (Record keeping)
40)	The approval holder must ensure that any **monitoring data**, surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the Guidelines for biological survey and mapped data, Commonwealth of Australia 2018 and Guide to providing maps and boundary data for **EPBC Act** projects, Commonwealth of Australia 2021, or as otherwise specified by the **Minister** in writing. The approval holder must submit all **monitoring data**, surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the **department** within 20 **business days** following the end of each **Annual Compliance Report Period** (**ACR period)**, except where otherwise specified in a **plan**.	Refer to the CEMP (GHD 2026). All little penguin monitoring data will be prepared in accordance with relevant guidelines. The relevant responsibilities on the seabird ecologist are articulated in this Plan.	Section 9.3 (Reporting) Section 9.4 (Record keeping)
41)	The approval holder must upload, at least annually, to the Atlas of Living Australia or the relevant state biodiversity database, all fauna sightings recorded during the specified monitoring activities related to this Action.	Refer to the CEMP (GHD 2026). Specific requirements for records relating to little penguin monitoring are included in this Plan.	Section 9.4 (Record keeping)

4.2 Environmental Management Plan Requirements

Environmental management plans describe how an action might impact on the natural environment in which it occurs and set out clear commitments from the person taking the action on how those impacts will be avoided, minimised and managed so that they are environmentally acceptable (DCCEEW 2024). This Plan focuses on monitoring and adaptive management arrangements in relation to little penguins only, and has been informed by:

- Environmental Management Plan Guidelines (DCCEEW 2024)
- The objectives of the EPBC Act and the principles of ecologically sustainable development as defined n in section 3A of the EPBC Act
- The Wildlife Conservation Plan for Seabirds (Commonwealth of Australia 2020)
- Standard Operating Procedure SC23-05 Using artificial nest boxes to monitor little penguins (*Eudyptula minor* (DBCA 2019)
- National Light Pollution Guidelines for Wildlife (Commonwealth of Australia 2023)
- International Standard 14001. Environmental Management Systems – Requirements with guidance for use (ISO 2015).
- Shoalwater Islands Marine Park Management Plan 2007-2017 (DEC 2006)
- State Environmental (Cockburn Sound) Policy (Government of Western Australia 2015)
- Environmental quality criteria reference document for Cockburn Sound (EPA 2017).

Specific requirements regarding environmental management plans outlined in the Guidelines (DCCEEW 2024) and that are relevant to this plan are included in Table 4-2 below. Remaining environmental management plan requirements are delivered through the CEMP.

Table 4-2 Environmental management plan requirements and plan reference

Requirement	Section or External Reference
Executive summary – key elements of the project, document purpose, main impacts and strategies to address them	Section 1
Project overview – activity locations in relation to little penguin nest sites and timing provided	Section 3; CEMP (GHD 2026)
Objectives – defines the environmental outcomes for the project, tailored to environmental issues outlined in the CEMP and in this Plan	Section 5
Environmental management roles and responsibilities – personnel responsible for the effective delivery of this plan	Section 7.1.2 Section 9.1 CEMP (GHD 2026)
Reporting – required reports, scopes, triggers for reporting, audience for reports and document control	Section 7 Section 8 Section 9.3 Section 9.4
Environmental training – delivery of this monitoring plan and required site visits	Section 9.2
Potential environmental impacts and risks – high level overview provided	Section 6.4
Environmental management and monitoring measures – monitoring measures related to little penguins including trigger values for adaptive management to ensure environmental outcomes are met	Section 7
Audit and review – measures for audit and review of this Plan	Section 10

5 LITTLE PENGUIN ENVIRONMENTAL OUTCOME

The environmental management plan guidelines (Commonwealth of Australia 2024) require that EOs, tailored to the environmental issues relevant to the Action, are defined. All commitments in this Plan, including the EOs must be specific, measurable, achievable, relevant and time bound (SMART). The EO relevant to little penguins is provided in Table 5-1 below together with the performance criteria that will be used to demonstrate that the EO has been achieved.

Table 5-1 Environmental outcome for little penguins

Number	Environmental outcome	Performance criteria
EO LP 1	No measurable decline in little penguin population size attributable to the SRF-West Project landside and maritime construction works.	• Little penguin monitoring will record nesting behaviour, nest conditions, breeding success, numbers of breeding adults (as an index for population size) and environmental variables within expected ranges of variation, during construction and for a 6-year period following the completion of construction. • The little penguin monitoring data will demonstrate little penguin population size changes are within normal ranges of variation (as compared to baseline population size between 2021–2024) or will provide evidence to demonstrate the influence of external factors.

6 EXISTING ENVIRONMENT

6.1 Little penguins on Garden Island/*Meeandip*

The little penguin is listed as a Marine species under s248 the EPBC Act. Little penguins are also a conservation value of regional priority in the bioregional plan for the South-West Marine Region (Commonwealth of Australia 2012). The species distribution spans southern Australia and New Zealand, and the total population is estimated at 469,760 individuals (BirdLife International 2025). The global conservation status of the little penguin is considered Least Concern with a stable population trend, but with the caveat that 60% of all known colonies have unknown trends (BirdLife International 2025).

Most of the Australian little penguin population is concentrated on nearshore islands in the southeastern states (Dann et al. 1991). The largest population in Australia is located at Philip Island in Victoria, which is estimated to support over 40,000 breeding adults (Nature Parks 2024). In 1996, the entire Western Australian population was estimated at 3,000 breeding individuals (Dann et al. 1996).

Little penguins currently or formerly occurred on at least 63 of Western Australia's 168 named islands between Carnac Island and Twilight Cove near Cocklebiddy (Cannell 2001). The Garden Island/*Meeandip* little penguin colony was established following the construction of the rock wall in Careening Bay for HMAS Stirling in 1975. Recent investigations on Carnac Island, including direct observations and acoustic recordings, suggest the former Carnac Island colony (Dunlop & Storr 1981) has been extirpated (E. Clitheroe pers. comm.). Two small, edge-of-range colonies remain within the Perth metropolitan region on Penguin Island and Garden Island/*Meeandip* (Cannell 2001).

Life history

Little penguins intermittently return to their breeding colonies from February to March to commence pre-breeding activities, including site prospecting, pair-bonding and nest guarding (Wienecke 1993). The breeding season is relatively protracted, variable among years and between pairs, but typically extends from April to January (Dunlop et al. 1988; Wienecke 1993; Nicholson 1994; Wykes et al. 1999; Cannell 2022; 2024; 2025a).

Little penguins, including the population on Garden Island/*Meeandip*, are asynchronous breeders and eggs are generally laid in any month from March to October (Table 6-1). Little penguins lay one or two eggs per clutch and can raise two clutches per season depending on prey availability (Cannell 2025b). On Garden Island/*Meeandip*, pairs have occasionally undertaken three breeding attempts in a season; however, one of these is usually unsuccessful (B. Cannell unpub. data). Adults incubate the eggs for approximately 35 days, and incubation is shared between the parents, with one incubating the eggs and the other foraging (Stahel & Gales 1987). During the incubation period, penguins on Garden Island can conduct multiple short foraging trips, i.e. 1–3 days or longer trips up to 9 days (Collins et al. 1999; Cannell 2022, 2024, 2025b). During the chick-rearing period, penguins typically forage much closer to the colony, and all foraging trips are generally limited to 1–2 days (Cannell 2022, 2024, 2025b).

Nest abandonment is assumed to typically be related to low availability of prey baitfish and leads to an increase in the number of unsuccessful breeding attempts (abandoned eggs and nests). Evidence suggests the breeding success of little penguins decreases with increased foraging distance from the colony (Cannell 2001). Data collected to date indicates that this pattern rarely occurs on Garden Island/*Meeandip*, probably reflecting better foraging grounds close to the nesting sites (Cannell 2004, 2022, 2024).

Once hatched, the chicks are unable to forage, defend themselves from predators or regulate their body temperature and must be guarded for 2–3 weeks (Stahel & Gales 1987). Both parents are involved in the guard phase, with one guarding the chicks whilst the other forages.

After the guard phase, both parents will leave on daily foraging attempts, driven by the developing chicks' increasing food requirements (Stahel & Gales 1987). The chicks are fully fledged at approximately eight weeks old, at which point they leave the colony (Wienecke 1993). The last chicks are generally found in the colony around late December to mid-January (Table 6-1).

It is unknown where the fledged chicks go when they leave the colony but evidence from other colonies suggests that chick mortality is high in the first year, with a probability of survival of only 17–42% (Sidhu et al. 2007; Agnew et al. 2015). Juveniles that do survive typically do not return to the natal colony for a year and recruit to the breeding colony when they are approximately 2–3 years old (Stahel & Gales 1987; Dann &

Cullen 1990; Cannell 2001; Dann 1992). Young birds have high site fidelity and generally return to within approximately 5 m^2 of their hatching location (Nicholson 1994). Occasionally, some recruits to the population will find other sites to nest as is evidenced from the colonisation of the Careening Bay colony on Garden Island/*Meeandip*.

The breeding cycle of little penguins on Garden Island/*Meeandip* is illustrated in Table 6-1 which shows peak breeding periods in darker shades and 'shoulder' periods in paler shades. White boxes indicate minimal activity in that month. January is split because the chicks have usually fledged and left the island by mid-January, but occasionally fledging occurs later (RPS 2024).

Table 6-1 Annual breeding cycle of little penguins on Garden Island/*Meeandip*

Behaviour	J	F	M	A	M	J	J	A	S	O	N	D
Egg laying												
Incubation												
Chicks present in colony												
Moulting period												

After breeding, the adults will undertake a catastrophic moult, whereby they replace all their feathers over a 2–3-week period (Reilly & Cullen 1983; Dann et al. 1996; Cannell 2004; Greenwell et al. 2022). This generally occurs between November and February (Table 6-1). During this period, the penguins will not leave the island as their emerging feathers are not waterproof. To survive the 2–3 week fast, the little penguins must build up fat stores prior to moulting, often doubling their average body mass (Cannell 2025b). The moulting period is physiologically intense, characterised by increased metabolic rates, energetic expenditure and body temperature, and little penguins are often emaciated at the completion of their moult (Stahel & Gales 1987; Cannell 2001; Greenwell et al. 2022). Following the annual moult, the penguins depart the colony returning only intermittently until eggs are laid (Cannell 2025b).

Daily behaviour

Daily little penguin behaviour can be defined into three periods, the morning departure, foraging, and rafting and return to shore. Little penguins depart the colony 1–2 hours predawn (Klomp & Wooller 1991; Rodríguez et al. 2016) swimming slowly and mostly along the sea surface (Cannell 2017, 2018). Having departed the colony, little penguins spend an extended period at the surface, engaging in self-maintenance behaviours such as preening, an activity that is important for feather maintenance.

Penguins return in the evening from sunset to approximately 90 minutes after Civil Twilight (Cannell 2004) and raft together at sea before coming ashore. The length of time spent in a raft before they come ashore is not currently known, however, observations of a small sample of birds suggest they may spend up to an hour rafting (B. Cannell pers. obs.). More than one raft can be formed, depending on how far from the colony they are foraging by the end of the day (Cannell 2004). Penguins that return later in the evening may not join a raft and may come ashore alone. Therefore, more than one group of penguins will arrive each night and not all the penguins that are in a particular raft may swim ashore together (Cannell 2004).

Penguins return to shore at sites close to their nests. The rafting area for the main colony on Garden Island/*Meeandip* is located adjacent to, and extending approximately 200 m past, the Diamantina Pier. The rafting area of the little penguins that nest between the wharves or at Colpoys Point is unknown but is likely to be with the little penguins from the main colony or in the waters immediately offshore from the nest sites. Garden Island/*Meeandip* little penguins have been found to return to the beach from rafting from sunset, with close to 100% having returned by 90 minutes after civil twilight. Once onshore, penguins can remain on the beach or seawall for some time before retiring to their nests (B. Cannell pers. obs.).

Diet and foraging patterns

Tracking studies during the incubation and chick-rearing periods demonstrate little penguins have large home ranges with Garden Island/*Meeandip* penguins preferentially foraging in Cockburn Sound/*Derbal Nara* (Cannell 2022, 2023, 2024). Their diet is variable depending on prey availability but largely consists of small schooling fishes. Historically, the main prey of penguins from Penguin Island consisted of sandy sprat

(Hyperlophus vittatus), southern sea garfish (*Hyporhamphus melanochir)*, anchovy (*Engraulis australis)*, blue sprat (*Spratelloides robustus)* and pilchard (*Sardinops neopilchardus)* (Klomp & Wooller 1988; Bradley et al. 1997; Cannell 2012; Cannell et al. 2013). More recently, the diet of Garden Island/*Meeandip* little penguins was found to consist of mackerel (*Sardinella lemuru)*, anchovy (*Engraulis australis)*, pilchard (*Sardinops sagax),* sandy sprat, and to a lesser extent blue sprat, silverbelly (*Parequula melbournensis)*, common hardyhead (*Atherinomorus vaigiensis)* and sea mullet (*Mugil cephalus)* (2025).

Penguins from the Garden Island/*Meeandip* main colony feed in Cockburn Sound/*Derbal Nara* during the breeding season (see below). The length of foraging depends on the breeding stage of the little penguin, with multiple days of foraging for incubating parents, about one day for chick-rearing penguins, and potentially weeks during pre-breeding/post-moult stages (Collins et al. 1999; Cannell 2017; Cannell 2018). Little penguins are visual predators, which means that once the light levels get too low to see prey underwater, they start to head back to the colony or remain at the surface in instances where they remain at sea for multiple days (Cannell & Cullen 1998). Auditory cues (sound) do not appear to be used in foraging. A summary of foraging behaviour timing for the main colony penguins is provided in Table 6-2.

Table 6-2 Timing of little penguin foraging behaviours at Garden Island/*Meeandip*

Time	-2 hours	Dawn	Day	Sunset	Civil Twilight	+90 mins
Behaviour	In nest	Departure	Foraging	Rafting/return to shore		Returning to nest/ in nest

Threats

Sea level rise, changes in sea temperature and oceanography were assessed as pressures of concern (Commonwealth of Australia 2012). Physical habitat modification, oil pollution, chemical pollution or contaminants, ocean acidification, collisions with vessels and disease were identified as being of potential concern for the species (Commonwealth of Australia 2012). Cannell et al. (2016) identified trauma from watercraft as being a major cause of little penguin mortality in the Perth metropolitan region, followed by starvation. Baitfish populations are highly variable in space and time and changes in oceanographic conditions have been shown to influence the distribution and abundance of prey species (Pearce et al. 2011; Cannell et al. 2016; Smith et al. 2017). A reduction in regional prey availability within the typical foraging range of little penguins, particularly during chick-rearing phases, can lead to starvation of the adults and, subsequently, their chicks (Cannell et al. 2016). Additionally, where penguins do not amass adequate fat reserves prior to moulting, they are vulnerable to starvation (Cannell et al. 2016).

Other threats include introduced terrestrial predators such as cats (*Felis catus)* and red foxes (*Vulpes vulpes)*, disease and contaminants (Cannell unpub. data; Cannell 2004; Cannell et al. 2016; Campbell et al. 2022). Due to the increasing pressures in the region, little penguins are considered a species of high conservation priority (Commonwealth of Australia 2012).

6.2 Little penguin population

The Careening Bay colony of little penguins was established following the construction of a series of rock walls for HMAS Stirling in 1975. By 1986, approximately 10–15 pairs of little penguins were regularly observed inhabiting the rock wall (Wykes et al. 1999). Irregular observations in Area C (the main colony, as shown in Figure 6-1) from 1995 to 1997 confirmed 6–16 active nests (i.e. breeding pairs) and other evidence of breeding activity was noted. Over a year-long monitoring program of Area C in 2001, 41 breeding pairs and a further 24 burrows with evidence of prospecting or breeding activity were observed (Figure 6-1; Cannell 2004).

In 2004, the Garden Island/*Meeandip* little penguin population was estimated to be at least 160 birds (Cannell 2004). This estimate was based on 71 known burrows being used for breeding and the counts of birds returning in the evening in Area C (Cannell 2004). In 2011, the Garden Island/*Meeandip* colony declined by approximately 20% from the peak level, likely due to a marine heatwave, but has both increased and decreased since (Cannell 2025a; B. Cannell pers. comm.).

To estimate the baseline population size of the little penguin population, the number of breeding adults recorded in Areas B–F (Figure 6-1) from 2021–2024 was used as an index of population size and is derived from the number of known and likely active nests, as each nest contains two adults. The total baseline population size (all age classes) cannot be provided, as the number of non-breeding adults (i.e. individuals

taking a sabbatical from breeding in any one year), immature and juvenile birds in the population is not known and cannot be easily measured.

Between 2021–2024, there was significant variation in the number of breeding adults, ranging from 156 to at least 226 individuals (noting Moresby Wharf was not monitored in 2021 or 2022) (Cannell 2025a). For the purposes of setting a baseline population size, 156 individuals stands as the minimum population size and at least 226 individuals as the maximum baseline population for comparison to future size estimates during and for 6 years post construction (Cannell 2025a).

Seabird populations, including little penguins, are variable and change in size in response to intrinsic (e.g. reproduction, mortality) and extrinsic (e.g. sea temperature, bait fish abundance, water quality, disturbance) factors. It is reasonable to expect there will continue to be variation in population size of similar scale into the future due to natural pressures, as observed between 2021–2024. The establishment and persistence of the colony on Garden Island/*Meeandip*, despite some level of human and vessel traffic disturbance within Careening Bay and Cockburn Sound/*Derbal Nara* more broadly, is a testament to the penguins' adaptability and resilience to low-level disturbance (Cannell 2025b).

Table 6-3 Number of known and likely little penguin nests in Areas B to F from 2021-2024. The number of breeding adults is presented in parentheses (Cannell 2025a)

Area	Nest Category	2021	2022	2023	2024
Area C to F	Known breeding	68	95	64	71
Area C to F	Likely breeding	17	18	11	13
Area B	Known breeding	NA	NA	2	4
Area B	Likely breeding	NA	NA	1	1
Total nests (breeding individuals)		**85 (170)**	**113 (226)**	**78 (156)**	**89 (178)**



Figure 6-1 **Little penguin known and previously used nest sites within Careening Bay. The temporal and spatial extent (years) of monitoring is distinguished with blue, green, yellow and pink circles**

6.3 Existing condition of little penguin nesting sites

Extant little penguin habitat is well known and consists largely of cavities in the sea wall together with a small number of nest boxes and natural nest sites under vegetation (n= 374, Table 6-4). Note that the number of nest sites can vary due to a change in the integrity of the nest site (e.g. burrow collapse, entrance blocked by floral growth), or penguins establishing new nest sites.

Table 6-4 Number of current, previously used or potential little penguin nest sites across Careening Bay. Total nests shown below with nest boxes in parentheses

Area	Number of Nest Sites
A	13
B and C	226 (12)
D and E	62
F	73 (5)
Total	**374 (17)**

A baseline condition assessment of the structural condition of little penguin nesting sites within rock walls was completed by a suitably qualified engineer from GHD prior to construction. This assessment focussed on engineering stability and photographs taken to document the current condition of the rock wall closest to the construction works and at more distant reference sites. The assessment methodology was completed as follows:

- the revetment at the main colony was divided into segments to be agreed on site in consultation with the qualified seabird ecologist
- the visual inspection was completed segment by segment
- a photographic record of each segment of the revetment batter was made to facilitate future visual reference.

The following information was recorded:

- location
- engineering / structural aspects; rock condition (rock type, strength, weathering and stability (interlocking with adjacent rocks), rock defects (fractures/cracks), evidence of instability (fallen rocks at revetment toe).

The baseline provided by this site assessment provides a baseline dilapidation record to enable a comparison of pre-construction conditions with any observed changes during construction monitoring activities (Appendix B).

6.4 Factors with potential to impact the little penguin population

Penguins are among the most threatened group of seabirds worldwide with 11 species listed on the International Union for the Conservation of Nature (IUCN) Red List as Near Threatened (2), Vulnerable (4), Endangered (4) or Critically Endangered (1) (IUCN 2025). While the global little penguin population is considered Least Concern (stable), many Australian populations are threatened, and sites with or without active conservation measures have experienced severe declines to the extent that some colonies no longer exist (Dann 1994; Stevenson & Woehler 2007; BirdLife International 2020; Cannell 2020; Greenwell et al. 2022). The threats to little penguin colonies are numerous but vary depending on location.

In the Perth region, including on Garden Island/*Meeandip*, little penguins are threatened by a range of confirmed anthropogenic-induced pressures, including watercraft injuries and invasive red foxes (Cannell et al. 2016; Cannell 2024). A study into mortality of little penguins in the Perth region showed that a high proportion of individuals (approximately 26%, n=45) occurred due to watercraft strike (Cannell et al. 2016). Mortality was more likely due to small fast-moving watercraft rather than larger, slow-moving vessels

(Cannell et al. 2016). Foxes were found to be the major contributor to penguin deaths on Garden Island/*Meeandip* in 2023, killing at least 39 individuals (Cannell 2024). Other potential sources of mortality include predation by carpet python *Morelia spilota imbricata* and Australian raven *Corvus coronoides*, disease, parasites and infections (Cannell unpub. data; Cannell et al. 2016; Sutton 2022). Reductions in prey abundance is another major vulnerability to little penguin populations (Cannell et al. 2016; Chiaradia 2013). Changes in the abundance of major prey can result in a dramatic change in their diet composition and trophic interactions, resulting in malnourishment, increased mortality and decreased breeding success (Dann et al. 2000; Chiaradia et al. 2010; Cannell et al. 2016; Cannell et al. 2024).

Rapid changes in the marine and terrestrial environment have been associated with poorer breeding with penguins shown to catch less prey under warmer conditions (Cannell et al. 2012; Carroll et al. 2016). Oceanographic change has the potential to drive a mismatch between plankton and the small pelagic fish on which penguin prey (Hinder et al. 2013). Furthermore, increasing terrestrial temperatures in the spring and summer months can cause fatal hyperthermia in both chicks and adults (Cannell et al. 2011; Cannell et al. 2012; Cannell et al. 2016; Clitheroe 2021). The thermoneutral zone for adult little penguins on nearby Penguin Island lies between 6 and 30°C (Horne 2010), and become hyperthermic in temperatures that exceed 35°C (Stahel & Nichol 1982).This issue is likely to be less problematic on Garden Island/*Meeandip*, where little penguins nest within rock walls that are close to the sea, as opposed to under vegetation or nest boxes where daily maximum temperatures are likely to be higher (BirdLife International 2020; Clitheroe 2021). However, in January and February 2025, five adult penguin deaths on Garden Island/*Meeandip* coincided with several days of temperatures between 33°C (the point at which penguins start to show signs of restlessness; Baudinette et al. 1986) and 40°C, with little to no sea breeze. The temperatures remained high for several hours each day (Bureau of Meteorology 2025), and it is most likely that these penguins succumbed to hyperthermia (Cannell 2025b).

In long-lived species such as seabirds, adult survival is of greatest importance for population growth rate, i.e. the trait with the greatest elasticity (Gadgil & Bossert 1970; Lebreton & Clobert 1991; Wooller et al. 1992; Sandvik et al. 2012). Where adult survival is directly reduced from events such as predation, starvation, or vessel strike, population-level changes may be observed. The impact of the fox predation event in 2023 is likely to be observed over several years, at least, due to lost breeding effort from those adult penguins that were killed and the juveniles that would have recruited into the population (Cannell 2025a). While the probability of juvenile little penguin survival is relatively low (17–42%) compared with adult survival (86%) (Sidhu et al. 2007; Agnew et al. 2015), reduced recruitment (where a large number of individuals are affected) into the population may have a measurable effect on the population.

Other potential anthropogenic pressures to little penguins that may arise from the Action include changes to ambient lighting that may disrupt natural behaviours, airborne and underwater noise, vibration, increased turbidity and resuspension of contaminated sediments, increased vehicle and personnel movement at night leading to disturbance, vessel strikes and leaks and spills. However, each of these potential impact and risk pathways has been assessed and appropriate management controls and monitoring requirements included in the approved Action design and implementation phase to ensure that acceptable environmental outcomes will be achieved during the SRF-West maritime and landside construction activities. Where appropriately mitigated and managed (per the CEMP, GHD 2026), potential impacts and risks are expected to be short term in duration and spatial extent, leading to minor levels of disturbance only and are not expected to lead to population-level changes to little penguins.

7 MONITORING AND ADAPTIVE MANAGEMENT MEASURES

7.1 Purpose of monitoring and adaptive management

The overarching purpose of the monitoring and adaptive management is to:

- understand the influence of a range of environmental variables and approved Action activities on little penguin behaviour and breeding success, and
- provide the evidence to support compliance reporting against the approved Action conditions of approval, specifically to demonstrate that the little penguin EO is being achieved.

7.1.1 Study area

The study area for the monitoring program covers all known nesting areas ('nesting sites' as per the Conditions) for the little penguin on Garden Island/*Meeandip*, that is, from Moresby Harbour to Colpoys Point (Areas A to F, Figure 6-1).

7.1.2 Penguin monitoring team and handling permits

All capture, handling, microchipping, collection of biological samples and tracking of little penguins will be undertaken following best practice methods approved by the UWA Animal Ethics Committee, WA Wildlife Licensing (Department of Biodiversity Conservation and Attractions) and/or the DCCEEW.

All surveys will be conducted by seabird ecologists for the purpose of preparing and implementing monitoring programs to detect changes in the little penguin population and correlating these changes with environmental variables. This means a person who has relevant professional qualifications (described in DBCA 2019) and/or meets the definition provided in the conditions of EPBC Act approval 2024/10031.

All ecological monitoring on Garden Island/*Meeandip* will be undertaken with appropriate Defence clearances, environmental clearance certificates and photography permits.

7.2 Breeding population monitoring

7.2.1 Aims

The aims of the long-term breeding population monitoring program are to:

- identify any changes in breeding activity, success or population size during construction activities and for a period of six years following the completion of construction
- assess breeding activity and success by measuring the timing of breeding, number of clutches laid, and success of breeding attempts, assessing interannual variation since program inception (2021)
- undertake colony-wide surveys of burrow occupancy to provide estimates of the number of breeding adults as an index of population size (per Cannell 2025a) and any changes over time
- assess whether the number of breeding adults has declined below baseline estimates and whether the EO has been achieved in accordance with the Conditions of Approval (provided in Section 5.1).

7.2.2 Method

Little penguin colony monitoring will be conducted on a fortnightly basis, continuing from baseline monitoring (December 2020), until at least six years following the completion of construction activities. Fortnightly visits are deemed an ideal frequency to increase the probability of observing chicks close to fledging (between 6–8 weeks of age) and increasing the probability of accurately identifying breeding outcomes (DBCA 2019). Furthermore, fortnightly monitoring during the moult period provides a sufficient window of opportunity for

moulting penguins to be observed. Surveying more frequently than fortnightly is not necessary and risks disturbing the penguins.

Each survey will comprise 1–1.5 field days and will involve visual surveys on foot, using a torch or burrow scope inserted into the entrance of potential nest or moulting sites where appropriate, located in rock walls and penguin nesting boxes. This includes checks of known or potential nesting or moulting sites for the presence of birds or likely presence (such as guano, feathers, nesting material).

Little penguins using nest boxes will be scanned for a microchip and processed following the methods for extraction, soft containment, scanning and weighing, insertion of Passive Implant Transponder (PIT) tag (known as a microchip), collection of morphometric data and returning penguins to the nest box as described in DBCA (2019), originally developed by little penguin scientists Dr Erin Clitheroe and Dr Belinda Cannell.

Field work will be scheduled depending on favourable weather conditions (low winds, light-moderate rain and avoiding very hot days or storms). Biologging devices cannot be applied to wet feathers as the tape used to attach devices (TesaTape) will not stick if they are wet.

The key elements of the monitoring program are outlined below. Breeding variables were selected as per Cannell (2004) and in accordance with the Standard Operating Procedure — Using artificial nest boxes to monitor little penguins (*Eudyptula minor*) (DBCA 2019).

7.2.2.1 Nest monitoring

Data recorded as part of each nest monitoring survey are as follows:

- date and time
- location
- nest ID
- number of adults (i.e. 0, 1, 2, unknown) present
  - identity of adults in nest boxes with PIT tags
- nest activity (loafing adult(s), with eggs/chicks, moulting, empty,, guano, nesting material, unknown)
- nest contents (in addition to adults, i.e. eggs: 0, 1, 2, unknown; chicks: 1, 2, unknown)
  - Identity of chicks in nest boxes with PIT tags; any unmarked chicks to be microchipped following methods described in DBCA (2019)
- nest condition – any obvious degrading of the burrows from the baseline state (in which case a habitat degradation report will be completed – see Section 7.2.2.2; Appendix B)
- nest contents photo (optional), or photos of obvious nest or rock wall degradation
- notes, including comments on any obvious nest or rock wall degradation.

A summary of the fortnightly monitoring will be provided to RPS within 7 days of the following month (see Appendix A), unless nest site degradation is noted (see Appendix B).

Presence of adults, eggs or chicks

Potential nest sites will be located and marked with a unique identification number. Nest contents will be determined using a torch or a burrowscope. However, it may not always be possible to observe adults, eggs or chicks even with a burrowscope since the entire nest cavity may not be observable within the rock wall. In such cases, any indications of nesting activity will be recorded, including the presence of fresh guano, nesting material, chick down, ants or fleas, penguin vocalisations and adult moult feathers.

It is not always possible to observe the number of eggs laid or the number of chicks. Therefore, the metric for each breeding attempt is a binary Yes/No outcome (that is, was at least one chick successfully raised). The month of egg-lay will be determined either by:

- estimating the age of an observed chick and subtracting 35 days (average length of incubation), or
- if chicks did not hatch, the month the eggs were first observed in the nest.

Nest sites with signs of recent activity or the direct observation of adults or chicks in the rock walls will continue to be monitored on a fortnightly basis. Information gathered from these surveys will provide information about habitat use during the breeding season and can be used to understand any possible changes in response to construction activity such as pile driving.

For example, if during construction there is abandonment in an area immediately adjacent to construction, but abandonments are not occurring in areas away from construction activity, this may indicate there has been an impact related to construction activities. Conversely, if breeding attempts remain stable during construction activities this is a strong indicator that birds are not impacted by the activity. Any change will be assessed by the seabird ecologist.

Timing of breeding, peak egg lay, breeding success

The timing of breeding, peak egg laying and breeding success is determined from the analysis of fortnightly monitoring of nest sites with signs of recent activity such as fresh faecal matter, nesting material or the direct observation of adults, eggs or age of chicks.

Body condition during breeding and the moult phase

Body condition is monitored for adults and chicks using the nest boxes which are confined to Area C and Area F. Body condition is generally a fair indication of health and can reflect prey abundance, prey location (paired with information from little penguin tracking) and other physiological stressors (Cannell et al. 2012; Cannell et al. 2016; DBCA 2019; Cannell et al. 2024).

Population index

At the end of each year (April), an annual monitoring report will be prepared, detailing the results of the long-term population monitoring. The estimated number of breeding adults will be used as an indicator of population size and will be derived from the number of nests with known and likely breeding activity, as each nest contains two adults. Note - the total population size cannot be estimated as the number of non-breeding adults (that is, individuals taking a sabbatical from breeding in any one year), immature and juvenile birds in the population is not known.

The population estimate will be compared to the minimum baseline of 156 breeding adults to confirm the little penguin population is not reduced below its baseline population size as a result of the Action (per Condition 10, DCCEEW 2025). If the little penguin population has declined below the baseline population size, the report will include an assessment of the potential underlying cause for the decline and provide recommended management measures to mitigate the little penguin population decline (Condition 12, DCCEEW 2025).

7.2.2.2 Nest integrity monitoring

A baseline condition assessment of the structural condition of little penguin nesting sites was completed by a suitably qualified engineer from GHD in June 2025 (GHD 2026). This assessment provided a dilapidation record to enable a comparison of pre-construction conditions (Section 6.3) with any observed changes made by the Seabird Ecology team during penguin monitoring activities.

Ongoing little penguin nesting habitat condition assessments will be completed by the seabird ecologist as part of the breeding population monitoring program. All current, historical or possible burrows will be visited each fortnight. Any obvious degrading of the burrows or changes to the rock wall from the baseline state will be documented, photos taken and changes will be reported to the Site Environment Officer (SEO) (verbally at the time of observation and in writing within 4 hours of observation) (Appendix B). Any flow-on effects to little penguin behaviour or breeding status will be recorded as part of the breeding population monitoring.

Where obvious nest degradation has occurred, an inspection of the surrounding area will be completed to determine whether it is an isolated case or whether degradation has occurred over a wider area. In the event that any portion of the rock wall is degraded or collapsed, the seabird ecologist will provide an update on the last known status of the burrow (empty, occupied, eggs or chicks present). The outcomes of the rock wall inspection will be captured within the report templates used for existing fortnightly nest inspections (Appendix A) or degradation report templates (Appendix B) and will be emailed through to the SEO to prompt further engineering inspections, in the event any degradation has occurred because of approved Action activities.

Additionally, an assessment of the potential cause (for example, vibration from construction, environmental factors) will be made by a seabird ecologist. Any degradation reports will be made available to the PMCA for review by a suitably qualified engineer appointed by the Project. A subsequent inspection by an engineer appointed by the suitably qualified professional may be conducted in the presence of a seabird ecologist to reassess the structural condition of the nesting sites and potential for any further change, in the event any degradation has occurred because of approved Action activities. The need for a further on-site inspection will be determined by the engineer and addressed in the CEMP. Any natural changes to rock wall habitat such as erosion during storms or tidal surges will be reported as per the above procedure but will not trigger an additional inspection by the engineer, nor will it be considered a reportable 'incident'.

Little penguin nesting habitat condition assessments by the seabird ecologist will conclude following the completion of construction. The engineer will complete a final inspection of the nesting habitat following completion to confirm no collapse or damage of little penguin nesting habitat arising from construction.

7.2.2.3 Triggers for adaptive management

If during the course of the routine nest monitoring, nest damage is observed, nests are abandoned or chicks are losing weight at levels above those observed during the baseline monitoring period, this will trigger use of the adaptive management procedure (Figure 7-1). The trigger levels have been set to allow for an early warning system to detect changes above baseline levels, that may be due to noise and vibration impacts arising from the onsite approved Action activities.

If the number of birds attempting to breed in a particular area is reduced during construction compared to baseline levels (that is, natural inter-annual changes in the baseline breeding data) and to other nesting areas on the island, this may indicate there has been a direct impact related to construction activities. Conversely, if breeding attempts remain stable during construction activities, this is a strong indicator that birds are not impacted by the activity (Cannell 2025b).

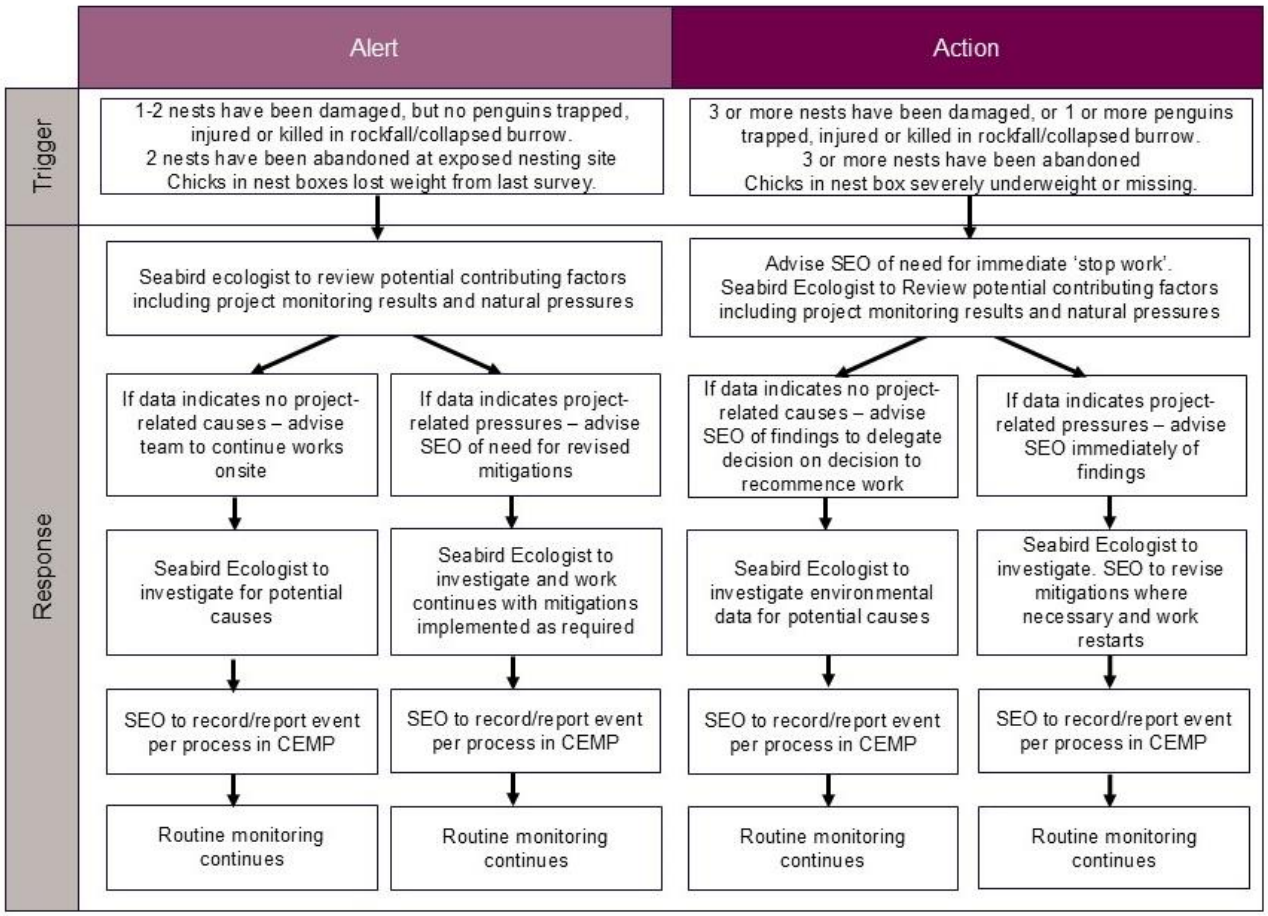


Figure 7-1 Breeding population monitoring triggers for adaptive management

Alert trigger exceedance

If the Alert trigger is initiated the seabird ecologist will review records of onsite activities that may have been occurring concurrently. If site data indicates that it is unlikely that the onsite activities have impacted the penguins, findings will be documented in a post-trigger inspection report, and an expert opinion about possible causes will be provided (Appendix D). Any notable changes to nest site integrity will be documented per Appendix B. Initial advice will be verbally communicated to the SEO immediately. Habitat degradation reports (Appendix B) and post-trigger inspection reports (Appendix D) will be provided to the SEO within 24-hours of the observation. During this time, routine monitoring and onsite activities will continue. Note that a review of environmental data (salinity, dissolved oxygen, sea temperature, turbidity and rainfall) that may explain potential contributing factors to breeding failure will be presented as part of the annual report.

If the data indicates approved Action-related pressures may have caused impacts to penguins, the SEO will be advised and onsite management controls and monitoring requirements reviewed by the SEO and seabird ecologist.

Action trigger exceedance

If the Action trigger is exceeded, the seabird ecologist will review records of onsite activities that may have been occurring concurrently. If site data indicates that it is unlikely that the onsite activities have impacted the penguins, findings will be documented in a post-trigger inspection report, and an expert opinion about possible causes provided (Appendix D). Any notable changes to nest site integrity will be documented per Appendix B. Initial advice will be verbally communicated to the SEO immediately. Habitat degradation reports (Appendix B) and post-trigger inspection reports (Appendix D) will be provided to the SEO within 24-hours of the observation. During this time, routine monitoring and onsite activities will continue. Note that a review of environmental data (salinity, dissolved oxygen, sea temperature, turbidity and rainfall) that may explain potential contributing factors to breeding failure will be presented as part of the annual report.

If the data indicates approved Action-related pressures may have caused impacts to penguins, the SEO will be advised to inform decision making about a ‘stop work’ procedure commencement. This will trigger a full review of site activities and potential need for further investigations (for example, structural integrity assessment) and review of noise and vibration management controls and monitoring requirements. During this time, routine monitoring will continue.

Population size change

To estimate the baseline size of the little penguin population, the number of breeding adults recorded across a single breeding season in Areas B–F was used as an index of population size. This estimate was derived from the number of known (confirmed) and likely active breeding pairs (indirect evidence of nesting), as each nest contains two adults, between 2021-2024 (Cannell 2025a). Each yearly estimate gained from the ongoing monitoring program will be compared with the baseline population size of 156–226 individuals (Cannell 2025a) to understand changes in the number of breeding pairs (as an index of population size). The baseline period provided a population estimate over four years. Any future estimates will be added to this baseline data to establish and understand the longer-term trend in population size.

In the event of the number of breeding adults being lower than the baseline estimate, a review of compliance records, environmental indicators and biologging data will occur to understand any potential factors that could explain a decline in breeding adults for that year. The revised annual estimates will be calculated at the end of each breeding season and presented in the annual monitoring report (approximately May-June). The results from the monitoring report will be used to inform the need for any revised management controls and monitoring requirements for remaining approved Action activities.

7.3 Environmental monitoring

7.3.1 Aims

Due to their small size and swimming mode of transport, little penguins are vulnerable to changes in environmental conditions (Berlincourt & Arnould 2015). Sea surface temperature (SST) has an important influence on foraging effort (Berlincourt & Arnould 2015) and breeding success (Cannell et al. 2012). Higher SSTs in the pre- to early-breeding period (April to May) have been shown to correspond with reduced

breeding success, including lower fledgling success, fewer chicks per pair and chicks typically having a lower mean mass at fledging (Cannell et al. 2012; Cannell et al. 2025).

During the breeding season, little penguins are restricted in the distance they can travel to find food (small schooling bait fishes) due to the need to return to the nest site to attend to eggs and chicks. Prey availability is a key factor influencing breeding success, the number of clutches per season and the body condition of both adults and chicks (also see Section 7.4.2.3). However, changes in environmental variables, including salinity, turbidity and rainfall, can be used as an indicator of potential effects on prey availability.

The specific aims of this study are to:

- assess the potential influence of environmental variables over time on little penguin breeding success
- separate any effects of natural pressures on breeding success and population size from potential pressures caused by the approved Action where possible.

7.3.2 Method

To assess the potential influence of environmental conditions and prey availability on breeding success and population size and to separate these from any effects that may be due to the approved Action, the influence of 5 environmental variables will be investigated. This data will be sourced from publicly available information via the DWER Water Information database and Bureau of Meteorology. These variables are:

- salinity (PSU)
- dissolved oxygen (mg/L)
- sea surface temperature (°C)
- turbidity (NTU)
- rainfall (mm).

Generalised linear models (GLM) will be used to determine the variables influencing breeding activity. Specifically, GLMs will be used to model the success or failure of eggs hatching or chicks fledging. The response variable will be the number of nests in which at least one egg hatched or the number of nests in which at least one chick was successfully raised.

Salinity, dissolved oxygen, sea temperature, turbidity, rainfall and area will be included as fixed effects in the models. The mean value of each of the environmental variables for the month the eggs are laid will be used in the models and the most influential variable(s) determined. The most parsimonious model will be used for the presentation of model coefficients and visual representation of variable effects.

To determine the influence of environmental variables on the proportion of eggs laid each month, a GLM will be used. The response variable will be the proportion of eggs laid in each month. Salinity, dissolved oxygen, sea temperature, turbidity, rainfall, and area will be included as fixed effects in the models. All analyses will be performed using multiple packages in ‘R’ programming language (R Core Team 2025) and presented in the annual monitoring report.

7.4 Behaviour monitoring

Little penguin behavioural monitoring will be undertaken to detect changes in behaviour during the approved Action works to inform adaptive management of onsite activities, as required to minimise and negate harm to little penguins. Behavioural monitoring will incorporate information gathered from the routine fortnightly surveys (see Section 7.2 for details), remote camera monitoring and tracking of little penguin foraging behaviour to understand any possible change in behaviour in response to construction activity or possible changes in prey availability.

7.4.1 Aims

The aims of little penguin behaviour monitoring are:

- provide advice to the acoustic consultant on the suitability of noise and vibration thresholds to protect little penguins

- provide advice to the acoustic consultant about suitable placement of noise and vibration monitoring stations in relation to penguin nesting sites
- participate in the design and implementation of the landside construction works noise and vibration adaptive management procedure to understand effects on little penguin behaviour in the nest, informing the need for additional onsite management controls and monitoring requirements as required
- detect, in a timely manner, any changes in burrow use and habitation that could indicate a significant increase in vigilance behaviours or nest abandonment
- assess the effect of noise and vibration on little penguin behaviour and nest structural integrity
- understand the movement patterns of little penguins at sea, compared with historical patterns, to allow for the detection of potential changes in behaviour that may be due to maritime construction activities
- provide evidence to demonstrate that EOs are achieved, and the approved Action has not caused harm to little penguins.

7.4.2 Methods

7.4.2.1 Support to noise and vibration monitoring program

The seabird ecologist and the GHD noise and vibration monitoring team have agreed on the placement of monitoring stations in relation to penguin nesting sites (Figure 7-2). Monitoring sites are needed to meet the needs of both the noise and vibration monitoring scope and penguin behaviour monitoring scope. Sites were selected based on the following criteria:

- proximity to landside construction noise and vibration producing works
- physical suitability of the site to safely mount the monitoring station without impeding little penguin ingress or egress from the colony
- closest point near to each nesting area and to the source of potential noise and vibration provides an early warning of noise and vibration levels that are representative of levels potentially received within the rest of the colony.

The seabird ecologist has provided input to noise and vibration thresholds and the development of the adaptive management procedure outlined in the CEMP (A4 Noise and Vibration Management Annexure, GHD 2026) and in accordance with Condition 8i, DCCEEW (2025).

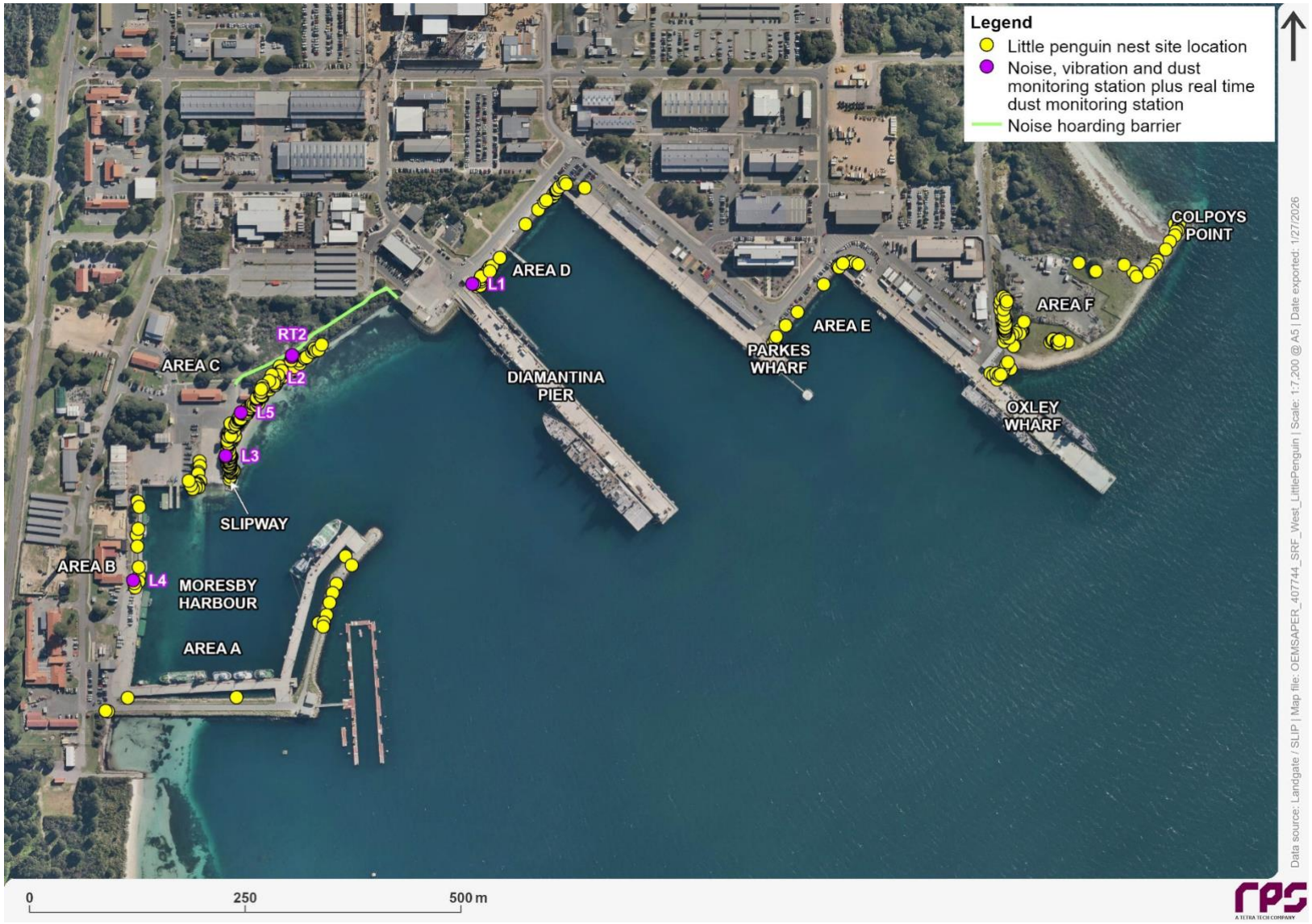


Figure 7-2 Location of noise, vibration and dust monitoring stations on Garden Island/*Meeandip*

7.4.2.2 Little penguin tracking

Prey availability is a key factor influencing breeding success, the number of clutches laid per season and the body condition of both adults and chicks (also see Section 7.4.2.3). Individuals may travel further away from their colonies and on longer foraging trips when prey is scarce (Weavers 1992; Cannell 2017; 2018; 2020; Collins et al. 1999; Chiaradia & Nisbet 2006).

In the absence of detailed data on prey abundance and limited fisheries data, there are limited options to directly quantify changes in prey availability. However, adult body condition (Section 7.2.2), environmental factors (Section 7.3.2) and biologging will be used to understand any changes in habitat use.

Biologging will be used to examine the movement patterns of penguins leaving from and returning to the island and any potential changes in behaviour during the maritime works period (Cannell 2022; 2024; 2025). While the project has committed to management controls and monitoring requirements that minimise harm to little penguins, including limited working hours to avoid overlap with the time penguins depart and return to their burrows (Section 3.3), biologging will provide an additional line of evidence to demonstrate that the little penguin EO is being achieved.

As little penguin nest sites within the rock walls have limited accessibility, only penguins within nest boxes located in Area C and F will be targeted for biologging, and only those that are > 1 kg (and at the discretion of the seabird ecologist based on the behaviour of the penguin at the time of potential tag deployment). Best attempts will be made to retrieve all devices. The number of biologging devices deployed in any one season will be dependent on the availability of the penguins at the appropriate life-history stages (such as late incubation and chick-guard phases). Only one penguin within a breeding pair will be fitted with a biologging device at any one time, but potentially penguins from multiple pairs could have devices deployed simultaneously.

Fine-scale movement patterns, including the core foraging habitat and home range, will be determined by monitoring the behaviour of tagged penguins, including:

- transit pathways, rafting and foraging areas
- departure and arrival times
- core area and home range.

Two biologging device types will be deployed on little penguins incubating eggs (satellite tags) or rearing chicks (3D-GPS tags). Satellite tags have a longer battery life than 3D GPS tags, which renders them more suitable for tracking studies during the incubation period. Satellite tags (Lotek K2G 154,74 mm * 21 mm * 11 mm, 18 g, Antenna angle 45°, duty cycle 2000–1500 UTC, repetition rate 35s) will be attached to penguins inhabiting the nestboxes during incubation. Satellite tags will cover one foraging trip per penguin (usually 3–5 days) whilst they incubate eggs (March–November). Data on penguin movement patterns will be collected by Argos, a global satellite-based location and data collection system. Argos Processing Centres calculate the position of the biologging devices based on information received from satellites and ground receiving stations. Data is uploaded to the Argos web platform at each satellite pass.

3D-GPS devices (Axy-Trek Marine, 26g, 56 x 23 x 12 mm) will be deployed on little penguins during the chick-guard period, covering at least one foraging trip (1–2 days per foraging trip). These devices provide high-resolution position accuracy at a much higher frequency rate compared with satellite devices. The GPS devices are archival and hence data is downloaded from the GPS upon retrieval of the tags. The 3D tags are deployed for a maximum of 3 foraging trips per penguin during the chick-rearing phase (May–January). The duration of the foraging period during the chick guard phase is shorter than the incubation period; thus, tags can be left attached for a greater number of foraging trips.

Provision for up to six satellite and six 3D-GPS devices has been made per annum. All data processing and statistical analyses of little penguin habitat use will be performed using ‘R’ language and presented as part of the annual monitoring report.

7.4.2.3 Camera monitoring

In addition to fortnightly breeding population monitoring, remote camera monitoring will be used as a leading indicator to detect changes in little penguin behaviour in response to noise and vibration resulting from the approved Action and support the implementation of adaptive management actions (per Condition 8 n, DCCEEW 2025), in order to prevent impacts at a population level. A series of trail cameras will be installed facing the nest entrances of a subset of little penguin nests within the colony prior to and during the

construction period to allow for remote inspection. These inspections will be used to detect potential changes from normal penguin movements in and out of the nests in relation to noise or vibration threshold exceedances during construction and inform necessary adaptive management responses on site to reduce noise and/or vibration to below threshold levels if needed. For full details of the noise and vibration monitoring, including selection of appropriate thresholds, see the CEMP, A4 Noise and Vibration Management Annexure (GHD 2025).

Careful consideration will be given to the camera mounting system to minimise any disturbance of nesting little penguins and to ensure they do not impede entry or exit from the burrow or modify normal behaviour. The cameras will be trained on the burrow entrances to record penguin movement in and out of the burrow as well as any other penguin behaviours near the nest entrance. The selection of burrows and installation of monitoring cameras will be undertaken by a seabird ecologist to ensure nests are representative of the colony and penguins are not disturbed during or after deployment.

The camera footage will be uploaded to a File Transfer Protocol (FTP) server and/or sent via email to allow remote analysis. A copy of all data will be stored on an SD card housed within the camera unit. The cameras will be powered with batteries and solar panels to reduce additional disturbance that could result from frequent camera servicing. For details on how camera footage will be used to inform adaptive management please refer to Section 7.4.3.

The following report sub-sections describe the little penguin monitoring and adaptive management as it relates to responsibilities of the seabird ecologists, in response to noise and vibration from construction activities. Noise and vibration from onsite activities have potential to affect the behaviour of penguins, while vibration also has potential to affect the stability of the nesting sites with potential flow-on effects to nesting success. Both elements are addressed in the monitoring program. The vibration and noise level monitoring program, including the noise and vibration thresholds to inform adaptive management onsite, is outlined in full in the CEMP (GHD 2026).

7.4.3 Adaptive management procedure

To support the camera monitoring program, an initial benchmarking of little penguin behaviour during a range of noise and vibration conditions will be conducted. This will begin once construction starts by reviewing camera footage and penguin behaviour under a range of ambient noise conditions (below the agreed noise and vibration thresholds) provided by the acoustic consultant, and quiet periods with no construction, to characterise their behaviour. Observations of little penguin departure and arrival timing, mate changeover, chick feeding events or other notable events will be documented to allow for a baseline characterisation of little penguin behaviour. This information will form the basis for comparison of penguin behaviour if the noise and vibration thresholds are reached. For example, if little penguins are observed displaying increased vigilance behaviour at the entrance to the burrow or exiting nests at times that differ to the baseline observations, this may indicate there has been an impact from the approved Action or some other natural pressure (e.g. predation event at the nest site).

A formal review of the noise thresholds will also be undertaken by the acoustic consultant following the commencement of SRF-West activities, once noise levels have exceeded 80 dBA LAeq(5min) on three occurrences (that is, i.e., noise levels approaching LAeq(5min) 85 dBA), to confirm the appropriateness and effectiveness of the adopted thresholds. This review will involve remote inspections of the camera footage by a seabird ecologist to determine if there is any observable change in penguin behaviour at this noise level. The review will be undertaken in consultation between the acoustic consultant and a seabird ecologist.

A further formal review of the thresholds by the acoustic consultant will be conducted after 6 months, incorporating findings from the little penguin monitoring program to determine whether any refinements to the noise thresholds or associated management controls and monitoring requirements are required.

A two-step adaptive management procedure will be used during landside construction works to ensure no unacceptable levels of noise and vibration will be received at the little penguin nesting sites and ensure the little penguin EO will be achieved. This procedure, presented in full in the CEMP, includes two response levels of ‘review’ and ‘stop work’ based upon agreed noise and vibration thresholds. This informs the need for additional noise and vibration management controls and monitoring requirements on site and to avoid harm to little penguins. The first step acts to review current noise and vibration conditions in relation to penguin behaviour through a ‘proceed with caution’ approach, while the second step includes a ‘stop work’ action to prevent harm. The procedure has been adopted from the CEMP, A4 Noise and Vibration Management Annexure and further detail to outline the role of the seabird ecologist is described below (Figure 7-3).

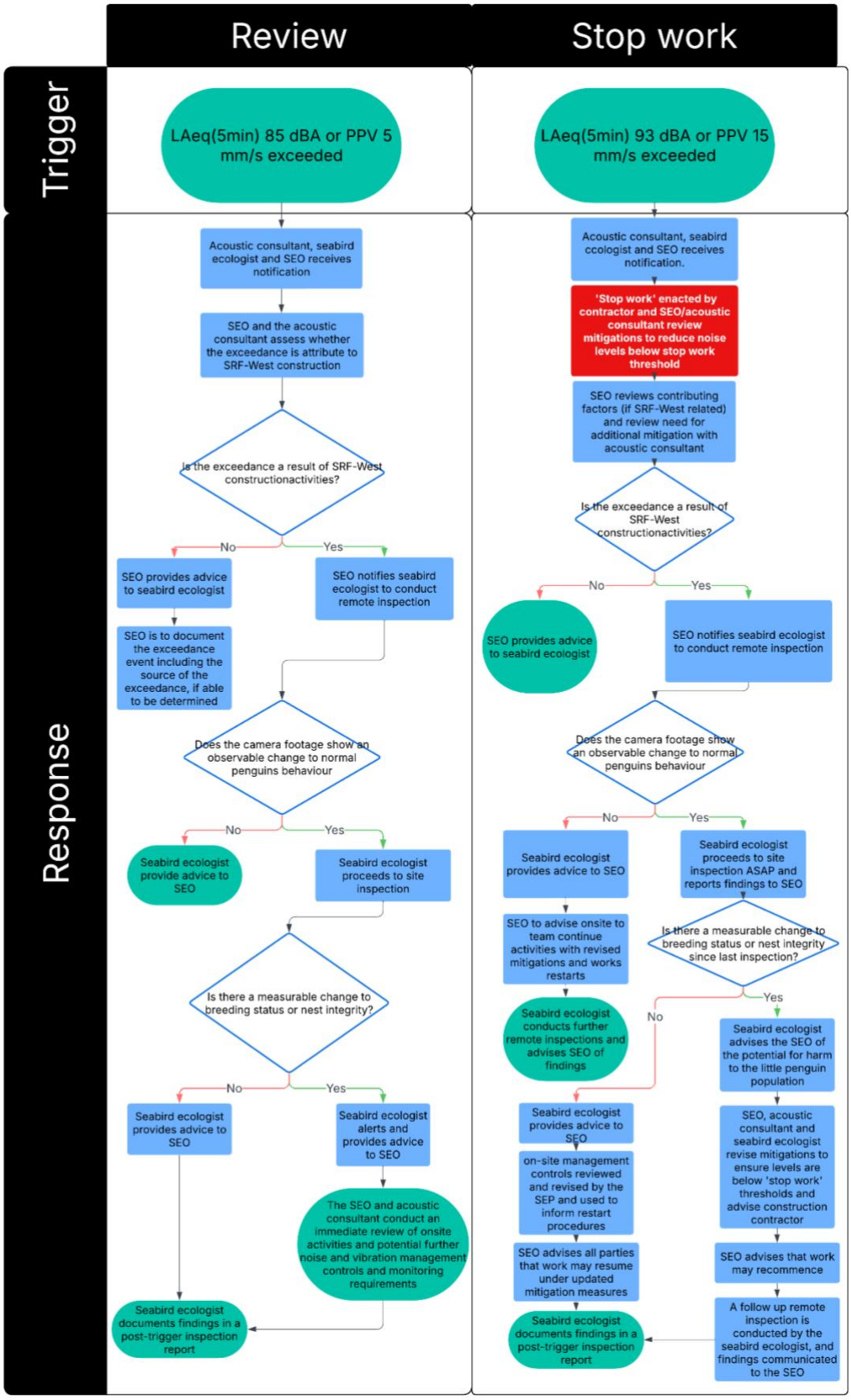


Figure 7-3 Role of the seabird ecologist in the adaptive management procedure for approved Action works (CEMP, A4 Noise and Vibration Management Annexure 2025)

Review threshold exceeded

In the event the 'review' threshold for noise and/or vibration is exceeded, the acoustic consultant and the SEO will review the contributing factors and determine if the noise/vibration levels have been exceeded due to SRF-West activities or other sources. This information and other relevant context will be provided to the seabird ecologist by the SEO while the activity continues. The seabird ecologist will be alerted by the SEO to consider the risk level to little penguins and will conduct a remote inspection by reviewing camera footage as soon as possible and at several biologically relevant intervals following the exceedance. For example, there will be a review of the footage at the time of the exceedance followed by reviews of all footage recorded at the entrance of nests during daylight hours and at the normal time of nest departure and/or return to the colony (i.e. within 60 minutes before sunset and at the determined normal times) to confirm normal behaviours are occurring (as determined in the baseline behavioural assessment). Remote monitoring will be reviewed as soon as possible and assessed for potential behavioural changes at the time of the exceedance and will be continued at regular intervals until 2.5 hours after the first observation of an adult at the nest. Note that changes in behaviour during these periods have the potential to compromise chick feeding rates, nest protection and ultimately influence breeding success.

If little penguin behaviour is deemed by the seabird ecologist to be normal (compared with the baseline behavioural assessment), ongoing review of camera footage will be undertaken for a period of up to 24 hours to confirm behaviour remains consistent with previously documented behaviours (i.e. departure behaviour, behaviour during daylight hours and arrival behaviour on the subsequent evening). If the imagery demonstrates that little penguins are not disturbed, this will be reported to the SEO and acoustic consultant. Findings will be documented in a post-trigger inspection report (Appendix D).

If the imagery demonstrates that little penguins are disturbed to the point of changing normal behaviour, the SEO will be alerted immediately. The SEO, acoustic consultant and seabird ecologist will conduct a review of onsite works and potential further noise and vibration management controls and monitoring requirements. The seabird ecologist will conduct an onsite inspection as soon as possible to record any measurable changes to breeding status and/or nest integrity. Findings will be documented in a post-trigger inspection report (Appendix D). These findings will be reported to the SEO as soon as possible. Follow up observations will be made as part of the fortnightly breeding population monitoring (Section 7.2).

Stop work threshold exceeded

In the event a 'stop work' threshold for noise and/or vibration is exceeded, a stop work will be enacted on-site by the Construction Contractor in consultation with the SEO and acoustic consultant. The acoustic consultant and SEO assess whether the exceedance is attributable to SRF-West construction. If so, the SEO will notify the seabird ecologist, and a remote inspection of the camera footage will be conducted by the seabird ecologist as soon as possible. If the camera footage shows no observable change in penguin behaviour this will be advised to the SEO. On-site management controls and monitoring requirements will be reviewed and revised as necessary, and the SEO will advise the seabird ecologist once work has restarted. The seabird ecologist will continue to remotely inspect camera footage at several biologically relevant intervals following the exceedance.

If the camera imagery demonstrates there has been a change to normal penguin behaviour, the seabird ecologist will alert the SEO to inform decision making about additional management controls and monitoring requirements, and the seabird ecologist will conduct a site inspection as soon as possible and report findings to the SEO. If this on-site inspection shows no measurable change in the breeding status or structural integrity of nests (as relevant) since the last inspection or routine monitoring event, the SEO will be advised. On-site management controls and monitoring requirements will be reviewed, revised and used to inform restart procedures. The SEO will advise the seabird ecologist once work has restarted.

If the onsite inspection shows measurable changes to breeding status and/or structural integrity of nests (as relevant) since the last inspection or monitoring event, this advice will be provided to the SEO to inform decisions about additional management controls and monitoring requirements by the onsite construction team. The seabird ecologist will be notified when work recommences. A follow-up remote inspection will be conducted, and findings will be communicated to the SEO.

Findings will be documented in a post-trigger inspection report (Appendix D).

8 QUALITY ASSURANCE AND QUALITY CONTROL

8.1 Equipment testing prior to deployment

All biologging devices will be bench tested with their respective remote download system prior to deployment to ensure correct functioning. GPS data will be plotted in the World Geodetic System 1984 (WGS84) coordinate system using latitude and longitudes.

8.2 Data reference

All biologging data files containing GPS location and habitat use (i.e. core foraging area and home range) data will be named in standard format (i.e. penguin ID_device ID_nest ID_date deployed). Each location or habitat grid-cell used will be identified with individual, date/time and latitude/longitude. GPS data is plotted in the WGS84 coordinate system using latitude and longitude.

All nest monitoring data files will be labelled in standard format (GI_Data_Year). Nest monitoring data will include each of the variables described in Section 7.2.2.2.

8.3 Survey log

The date, all nests/moult sites are checked and number of birds or nest contents encountered will be recorded using notebooks. The GPS position of any new nests will be determined using a hand-held GPS device. Additionally, any PIT tag numbers and/or biologging tag numbers will be recorded. This information is transferred to digital spread sheets and stored on secure data storage servers belonging to the University of Western Australia. Transcribed data will be double-checked to ensure there are no transcription errors. Field notebooks will be stored in a secure location when not in use.

Field trip summary reports will be provided to RPS within seven days of the following month, summarising field work outcomes at the completion of each trip (see Appendix A) (Section 9.3.3). Copies of the field trip summary report will be provided to the SEO following a quality assurance check by RPS.

8.4 Data analysis and post-processing

Little penguin behaviour monitoring and habitat use

Quality control of at-sea movement data will be conducted during the analysis phase using appropriate filters to remove erroneous location estimates. To account for location uncertainty and the irregular time series of Argos positions, a continuous-time, correlated random walk or randomised correlated walk state−space model in the R package foieGras will be used (Jonsen & Patterson 2020; Jonsen et al. 2020). Specifically, the model will be used to predict the most probable locations of little penguins.

Core habitat and home range will be determined by calculating the 50% (from GPS and satellite devices) and 95% (from satellite devices) kernel density areas respectively, using the Brownian Bridge kernel method which will be implemented in the function “kernelbb” of the R package “adehabitatHR” (Calenge 2006).

All data processing, statistical analyses and graphical displays will be performed using ‘R’ programming language (R Core Team 2025).

8.5 Chain of custody

All field data will be collated, formatted and visualised in a way that is fit for purpose to inform reporting and to demonstrate compliance with the Action conditions (DCCEEW 2025). All processed at-sea location and habitat-use data will be provided by the University of Western Australia in electronic form at time of report submission to RPS, along with metadata statement.

Per DCCEEW (2025), monitoring data, surveys, maps and other spatial and metadata required under the conditions of this approval will be prepared in accordance with the Guidelines for biological survey and mapped data (Commonwealth of Australia 2018) and Guide to providing maps and boundary data for EPBC Act projects (Commonwealth of Australia 2021) or as otherwise specified by the Minister in writing.

9 IMPLEMENTATION OF THE PLAN

The following events will trigger involvement of the seabird ecologist and may constitute an event:

- Little penguins found within Action area
- Little penguins found injured or sick
- Obvious behavioural disturbance of little penguins
- Obvious changes to structural integrity of nesting sites
- Deceased little penguins.

In each case, where this is noted by construction teams, Defence staff or the SEO, the Seabird Ecologist will receive a notification from the SEO. The seabird ecologist will conduct site inspections as needed to inspect damage (Appendix A, B) or move penguins (Appendix C). The SEO must arrange for veterinary care or assistance from an experienced wildlife carer for a little penguin found injured within the Action Area (Appendix C). The SEO will notify the seabird ecologist in the event an injured or dead penguin is found within the Action Area.

Where dead adults or chicks are observed during fortnightly monitoring and the cause of death is deemed to be due to natural causes (i.e. not related to approved Action activities), event reporting will not be completed by the seabird ecologist. However, all chick deaths will be included in fortnightly and quarterly reports. Event reports will be completed by the seabird ecologist for any dead adults or chicks found during an inspection triggered by a threshold exceedance in all circumstances.

9.1 Roles and responsibilities

The roles and responsibilities of key staff and contractors in relation to delivery and reporting of this plan are provided in Table 9-1 below.

Table 9-1 Roles and responsibilities for implementation of the Little Penguin Monitoring and Management Plan

Role	Responsibility	Organisation
Site Environment Officer (SEO)	• Full list of responsibilities is included in the CEMP. • Receive advice from the seabird ecologist regarding incidents, events and adaptive management actions that need to be implemented. • Inform the seabird ecologist about any records of little penguins that appear to be harmed by the Action, to inform ongoing monitoring and population assessment efforts.	PMCA
Suitably qualified seabird conservation ecologists (seabird ecologist)	• Prepare a report that establishes the baseline population of little penguins, detailing how it was derived from relevant historical population data and why it is suitable for comparison to data collected after commencement of the Action. • Design, coordinate and oversee little penguin monitoring plan that: – effectively tracks the little penguin population – identifies the location of all little penguin nesting sites in use within the Action area – is undertaken at regular intervals. • Ensure that all little penguin monitoring data is prepared in accordance with the Guidelines for biological survey and mapped data, (Commonwealth of Australia 2018) and the Guide to providing maps and boundary data for EPBC Act projects (Commonwealth of Australia 2021). • Record and provide all little penguin monitoring data to the SEO when requested to enable the approval holder to meet reporting requirements, including any records of penguins that appear to have been harmed as a result of the Action. • Develop and use reporting templates that meet reporting requirements, in consultation with the SEO.	RPS/UWA

Role	Responsibility	Organisation
	• Provide all fauna sightings obtained during little penguin monitoring to the SEO for the purpose of uploading (at least annually) to the Atlas of Living Australia or the relevant state biodiversity database. • Support the identification of all little penguin nesting sites within 50m of the Action area to be clearly signed and demarcated. • Ensure the plan is ready for publication on the project website within 15 business days prior to implementation and available for submission to the Department if requested. • Provide advice to Defence about the need to redact or remove any sensitive biodiversity data prior to publication on the website. • Provide advice about use of silt curtains during dredging at Armament Wharf, as requested by the SEO. • Provide advice about the placement of dredging pipelines to avoid harm to little penguins, as requested by the SEO. • Provide advice about baseline condition of little penguin nesting sites prior to construction commencing, as requested by the SEO. • Support development of a noise and vibration monitoring program, including appropriate noise and vibration thresholds and location of monitoring stations in relation to penguin nesting sites, in collaboration with the acoustic consultant. • Provide advice about schedule and timing of construction activities to avoid and minimise harm to little penguins, as requested by the SEO. • Respond to requests for advice during noise and vibration monitoring in response to alert and stop work thresholds being reached. • Provide assistance during events where little penguins may be found injured or deceased during the approved Action works. • Respond to requests for assistance for distressed, hurt or deceased little penguins as per attached procedures. • Maintain and provide to SEO all compliance records in relation to implementation of this plan.	
Suitably qualified acoustic expert (referred to in this annexure as 'acoustic consultant')	• Implement the Noise and Vibration Monitoring Program in accordance with the CEMP A4 Noise and Vibration Management Annexure. • Establish the terrestrial noise and vibration thresholds in consultation with a suitably qualified seabird conservation ecologist, allowing for revisions. • Advise the SEO and Construction Contractor on management controls and monitoring requirement options when noise and/or vibration thresholds are exceeded. • Manage and maintain the noise and vibration monitoring system for the duration of construction works, including daily charts, monthly reports and biannual review of the noise and vibration thresholds.	GHD
Qualified marine fauna observer	• Monitor safety zones during maritime works and trigger shutdowns if marine fauna is observed within the shutdown zone or is about to enter the shutdown zone (not required for the early works activities).	Contractor

9.2 Training

This plan will be provided to all RPS and UWA staff engaging in onsite activities and reporting to ensure compliance against the requirements is achieved. All personnel attending site and needing to enter the construction zone will complete the requisite level of training and induction commensurate with their role, as outlined in the CEMP.

9.3 Reporting

9.3.1 Incident reporting

An incident involving little penguins means any:

- event which has the potential to, or does, **harm** to little penguins, which includes, but is not limited to:

  - vessel strikes
  - leaks and spills of any substance that can cause **harm** to **little penguins**
  - exceedance of the **noise threshold level** at **little penguin nesting sites**
  - exceedance of the **vibration threshold level** at **little penguin nesting sites**
  - a decline in the **little penguin population** at **Garden Island/*Meeandip*** below the **baseline population** or a declining population trend that has the potential to decrease the **little penguin population** at **Garden Island/*Meeandip*** below the **baseline population**.
- potential non-compliance with these conditions, including the administrative requirements
- actual non-compliance with these conditions, including the administrative requirements
- potential non-compliance with one or more commitments made in a **plan**, and/or
- actual non-compliance with one or more commitments made in a **plan** (DCCEEW 2025).

The need for incident reporting in relation to the little penguin will be determined by the seabird ecologist in consultation with the acoustic consultant and the SEO (see CEMP – Section 7, GHD 2026). Incident reporting will be as per the CEMP requirements. Changes to the baseline population will be reported in the annual report.

9.3.2 Compliance reporting

Compliance reporting against Condition requirements is addressed in the CEMP. All records pertaining to little penguin monitoring events, findings and advice provided to the SEO will be retained and provided to the SEO to support compliance reporting.

9.3.3 Little penguin monitoring reporting and schedule

The following reports will be produced from the various forms of little penguin monitoring:

- **Inspection reports** will be produced following a remote or site inspection by the seabird ecologist in response to a noise or vibration threshold exceedance. These reports will be in the form of an email and will be sent to the SEO. They will summarise the key findings of the inspection in terms of observed or measurable changes in little penguin behaviour, breeding status and/or nest integrity.
- **Field reports** will be in the form of the reporting template in Appendix A and provided for each fortnightly survey within seven days of the following month. These reports will summarise the results of the fortnightly monitoring and include any significant observations or notable events, including changes in little penguin behaviour and predation events, or changes to habitat (24 reports annually).
  - 2 field reports due via email within the first week of the following month from May 2025 to April 2028.
- **Quarterly reports** are brief reports provided to the SEO summarising any significant observations, notable events in relation to approved Action activity timing, highlighting any potential issues such as abandoned eggs/chicks near the construction areas (Areas B, C and D) compared to other sites further away, significant weather or climatic events, or changes in little penguin behaviour. Reports will include commentary on nest integrity (such as any notable changes in sea wall integrity, rock slippage etc) and limitations and other contributing factors that may influence interpretation of results (including any possible changes related to construction). Population estimates are excluded from the quarterly report, but any events that may affect population change or viability are to be described. Any recommendations for improvement of the monitoring program should be identified prior to the commencement of the next year of monitoring. Includes 2 rounds of review with 4 reports produced annually.
    - Draft quarterly reports due within 15 working days following completion of the last monitoring event for the quarter.
    - Updated quarterly report due within 15 working days following provision of comments from RPS.
- **Annual reports** detailing data collection and analysis methods, survey effort, results and discussion. Report is to provide information about the current condition of the little penguin population and

contextualise monitoring results with historical data. The discussion will include interpretation of results, including against historical data. Specific inclusions:

- little penguin activity (presence of faecal matter, nesting material, feathers or birds)
- breeding activity including maps that identifying the locations of all active nests
- graphical displays showing number of breeding attempts, number of clutches (successful and unsuccessful), proportion of successful clutches
- graphical displays to compare current breeding results with historical averages and interpretation of change
- presentation of modelling results investigating the influence of 5 environmental variables (salinity, dissolved oxygen, sea temperature, turbidity and rainfall) on the breeding performance of the penguins
- moulting activity, including maps that identify the locations of all active moult sites
- movement behaviour, including detail of all tagged individuals, mapping including home range and core range, tag ID and type, breeding stage, deployment date, trip duration and breeding status (egg incubation, hatching, chick fledging) from each nest site
- population status assessment, based on nest site data and any observed changes in the population. Breeding numbers will be used as an indicator of population size and compared with previous years. Discussion will include whether any changes in population size during the SRF-West construction period are within the natural range of variability or potentially influenced by construction activity
- timing of construction activities, whether any changes in behaviour during the SRF-West construction period were potentially influenced by construction activity (such as underwater noise from piling activities) or commentary on sufficiency of management controls and monitoring requirements
- the report will include assumptions, limitations and other contributing factors that influence the interpretation of results
- draft annual reports due to RPS seabird ecology team from UWA within 40 working days following the final annual survey. Draft annual reports will be provided to the SEO for review within 10 working days thereafter.
- updated annual reports due to RPS seabird ecology team from UWA within 15 working days following provision of comments.
- The final report will be provided to the SEO and RPS PMCA on completion.

9.4 Record keeping

The following records, outlined in Table 9-2 below, must be maintained by all staff with responsibilities outlined in this Plan and supplied to the SEO to ensure compliance with the conditions can be demonstrated. All records should be supplied annually as a minimum.

Table 9-2 Record types and formats required to demonstrate compliance with approved Action conditions of approval

Record type	Description	Format
Data	• All monitoring data arising from ongoing population monitoring • Fauna sightings	• Excel spreadsheets • Tracking data and band numbers • Metadata • Results of Quality Assurance/Quality Control procedures • Photographs and video footage (subject to Defence approval) • Maps including locations of nest sites

Record type	Description	Format
Communications	• All project communications	• Written records of conversations with government officials • Written records of advice provided in relation to meeting Condition requirements • Written records of site visits and any advice provided • Meeting minutes • Emails to and from Defence and other project team members
Reports	• All project reports	• Inspection reports – word documents • Monthly (Appendix A) and annual reports - word documents • Event (Appendix C) and habitat degradation (Appendix B) forms – word documents • Post-trigger inspection (Appendix D) report – word document • Environmental incident reporting (Appendix F in the CEMP [GHD 2026]).

Per DCCEEW (2025), any monitoring data, surveys, maps and other spatial and metadata required under the conditions of this approval are to be prepared in accordance with the *Guidelines for biological survey and mapped data* (Commonwealth of Australia 2018) and *Guide to providing maps and boundary data for EPBC Act projects* (Commonwealth of Australia 2021) or as otherwise specified by the Minister in writing.

The approval holder must submit all monitoring data, surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 20 business days following the end of each ACR period, except where otherwise specified in a plan.

All fauna sightings recorded during the specified monitoring activities related to this Action will be uploaded, at least annually, to the Atlas of Living Australia or the relevant state biodiversity database (DCCEEW 2025).

10 PLAN IMPROVEMENT AND REVIEW

This plan will be reviewed throughout the construction period and on an annual basis by the RPS and UWA seabird ecologists delivering the monitoring program (described in Section 7.1.2) to:

- ensure the environmental outcome is achieved
- assess the ongoing requirements for monitoring and management measures including the need for changes to adaptive management measures as needed to avoid and minimise harm to little penguins
- ensure all record keeping, reporting and submission of monitoring data and fauna sightings are delivered as per the requirements of the monitoring plan and approved Action conditions of approval.

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Appendix A
Fortnightly little penguin monitoring reporting

LITTLE PENGUIN NEST MONITORING FIELD REPORT

Submarine Rotational Force-West, Priority Infrastructure Works

Prepared by Dr Belinda Cannell, University of Western Australia

Monitoring Date		Reporting Date	

Area A (Moresby Harbour, eastern and southern wharves)			
Total number of burrows checked[1]			
Total active nests			
Nests with at least one adult			
Nests with at least one egg			
Nests with at least one chick			
Nests with dead chick/s		Nests with abandoned egg/s	
Burrows with activity but no confirmed nesting[2]			
Number of recaptures (nest boxes only)		Number microchipped	
Number of moulting birds		Number of moulting sites[3]	
Little penguin habitat inspection[4]			
Observations/additional work			

Areas B and C (Moresby Wharf, Main Colony)			
Total number of burrows checked[1]			
Total active nests			
Nests with at least one adult			
Nests with at least one egg			
Nests with at least one chick			
Nests with dead chick/s		Nests with abandoned egg/s	
Burrows with activity but no confirmed nesting[2]			
Number of recaptures (nest boxes only)		Number microchipped	
Number of moulting birds		Number of moulting sites[3]	
Little penguin habitat inspection[4]			
Observations/additional work			

Areas D to E (Diamantina Pier to Oxley Wharf)			
Total number of burrows checked[1]			
Total active nests			
Nests with at least one adult			
Nests with at least one egg			
Nests with at least one chick			
Nests with dead chicks		Nests with abandoned eggs	
Burrows with activity but no confirmed nesting[2]			
Number of recaptures (nest boxes only)		Number microchipped	
Number of moulting birds		Number of moulting sites[3]	
Little penguin habitat inspection[4]			
Observations/additional work			

Area F (Colpoys Point)			
Total number of burrows checked[1]			
Total active nests			
Nests with at least one adult			
Nests with at least one egg			
Nests with at least one chick			
Nests with dead chicks		Nests with abandoned eggs	
Burrows with activity but no confirmed nesting[2]			
Number of moulting birds		Number of moulting sites[3]	
Little penguin habitat inspection[4]			
Observations/additional work			

[1] Burrow refers to sea wall cavities, nest boxes and/or shrubbery used by penguins for breeding and/or moulting.
[2] Signs of activity refers to the presence of fresh faeces, feathers and/or nesting material.
[3] Moulting site refers to burrows where moulted feathers and/or moulting individuals were present.
[4] Status of rock wall to be documented, i.e. no obvious change or notable change (per Garden Island Little Penguin Monitoring Plan)

General comments:

NOTE: It is not always possible to identify contents of a nest site from one monitoring session to the next. As such, changes in numbers between monitoring dates do not necessarily reflect the true state. Additionally, due to the asynchronous breeding of the penguins, with penguins laying eggs any time from March/April to November, it is not possible to determine the success of a breeding season until the season has completed, i.e. approx. 13 weeks after the last clutch was laid. This further means that the overall success of the breeding season cannot be compared between years until the season is completed, and the raw data has been analysed.

Appendix B
Habitat degradation reporting

GARDEN ISLAND LITTLE PENGUIN HABITAT DEGRADATION PROCEDURE

Submarine Rotational Force-West, Priority Infrastructure Works

Purpose

The purpose of this form is to record any observations of little penguin habitat change and any potential impacts of habitat change to little penguins and to understand why that might have occurred.

Observations of any change to little penguin nesting habitat are the responsibility of the seabird ecologist and will be made during the fortnightly monitoring of the Careening Bay penguin colony (Areas C and D only). Any obvious degradation of little penguin nests or changes to the rock wall from the baseline state will be documented, photos taken and changes reported to the SEO (verbally within 4 hours of observation and in writing within 24 hours of observation).

This form is only required in the instance that observable changes are recorded during the survey. Where the status of habitat remains unchanged, comments to that effect will be provided on the fortnightly little penguin monitoring report template (Appendix A).

Instructions

- The SEO must be immediately notified of any habitat change and any potential impacts to little penguins.
- Complete one Little Penguin Habitat Change form using the table at the end of this document, when there is a notable change in habitat.
- The completed form is to be emailed to the SEO within 24 hours of identification of the change. Please include all relevant and clearly labelled digital images to support the observation. Identify which area of the colony the degradation has occurred in as well as the last known status of any affected burrows and complete an assessment of the potential cause (e.g. vibration from construction, environmental factors).
- Death and injury of any fauna as a result of the Action must be notified to the SEO who will contact the Department of Defence (Directorate of Environmental Planning, Assessment and Compliance), who may send a Notification to the DCCEEW.

Little Penguin Habitat Degradation Form

Name of Observer/s:			
Position:		**Contact No.:**	

Monitoring Date		Reporting Date	
Location (e.g. A to F)			
GPS location of impacted nests (nest 1)			
GPS location of impacted nests (nest 2)			
GPS location of impacted nests (nest 3)			
GPS location of impacted nests (nest 4)			
Observations			
Number of confirmed or potential burrows affected			
Number of penguins (adults, chicks, eggs) impacted (if known)			
Potential cause of degradation			
Additional comments			
Action taken			
Number of photos taken and file names			

Appendix C
Little penguin event reporting

LITTLE PENGUIN EVENT PROCEDURE

Submarine Rotational Force-West, Priority Infrastructure Works

Purpose

The purpose of this procedure is to record any events where injured, disorientated or deceased little penguins are observed by the seabird ecologist and to meet incident reporting obligations. This information will aid in understanding why the event has occurred and if additional management controls and monitoring requirements need to be implemented to ensure that the environmental outcome will be achieved. The information may also be used for 'Environmental incident and non-conformance reporting, as defined in the CEMP (Section 7 – GHD 2026).

Scope

This procedure covers events involving dead, injured or disorientated little penguins found within the Action area and as defined in Section 9 of this monitoring plan.

Responsibilities

The seabird ecologist is to report any observations of dead, injured or disorientated penguins within the Action area to the SEO immediately, where mortality is potentially related to approved Action activities. In accordance with Section 9, where dead adults or chicks are observed during fortnightly monitoring and the cause of death is deemed to be due to natural causes (i.e. not related to approved Action activities), event reporting will not be completed. However, all adult or chick deaths will be included in fortnightly and quarterly reports. Event reports will be completed by the seabird ecologist for any dead adults or chicks found during an inspection triggered by a threshold exceedance in all circumstances.

Instructions

- If a little penguin is found injured or killed within the Action area, the seabird ecologist will immediately contact the SEO to initiate a stop works procedure.
- If an injured little penguin is found within the Action area, the SEO must arrange for veterinary care, with guidance from an experienced seabird ecologist.
- seabird ecologist to complete one 'Little Penguin Event Form' using the table below, when an injured, disorientated or deceased little penguin is observed. The seabird ecologist will return the 'Little Penguin Event Form' within 24 hours of the observation.
- Include all relevant and clearly labelled digital images to support the observation. Identify the location of the site (GPS location), time of observation, status of the bird (injured, disoriented, deceased), outcome and any other relevant information.
- The SEO must investigate all reported accidents/injuries and ensure corrective action is taken to prevent recurrence.
- The SEO will contact the Department of Defence (Directorate of Environmental Planning, Assessment and Compliance) in the instance an injured or killed little penguin is found, who may send a notification to DCCEEW.

Little Penguin Event Form

Name of Observer/s:			
Position:		**Contact No.:**	

Observation (seabird ecologist to complete)	
Date	
Time	
GPS location	
Area (e.g. CIF, Moresby Harbour, Diamantina Pier)	
Ambient light levels (e.g. daytime, nighttime, dusk, dawn)	
Number of affected birds sighted	
Bird ID if possible (please take photos)	
Bird behaviour (e.g. injured, disoriented, deceased etc.)	
Fate of bird (e.g. bird moved on, rescued and placed in quiet place in box and taken into care, deceased)	
If taken into care, provide details	
If deceased and stored, provide details of storage	
Number of photos taken and file names	
ACTION: Action taken in relation to the construction activity (e.g. stop work, no construction at the time of observation)	
Review (SEO to complete)	
PREVENTION: Have all preventative actions been reviewed by the SEO and implemented? Provide detail (if relevant)	
Date and time seabird ecologist contacted	
seabird ecologist name and advice provided	

Appendix D
Post-trigger inspection reporting

GARDEN ISLAND LITTLE PENGUIN POST-TRIGGER REPORTING PROCEDURE

Submarine Rotational Force-West, Priority Infrastructure Works

Purpose

The CEMP (GHD 2026) requires that in the event of an exceedance of noise or vibration threshold levels, an approved seabird ecologist will inspect known active nests in the area to determine any impacts to the little penguin nesting population on Garden Island. Following the inspection, the seabird ecologist will provide expert advice on likely causes and recommendations for management responses. This will guide ongoing management of the approved Action works and advise when a 'stop work' order can be revoked.

The purpose of this report is to record observations of little penguin behaviour, injured or deceased penguins, abandoned or damaged nests, from the inspection following a 'review' or 'stop work' trigger exceedance for noise or vibration during approved Action construction. This will assist in understanding any potential impacts to the colony, related to approved Action activities. The report also captures recommendations for immediate actions to reduce risk to the little penguin population, and advice on potential management controls and monitoring requirements that may be required longer term to avoid ongoing impacts.

The observations and recommendations are the responsibility of the seabird ecologist as described in Section 9.2 of the *Little Penguin Monitoring and Adaptive Management Plan* (RPS 2025) and defined by DCCEEW in the approved Action Conditions of Approval.

Instructions

- In the event a 'review' trigger necessitates an onsite inspection, or a 'stop work' is triggered, the seabird ecologist will undertake a site visit to assess whether approved Action activities have led to a measurable change of little penguin breeding status or nesting activity.
- The outcomes of the inspection and the seabird ecologist expert opinion in relation to management controls and monitoring requirements of any observed changes in penguin nesting or nest integrity will be recorded in this report.
- The SEO must be immediately notified of the outcomes of the post-trigger inspection.
- The SEO must investigate all reported triggers and ensure corrective action is taken to prevent recurrence.
- Best endeavours will be undertaken to send the completed report to the SEO within 24 working hours of the inspection occurring.

In addition to this Post Trigger Inspection Report, a Little Penguin Event Report will be completed by the seabird ecologist for any dead adult or little penguin chicks found during a trigger inspection.

Little Penguin Post-Trigger Inspection Report

Report prepared by:			
Reporting date:		**Contact No.:**	

Observation	
Date	
Time	
Area of inspection (i.e. Area A–Area F)	
Cameras or nests checked	

Background

Provide detail of trigger – location, time, noise or vibration trigger, actions taken, remote camera inspection and findings etc.

Inspection Findings

Expert Opinion

Australian Government
Defence

SRF-W Priority Infrastructure Works
Construction Environmental Management Plan Version 2

A6

Maritime Trial Piling Exercise Management Annexure



Defending Australia and its national interests in order to advance Australia's security and prosperity
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A6 Maritime Trial Piling Exercise Management Annexure

Project name		SRF-West Priority Infrastructure Works | Construction Environmental Management Plan						
Document title		A6 Maritime Trial Piling Exercise Management Annexure						
Status Code	Revision	Author	Reviewer			Approved for issue		
			Name	Signature	Date	Name	Signature	Date
S4	0	B. Galbraith T. Forgie C. Witte L. Allsopp	K. Clulow	On file	19/02/2026	S. Orr	On File	19/02/2026

Table 1 Change register

	Change register		
Version	Revision	Date	Reason for revision
1	Rev 0	20/02/2026	Issue for publication

1. Objectives

The primary objective of this Maritime Trial Piling Exercise Management Annexure is to implement controls and procedures during the completion of the trial piling exercise at the Armament Wharf, required by Condition 8r of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2024/10031, which is required to enable piling activities as part of the maritime works to commence. The maritime trial piling exercise is necessary to validate modelled noise predictions, evaluate efficacy of noise mitigation measures and re-evaluate safety zone dimensions to prevent harm from noise to marine fauna.

This annexure supports the Construction Environmental Management Plan (CEMP), which fulfils a requirement under EPBC Act approval 2024/10031, and as identified by the environmental risk assessment (refer to section 10.2 of the CEMP) to mitigate impacts to specific environmental and heritage values of the Action area. The specific approval conditions relevant to this annexure and how they have been addressed are detailed in Section 3.

The requirements outlined in this annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to the completion of a trial piling exercise prior to the commencement of maritime works. This annexure covers requirements applicable to the trial piling exercise only and does not address all maritime activities or conditions of approval. Table 2 summarises how each relevant condition has been addressed in this annexure.

This annexure provides instruction and guidance to inform all personnel involved in the trial piling exercise, including the Construction Contractor, of the obligations with regards to daily prestart, soft-start, shut-down and low visibility conditions. These requirements are to be implemented with guidance from suitably qualified marine fauna observers (MFO).

Appendix A includes details of the trial piling exercise.

The CEMP defines terms used and activities managed by this annexure. The CEMP must be referred to for additional context, including:

– approved Action details including document control, the EPBC Act Action and person accepting responsibility for the CEMP and all associated annexures, including this annexure
– approved Action description
– emergency contacts, procedures, and specific exemptions that may apply
– potential environmental risks and impacts of the approved Action
– auditing and review requirements
– glossary
– references.

This annexure must be read in conjunction with the CEMP and all other annexures.

A physical copy of this annexure will be on-site for use should an incident occur.

2. Reference documents

This annexure has been prepared in accordance with the following regulations and guidance documents.

Commonwealth:

– *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

- Environment Protection and Biodiversity Conservation Regulations 2025 (Commonwealth)
- *Biosecurity Act 2015* (Commonwealth)
- Biosecurity Regulations 2016 (Commonwealth)
- National Light Pollution Guidelines for Wildlife 2023, Department of Climate Change, Energy, the Environment and Water (DCCEEW)
- Environmental Management Plan Guidelines 2024, DCCEEW
- Survey Guidelines for Australia's Threatened Mammals 2011, Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)

Department (Defence):

- Department of Defence (2019) Environment and Heritage Manual
- HMAS Stirling Oil Spill Contingency Manual (OSCM) (Royal Australian Navy, 2026)
- HMAS Stirling Base Instruction relating to biosecurity matters

The following documents should be consulted for additional context and details on the requirements outlined in this Maritime Trial Piling Exercise Management Annexure where required:

- Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (U.S. National Oceanic and Atmospheric Administration, 2024)
- Underwater Piling and Dredging Noise Guidelines (Government of South Australia, 2023)
- AS 2159-2009 Piling – Design and Installation (Standards Australia, 2009)
- Guidelines for minimising the risk of injury to marine mammals from geophyiscal surveys (seismic survey guidelines. (Joint Nature Conservation Committee (JNCC), 2017)
- Protocol for minimising risk of injury to marine mammals from piling noise (Joint Nature Conservation Committee (JNCC), 2010)
- Maritime trial piling exercise and Syngnathid technical memorandum (GHD, 2026c) (Appendix B)
- Syngnathid Management Plan (GHD, 2026b)

The Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD,2026c) (Appendix B) draws from the Syngnathid Management Plan (GHD, 2026b) and sets out a strategy to minimise harm to Syngnathids for the limited purpose of the maritime trial piling exercise. The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on harm minimisation and translocation of Syngnathids for future maritime activities associated with the approved Action.

3. Conditions of approval

The requirements outlined in this annexure have been prepared to address the relevant conditions of approval under EPBC Act approval 2024/10031 relating to the trial piling exercise, which is required to be completed prior to the commencement of maritime works. All other activities approved by EPBC Act approval 2024/10031 within the Armament Wharf Action area do not form part of this CEMP Table 2 summarises how conditions have been addressed in this Annexure.

Table 2 Conditions of Approval relevant for this annexure and how they are addressed

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
EPBC Act approval 2024/10031			
Clearing limits			
1c	*The approval holder must not:* *c) Harm protected matters within avoidance areas*	The Contractor shall not access the rainbow bee-eater avoidance area at any time during the landside activities supporting the trail piling exercise.	Section 7.1 of this annexure.
2b	*The approval holder must not clear more than:* *b) 1.00 ha of seagrass within the seagrass disturbance area*	No seagrass clearing is required for the trial piling exercise. Requirement in this annexure that there is no seagrass clearing during the trial piling exercise.	Section 7.1 of this annexure.
Injury avoidance and veterinary care			
4	*From the commencement of the Action until the completion of the Action, the approval holder must arrange for veterinary care or assistance from an experienced wildlife carer for any native terrestrial or marine animal found injured within the Action area.*	Rescue plan protocols outlined in the Flora and Fauna Management Annexure (Annexure A1) state the process for seeking veterinary care for any terrestrial fauna found injured within the Action area. Rescue plan protocols outlined in Appendix C of this annexure state the process to be followed should marine fauna be found injured within the Action area.	Appendix B of the Flora and Fauna Management Annexure (Annexure A1). Appendix C of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). Appendix C of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
5	*The approval holder must ensure that, from the commencement of the Action until completion of construction, if any little penguin, Perth slider or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4) and in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)	Section 6.3, Section 9.2, Appendix A and Appendix B of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f).
Terrestrial noise and vibration			
8i	*The CEMP must include a noise and vibration monitoring program, prepared by a suitably qualified acoustic expert in consultation with a suitably qualified seabird conservation ecologist. The noise and vibration monitoring program must:* *(i) Specify terrestrial noise threshold levels (dB) and vibration threshold levels (mm/s) that will not be exceeded at any little penguin nesting sites during construction to avoid harm to little penguins and little penguin nesting sites, including the methodology relied on to establish these acoustic parameters. Vibration threshold levels and noise threshold levels must be specified for each of the following periods to reflect their different sensitivities (i) little penguin arrival period, (ii) little penguin departure period, (iii) little penguin day-time period and (iv) little penguin night-time period.* *(ii) The noise and vibration monitoring program must specify how noise and vibration levels generated by the Action during construction will be continuously monitored in order to detect any exceedance of the acoustic parameters that may harm little penguins.* *(iii) The noise and vibration monitoring program must be capable of detecting any exceedance of the terrestrial noise threshold level or vibration threshold level at the little penguin nesting sites.* *(iv) The noise and vibration monitoring program must trigger implementation of a stop works procedure if a noise threshold level or vibration threshold level is exceeded.*	The trial piling exercise will not be undertaken near the little penguins or little penguin nests. Terrestrial noise and vibration will not be undertaken for the trial piling exercise and the thresholds in the Noise and Vibration Annexure (Annexure A4) will not apply.	Not applicable
8k	*The CEMP must specify that maritime works in the Careening Bay Action Area only occur during the period commencing 30 minutes after sunrise and ending 30 minutes before sunset, to avoid harm*	The works are not being undertaken in the Careening Bay Action area.	Not applicable

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
	to the little penguins during their arrival, departure and rafting periods.		
Underwater noise			
8o	*The CEMP must require that noise producing maritime works must not exceed:* – *i) The little penguin Temporary Temporal Shift value of 188 (re 1µPa2s) Sound Exposure Level (SEL) weighted for Other Carnivores in Water (OCW) and 226 peak dB (re 1 µPa) at a distance greater than 20 m from the source of sound.* – *ii) 160 dB re 1µPa² s (SEL) and 190 dB re 1 µPa (peak) for single pile strikes, at 750 m from the source or as otherwise advised by a suitably qualified acoustic specialist, to avoid behavioural disturbance to Indian Ocean bottlenose dolphins located in Cockburn Sound.*	This annexure includes additional mitigation measures to limit the impact of Sound Exposure Levels during the maritime trial piling exercise, including elevated levels of marine fauna observation.	Sections 7, 8, and 9 of this annexure.
8p	*The CEMP must specify safety zones that are calculated by a suitably qualified acoustic expert and based on the modelled and verified noise levels produced by construction, to avoid harm to protected matters. The safety zones must be based on the behavioural and physiological (Temporary Temporal Shift and Permanent Temporal Shift) underwater noise threshold levels for little penguins, Indian Ocean bottlenose dolphins and other relevant marine fauna, as per Table 4.9 of Underwater Noise Impact Assessment Report (Appendix B).*	This annexure specifies safety zones that have been calculated by an acoustic expert. The trial piling exercise will be used to validate modelled predictions for noise levels and re-evaluate the safety zones in future CEMP versions.	Sections 7, 8, and 9 of this annexure.
8q	*The CEMP must include details of underwater noise monitoring to be implemented for the duration of the maritime works at the Armament Wharf Action area.*	This annexure includes details of underwater noise monitoring to be undertaken limited to the trial piling exercise to inform the Condition 8r(i).	Section 8 of this annexure.
8r	*The CEMP must specify that piling, as part of the maritime works, will only commence following completion of a trial piling exercise to achieve the following outcomes:* – *i) Validate the modelled predictions for noise levels,* – *ii) Quantify the rate of sound attenuation with distance from the piling site to validate modelled predictions,* – *iii) Evaluate the efficacy of adopted noise mitigation measures to be implemented during the piling construction period at Armament Wharf Action area, and*	This annexure specifies that maritime piling included in the approved Action must not commence before the completion of the trial piling exercise. This includes meeting the outcomes listed in Condition 8r, and the specification of safety zones that will prevent harm from noise to marine fauna.	Sections 7, 8, and 9 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
	– *iv) Based on the monitoring results, re-evaluate the dimensions of the safety zones that will prevent harm from noise to marine fauna.*		
8t	*The CEMP must specify that, after any stoppage of 30 minutes or longer duration, maritime works will only commence: after the safety zones have been visually inspected for the presence of little penguins, Indian Ocean bottlenose dolphins and other marine fauna by a suitably qualified marine fauna observer, who has confirmed that no marine fauna have been observed in the safety zones, and if undertaking an impulsive noise generating activity, such as impact piling, a soft-start procedure will be used in which the piling impact energy or noise level is gradually increased from nil to full power over at least 10 minutes, allowing time for fauna to move away from the noise source and reduce the potential for injury.*	This annexure includes the provision for the stop works requirements listed in this condition.	Sections 7, 8, and 9 of this annexure.
8u	*The CEMP must specify that during all maritime works, a suitably qualified marine fauna observer will monitor the safety zones, and that all maritime works will shut down immediately if any marine fauna is observed within the shutdown zone or is about to enter the shutdown zone from the low power zone or observation zone.*	This annexure requires marine fauna observation during the trial piling exercise and includes stop works requirements if marine fauna are observed within or are about to enter the shutdown zone. This condition requirement will also be addressed in future versions of the CEMP prior to maritime activities commencing.	Sections 7, 8, and 9 of this annexure.
Leaks and spills			
8v	*The CEMP must include:* – *i) measures to prevent leaks and spills during construction, including but not limited to hydrocarbons, and* – *ii) appropriate measures to respond to leaks and spills in a timely and effective manner to prevent and minimise impacts to protected matters.*	Performance criteria and management controls relevant to terrestrial works are detailed in Sections 6 and 7 of the Soil and Water Quality Management Annexure (Annexure A3). Performance criteria and management controls relevant to trial piling exercise are detailed in Sections 6 and 7 of this annexure.	Soil and Water Quality Management Annexure (Annexure A3). Sections 6 and 7 of this annexure. HMAS Stirling Oil Spill Contingency Manual (RAN, 2026).
Biosecurity			
8y	*The CEMP must specify biosecurity measures that will be implemented during construction to ensure the Action is undertaken in a manner that prevents:*	Performance criteria and management controls are identified in Sections 6 and 7 of the Flora and Fauna Management Annexure (Annexure A1) that address these requirements.	Flora and Fauna Management Annexure (Annexure A1). Sections 6 and 7 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
	– *i) the introduction of new pathogens, environmental weeds, or exotic marine and terrestrial species to Garden Island or Cockburn Sound that could harm the environment, and* – *ii) the spread of pathogens, environmental weeds, and exotic marine and terrestrial species to areas where they were not previously present.*	Performance criteria and management controls relevant to marine pests are identified in Sections 6 and 7 of this annexure that address these requirements.	
8z	The CEMP must specify biosecurity measures that will be implemented during construction for the following: Phytophthora species, polyphagous shot-hole borer, carpet sea squirt, Asian green mussel, white colonial sea squirt, and black rat.	Performance criteria, management controls, and monitoring requirements for marine pests relevant to the maritime trial piling exercise are detailed in Sections 6, 7 and 8 of this annexure. Performance criteria, management controls are identified for phytophthora and black rat are in Sections 6 and 7 of the Flora and Fauna Management Annexure (Annexure A1) that address these requirements.	Sections 6, 7 and 8 of this annexure.
Little Penguin – Direct Disturbance and Obstruction			
16a-c	*The approval holder must ensure that construction vessels and equipment do not moor in the following areas:* *a. Rafting avoidance area.* b. *Little penguin arrival areas.*	No construction vessels are required for the trial piling exercise. Management controls for auxiliary vessels are provided in Section 7 and Section 8 of this annexure.	Not applicable
	c. Seagrass avoidance areas.	Performance criteria for seagrass avoidance are provided Section 6 of this annexure. Avoidance, mitigation and monitoring measures are provided in Section 7 and Section 8 of this annexure.	Sections 6, 7 and 8 of this annexure.
Little Penguin and Indian Ocean Bottlenose Dolphin – Leaks and Spills			
17	*The approval holder must ensure that no little penguins are harmed as a result of leaks and spills, including but not limited to hydrocarbons, caused by the taking of the Action.*	Performance criteria and management controls relevant to terrestrial works are detailed in Sections 6 and 7 of the Soil and Water Quality Management Annexure (Annexure A3). Performance criteria and management controls relevant to the maritime trial piling exercise are detailed in Sections 6 and 7 of this annexure.	Soil and Water Quality Management Annexure (Annexure A3). Sections 6 and 7 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
18a-e	*The approval holder must, prior to commencement of the Action, revise the existing Oil Spill Contingency Manual to:* *a. include the new facilities, any new or upgraded spill response equipment, and standard operating procedures required to manage the risks associated with spills* *b. include a worst-case scenario of predicted spread of oil spills that considers a 30-knot easterly wind* *c. include specific incident management procedures for protecting sensitive values, including little penguin nesting sites, during pollution incidents* *d. remove plans for clean-up of the rock walls using high pressure hoses (as this may push oil into the little penguin nesting sites), and* *e. include all little penguin nesting sites in the priority areas and mapping.*	The HMAS Stirling Oil Spill Contingency Manual (RAN, 2026) has been revised to address Condition 18a-e.	HMAS Stirling Oil Spill Contingency Manual (RAN, 2026).
Little Penguin and Indian Ocean Bottlenose Dolphin – Vessel Strike			
24a-e	*From the commencement of the Action until the completion of the Action, the approval holder must avoid and minimise harm to little penguins and Indian Ocean bottlenose dolphins by ensuring that:* *a. No auxiliary vessels and no construction vessels operate within the Careening Bay Action Area outside the period commencing 60 minutes after sunrise and ending 60 minutes before sunset.* *b. No vessels exceed a speed of 4 knots when travelling in the Careening Bay Action area or the little penguin departure area, except vessels conducting security operations or emergency operations.* *c. All vessel strikes involving little penguins or Indian Ocean bottlenose dolphins are reported to the department as an incident.* *d. All construction vessels with outboard motors are fitted with propellor guards.* e. *All construction vessels are fitted with a Vessel Monitoring System.*	No works are being undertaken in the Careening Bay Action Area for the trial piling exercise. Sections 6 and 7 of this annexure include performance criteria and management controls to meet condition 24 a, b and c. No construction vessels are required for the trial piling exercise. All requirements of condition 24 a-e will be addressed in future versions of the CEMP prior to maritime activities commencing.	Sections 6 and 7 of this annexure.
Syngnathids			

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
25	*The approval holder must, before the commencement of maritime works, develop a detailed strategy to minimise harm to Syngnathids. The strategy must be prepared by a suitably qualified Syngnathid ecologist and must use best practice to translocate Syngnathids from the disturbance area to a receiver site such as natural habitat, or other suitable habitat, prior to the commencement of maritime works.*	The Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B) which draws from the Syngnathid Management Plan (GHD, 2026b) sets out a strategy to minimise harm to Syngnathids for the purpose of the maritime trial piling exercise. The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on harm minimisation and translocation of Syngnathids, for future maritime activities associated with the approved Action.	Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c).
26a-e	*The approval holder must ensure that all maritime works involving Syngnathids or Syngnathid habitat are planned and overseen by a suitably qualified Syngnathid ecologist. These activities must include:* – *a) Preparing a risk assessment for translocation, with consideration of the National Policy Guidelines for the Translocation of Live Aquatic Animals.* – *b) Developing and overseeing baseline and monitoring surveys which include both diving and environmental DNA (eDNA) methodologies to:* • *i) establish the baseline species presence, abundance and distribution within the disturbance area, and* • ii) monitor receiver sites at 1, 3, and 6 years following completion of the maritime works. – *c) Developing and overseeing the implementation of the translocation process, including translocation surveys.* – *d) Selecting and preparing appropriate receiver site locations, such as natural habitat or other suitable habitat.* – *e) Contribute to Syngnathid knowledge in Cockburn Sound. Prior to the translocation surveys in the seagrass disturbance area, the suitably qualified Syngnathid ecologist must engage with West Australian Marine Science Institution (WAMSI) Westport Marine Science Program and investigate opportunities to collaborate during translocation surveys by contributing reference Syngnathid specimens to the Cockburn Sound Syngnathid eDNA library*.	Conditions 26 a, c, and d are addressed in the Trial Pile and Syngnathids Technical Memorandum (GHD, 2026c) (Appendix B) which draws from the Syngnathid Management Plan (GHD, 2026b). The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on Conditions 26 a-e, for future maritime activities associated with the approved Action.	Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c).

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
27	*The approval holder must ensure a translocation survey is undertaken on the same day and immediately prior to harming any Syngnathid habitat, to avoid Syngnathids recolonising the disturbance areas. Translocation surveys must include diving surveys of pylons, which are more effective at capturing seahorses, and seine netting for more cryptic Syngnathids in seagrass disturbance areas.*	This requirement is addressed in the Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B) which draws from the Syngnathid Management Plan (GHD, 2026b) The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on translocations surveys, for future maritime activities associated with the approved Action.	Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c).
28	*The approval holder must ensure that at a minimum, translocation activities are carried out by a suitably qualified marine field ecologist, under the guidance of the suitably qualified Syngnathid ecologist.*	The translocation activities will be carried out by suitably qualified marine field ecologist, under the guidance of the suitably qualified Syngnathid ecologist.	Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c).
Administrative conditions			
40	*The approval holder must ensure that any monitoring data, surveys, maps, and other spatial and metadata required under the conditions of this approval are prepared in accordance with the Guidelines for biological survey and mapped data, Commonwealth of Australia 2018 and Guide to providing maps and boundary data for EPBC Act projects, Commonwealth of Australia 2021, or as otherwise specified by the Minister in writing. The approval holder must submit all monitoring data, surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 20 business days following the end of each Annual Compliance Report Period (ACR period), except where otherwise specified in a plan.*	Sections 7 and 11.4 of the CEMP include this requirement.	Section 7 of the CEMP. Section 11.4 of the CEMP.
41	*The approval holder must upload, at least annually, to the Atlas of Living Australia or the relevant state biodiversity database, all fauna sightings recorded during the specified monitoring activities related to this Action.*	Section 7 of the CEMP lists this reporting requirement. This annexure, and the Flora and Fauna Management Annexure (Annexure A1) include the requirement for compulsory upload by ecologists (in consultation with DEPAC) of fauna sightings to the Atlas of Living Australia, with a minimum annual upload.	Section 7 of the CEMP. Flora and Fauna Management Annexure (Annexure A1). Section 10 of this annexure.

Condition number	Requirement	How it is addressed in the CEMP and Annexure	Relevant section
		This annexure, and the Flora and Fauna Management Annexure (Annexure A1), require relocations or injuring incidents to be captured in incident reports and general sightings from monitoring programs to be summarised in monitoring reports.	

4. Induction and training

Induction and training requirements are identified in Section 8 of the CEMP. Maritime trial piling exercise activity management aspects from this annexure that will be included in induction and training material are:

- fauna and habitat values (protected or of interest, including but not limited to the rainbow bee-eater, seabirds, little penguin and their respective departure and rafting areas, Indo-Pacific bottlenose dolphins and Syngnathids)
- reporting and record keeping requirements
- protocols for identifying native fauna (including marine mammals, cetacean, and pinniped species) to support reporting and documentation
- protocols for avoiding the introduction and spread marine exotic species to Garden Island/*Meeandip*
- protocols for identifying marine exotic species to support reporting and documentation
- avoidance areas, safety zones, and other delineated boundaries
- marine fauna observation, rescue and relocation protocols
- specific environmental obligations in WA waters
- soft-start procedure requirements and stop work procedure requirements.

5. Responsibility

The key roles and responsibilities for implementation of the CEMP, including the associated environmental management annexures, are provided in Section 6 of the CEMP. As specified in the CEMP, the Site Environmental Officer (SEO) is responsible for oversight and monitoring the implementation of the environmental management annexures on behalf of Defence for the approved Action. Table 3 outlines roles and responsibilities relevant to this annexure. Responsibilities for the specific management controls and monitoring requirements in this annexure are provided in Sections 7 and 8.

Table 3 Responsibilities for this annexure

Position	Responsibility
Construction Contractor	In addition to responsibilities outlined in Section 6 of the CEMP, the Construction Contractor will (for all aspects covered under this annexure): – prepare, implement and have overall responsibility for environmental performance of the Construction Contractor's CEMP for the trial piling exercise, that is consistent with the CEMP and this annexure – ensure adequate training of all personnel and subcontractors within their area of responsibility for the trial piling exercise – ensure all maritime piling equipment is adequately maintained and correctly operated so as to reduce the risk of harm to the environment to as low as reasonably practicable – report all environmental incidents or any potential environmental events to the SEO as soon as practicable, and within 4 hours, in accordance with Section 7.1 of the CEMP. For the purposes of the trial pile exercise only, the Construction Contractor's responsibility is limited to landside operations and the operation of the piling rig. The Construction contractor will be directed by the MFO, and marine field ecologists for all pile rig commencement and stoppage instructions.
Marine Fauna Observer (MFO) (as defined in the EPBC Act approval 2024/10031)	Suitably qualified MFO (as defined in the EPBC Act approval 2024/10031) (for the purpose of inspecting safety zones for marine fauna) means a specialist with experience in marine mammal identification, including behaviour and distance estimation. Their responsibilities include to: – maintain records of all details of marine fauna observations on suitable marine fauna observation sheets – visually monitor for marine mammals and other relevant marine fauna from a high vantage point and nearby vessel for at least 30 minutes before starting trial piling. – monitor safety zones during trial pile activities – notify the contractor for implementation of the stand-by and soft-start procedure or stop-work procedure.
Site Environmental Officer (SEO)	In addition to responsibilities outlined in the CEMP, the SEO will: – oversee the preparation and implementation of induction and training requirements in this annexure – undertake site inspections and compliance audits in accordance with the CEMP and at the frequencies specified in Section 8 of this annexure – communicate with the Project Manager Contract Administrator (PMCA) and Defence as part of incident response – (with other roles, where required in this annexure) identify and review causes and implement measures to prevent incident recurrence and, when triggered, implement adaptive management measures.
Suitably qualified acoustic expert (Acoustic expert)	Refer to the Noise and Vibration Management Plan Annexure (Annexure A4) for further information on roles and responsibilities associated with the acoustic expert.
Suitably qualified Syngnathid ecologist (as defined in the EPBC Act approval 2024/10031) (Syngnathid ecologist)	Syngnathid ecologist (as defined in the EPBC Act approval 2024/10031) (for the purpose of preparing and implementing environmental management strategies) means a person who has relevant professional qualifications and: – has at least 5 years' experience designing and implementing surveys and translocations for Syngnathids

Position	Responsibility
	– has at least 5 years' experience writing and implementing management plans for Syngnathids – has at least 5 years' experience with Syngnathids, with both aquaculture (capture and movement) and ecological (*in-situ* populations) expertise – Can give authoritative assessment and advice on the presence of Syngnathids. Their responsibilities include: – adhering to animal ethics and established procedures for the humane handling of live organisms – providing oversight of the implementation of Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix C), or provide delegated authority to the marine field ecologist – providing oversight of the selection and preparation of appropriate receiver site locations, such as natural habitat or another suitable habitat – providing an authoritative assessment of the need and methods by which reference Syngnathid specimens are to be provided to the Cockburn Sound Syngnathid eDNA library – review of the post translocation reporting.
Suitably qualified marine field ecologist (as defined in the EPBC Act approval 2024/10031) (Marine field ecologist)	Marine field ecologist (as defined in the EPBC Act approval 2024/10031) (for the purposes of Syngnathid translocation surveys and translocating collected Syngnathids) means a person who is authorised by the Western Australian Government to capture and handle wildlife, and who has relevant professional qualifications and at least 3 years of work experience implementing surveys and translocations for Syngnathids and can give an authoritative assessment and advice on the presence of Syngnathids. Their responsibilities include: – adhering to animal ethics and established procedures for the humane handling of live organisms – handling of Syngnathids – maintenance of husbandry while on board the vessel – undertaking of handling for the purposes of gathering health information – tagging of Syngnathids (where applicable) – releasing of Syngnathids to the commercial diver team to place in receiving habitat – preparation of the Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B) – implementation of Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B) under the delegation of the Syngnathid ecologist – commencement and completion of the post translocation reporting. For the purposes of the maritime trial piling exercise only, the marine field ecologist is nominated as the responsible party for all vessel related management controls and monitoring requirements.
Suitably qualified seabird conservation ecologists (Seabird Ecologist)	Refer to Table 9.1 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
All site personnel and parties involved in the trial piling exercise	– comply with the requirements of the CEMP and this annexure – comply with all legal requirements under the approval conditions and relevant Acts – exercise a duty of care to the environment at all times – report any environmental incidents to the SEO as soon as practicable.

6. Performance criteria

Performance criteria associated with this annexure are outlined in Table 4.

Table 4 Maritime trial piling exercise management objectives and performance criteria

Objective	Performance Criteria
General marine flora and fauna management objective	
Minimise indirect impacts on surrounding sensitive receptors.	100% compliance with controls listed in Sections 7 and 8 of this annexure.
Prevent impacts to native fauna resulting from approved Action activities.	No injury or harm to fauna attributable to construction personnel interactions and the trial piling exercise. If injury or mortality occurs, assistance and care is provided in accordance with the Marine Fauna Observation, Rescue and Relocation Protocol (Appendix C). All stop works procedures (little penguins and marine mammals) are implemented in accordance with the Marine Fauna stop work protocols (Appendix C). All adaptive management measures are in accordance with Section 9 of this annexure. All reporting and documentation are in accordance with Section 10 of this annexure.
Minimise harm to marine fauna in the water from approved Action activities generating underwater noise.	MFO is present during all trial piling exercise activities to monitor safety zones, shut down works, record and report sightings and incidents. Monitoring in accordance with Section 8 of this annexure.
Seagrass meadow management objectives and performance criteria	
Prevent impacts to seagrass meadows resultant from the trial piling exercise	100% compliance with controls listed in Sections 7 and 8.
Little penguin management objectives and performance criteria (maritime works)	
Ensure that no little penguins are harmed as a result of leaks and spills, including but not limited to hydrocarbons, caused by the taking of the Action.	100% compliance with controls listed in Sections 7 and 8.
Indo-Pacific bottlenose dolphin management objectives and performance criteria	
Prevent harm to the Indo-Pacific bottlenose dolphin resulting from vessels	100% compliance with controls listed in Sections 7 and 8.
Syngnathids management objectives and performance criteria	
Minimise harm to Syngnathids resulting from the trial piling exercise.	100% compliance with Maritime Trial Piling and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B).
Biosecurity management objectives and performance criteria	
Prevent the introduction of new marine invasive species including carpet sea squirt, white colonial sea squirt and Asian green mussel to waters of Garden Island/*Meeandip* that could harm the environment.	No new invasive marine species are introduced to Garden Island/*Meeandip.*
Prevent the spread of invasive marine species to areas where they were not previously present within the waters of Garden Island/*Meeandip*.	Invasive marine species are not spread to areas of Garden Island/*Meeandip* where they were not previously present.

7. Management controls

Management controls relevant to this annexure are outlined in Table 5 and Table 6.

The management controls and monitoring requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of environmental values in the Action area:

– Noise and Vibration Management Annexure (Annexure A4)
– Heritage Management Annexure (Annexure A2)
– Little Penguin Monitoring and Management Plan (RPS, 2025) (Annexure A5)
– Maritime Trial Piling and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B of this Annexure).

Where any conflict exists, specific guidance or advice from a marine field ecologist will prevail. The marine ecologist will provide advice in consultation with the Syngnathid ecologist.

7.1 Pre-commencement of the maritime trial piling exercise

Prior to the commencement of the trial piling exercise, as part of the maritime works, the MFOs are to establish safety zones to minimise the risk of harm to marine fauna from the trial piling exercise. For the purpose of this trial piling exercise, marine fauna are interpreted as noise sensitive fauna likely to be present, including marine mammals, little penguins and turtles. The safety zones are based on the noise modelling undertaken as part of the Underwater Noise Impact Assessment Report (GHD, 2024) and scientific evidence regarding the impact of noise on marine fauna species and noise and vibration impacts associated with piling.

Table 5 Pre-commencement maritime trial piling exercise management controls

Item	Specific control	Reference	Responsibility
General Terrestrial Flora and Fauna controls			
1	Construction Contractor must not access the avoidance area for rainbow bee-eater at the Armament Wharf.	EPBC Approval 2024/10031 – 1) a)c)	Construction Contractor
General Marine Flora and Fauna controls			
2	MFO as approved by DCCEEW will be engaged for marine fauna observations.	EPBC Approval 2024/10031 – 8) u)	SEO
3	Safety zones to minimise behavioural and physiological disturbance to Indian Ocean bottlenose dolphins and little penguins located in Cockburn Sound must be established prior to trial piling exercise commencing. Refer to Figure 2. Safety zones are to be demarcated by the MFOs.	EPBC Approval 2024/10031 – 8) u)	MFOs
4	All relevant parties involved in the trial piling exercise must undertake induction and training requirements for this annexure in accordance with Section 4.		Construction Contractor
5	Construction Contractor must identify all avoidance areas and safety zones on site plans.	EPBC Approval 2024/10031 – 16) a)-c)	Construction Contractor
Seagrass meadow specific controls			
6	No seagrass clearing will occur for the maritime trial piling exercise.	EPBC Approval 2024/10031 – 2) b)	Marine field ecologist
7	Seagrass avoidance areas, identified by the marine field ecologist, must be clearly demarcated with surface buoys by the vessel operator.	EPBC Approval 2024/10031 – 1) a) EPBC Approval 2024/10031 – 1) b) EPBC Approval 2024/10031 – 1) c)	Marine field ecologist

Item	Specific control	Reference	Responsibility
		EPBC Approval 2024/10031 – 2) b)	
Little penguin specific controls			
8	Auxiliary vessels must not moor in the following areas: a) Rafting avoidance area b) Little penguin arrival areas c) Seagrass avoidance areas	EPBC Approval 2024/10031 – 16) a) EPBC Approval 2024/10031 – 16) b) EPBC Approval 2024/10031 – 16) c)	Marine field ecologist
Syngnathid specific controls			
9	Syngnathid clearance and salvage activities must be undertaken immediately prior to the commencement of trial piling activities (in the immediately preceding 2-3 days), where safety of in-water personnel (divers and boat operators) can be appropriate managed.	EPBC Approval 2024/10031 – 27	Marine field ecologist
10	Syngnathid clearance and salvage activities will be undertaken in an area covering no less than 60 m in all directions from the trial pile location. Clearance and salvage will be undertaken to minimise the likelihood of recolonisation during the activity.	EPBC Approval 2024/10031 – 27	Marine field ecologist
11	Syngnathids will be translocated to a suitable location agreed with Navy, DEPAC, base management and the suitably qualified Syngnathid ecologist.	EPBC Approval 2024/10031 – 27	Marine field ecologist
12	Translocation activities must only be carried out by a suitably qualified marine field ecologist, under the guidance of the suitably qualified Syngnathid ecologist.	EPBC Approval 2024/10031 – 28	SEO
Biosecurity specific controls			
13	Prior to the commencement of the maritime trial piling exercise, a visual survey for carpet sea squirt (*Didemnum vexillum*) and other invasive marine species is to be undertaken by divers opportunistically alongside the Syngnathids translocation tasks.	EPBC Approval 2024/10031 – 8) y) EPBC Approval 2024/10031 – 8) z)	SEO
14	All equipment and materials to be deployed for the maritime trial piling exercise are to be thoroughly cleaned and free of any debris or organic matter prior to use.		Construction Contractor

7.2 Post-commencement maritime trial piling exercise

Table 6 details the requirements to be implemented post-commencement of the maritime trial piling exercise.

Table 6 Post-commencement actions for the maritime trial piling exercise

Item	Specific control	Reference	Responsibility
General Marine Flora and Fauna controls			
15	If any little penguin, or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure (Appendix C of this annexure).	EPBC Approval 2024/10031 – 5)	All personnel
16	Veterinary care or assistance from an experienced wildlife carer is to be arranged via the SEO for any native terrestrial or marine fauna found injured within the Action area.	EPBC Approval 2024/10031 – 4)	SEO
17	Safety zones for each day of the maritime trial piling exercise will be communicated to all relevant parties and enforced by the MFOs.		MFO
18	The maritime trial piling exercise is only to commence if marine fauna have not been sighted within the safety zones following the completion of the 30-minute daily prestart visual observations. Clearance is to be provided by the MFO and clearly communicated to the Contractor. This procedure is also required after any break in piling longer than 30 minutes.	EPBC Approval 2024/10031 – 8) t)	Construction Contractor
19	During the soft start procedure, piling impact energy will gradually increase from nil to full power over a period of 10 minutes, allowing time for fauna to move away from the noise source and reduce the potential for injury. This procedure is also required after any break in piling longer than 30 minutes to alert marine life and allow them to move away. Visual observations of marine fauna within the safety zones will be maintained by the MFO throughout soft starts.	EPBC Approval 2024/10031 – 8) t)	Construction Contractor
20	If marine fauna is spotted in the observation zone during the soft-start or the normal course of the maritime trial piling exercise, the fauna must be observed and readiness for shutdown communicated to the Construction Contractor.	EPBC Approval 2024/10031 – 8) t)	MFO
21	If marine fauna is spotted in the shutdown zone during the soft-start or the normal course of the maritime trial piling exercise, an immediate shut down must be implemented.	EPBC Approval 2024/10031 – 8) u)	Construction Contractor
22	Following a shutdown in piling operations, piling may resume when advised to the Construction Contractor by the MFO, when they confirm that marine fauna is outside of the shutdown zone, or when >30 minutes has elapsed since the last sighting.		MFO
23	Access to all necessary materials for mitigating and responding to leaks and spills is to be maintained.	EPBC Approval 2024/10031 – 8) v)	Construction Contractor

Item	Specific control	Reference	Responsibility
24	Safety data sheets for all potentially hazardous substances are to be followed.	EPBC Approval 2024/10031 – 8) v)	Construction Contractor
25	All vessels will manage fuel and chemical on board the vessel in accordance with their vessel management plan.	EPBC Approval 2024/10031 – 8) v)	Marine field ecologist
26	All vessel refuelling is to be undertaken in accordance with the relevant vessel's Vessel Management System.	EPBC Approval 2024/10031 – 8) v)	Marine field ecologist
27	All marine leaks and spills are to be responded to in accordance with the HMAS Stirling Oil Spill Contingency Manual, and in accordance with Section 7.3.4 of the CEMP.	EPBC Approval 2024/10031 – 8) v)	Marine field ecologist
28	All landside leaks and spills are to be responded to in accordance with the HMAS Stirling Oil Spill Contingency Manual, Soil and Water Quality Management Annexure (Annexure A3) and in accordance with Section 7.3.4 of the CEMP.	EPBC Approval 2024/10031 – 8) v)	Construction Contractor
Safety zones			
29	Observation and shut-down zones are to be implemented for the maritime trial piling exercise. Observation zone (900 m)– If a species enters within the observation zone of the vessel, log and maintain visual tracking. Shut-down zone (650 m) – If a species enters within the shutdown zone of the vessel, initiate a Stop Works, maintain visual tracking and resume when fauna is outside the shutdown zone or when >30 minutes has elapsed since the last sighting.		MFO
30	All maritime trial piling works must stop if any marine fauna are spotted within the shut down zone.		Contractor (piling)
31	Shut down and observation zones are to be determined using the GPS on the contractor's workboat.		MFO
Marine Fauna Observation specific controls			
32	A minimum of two (2) MFO are to be present for the duration of maritime trial piling exercise during piling works.	EPBC Approval 2024/10031 – 8) t) EPBC Approval 2024/10031 – 8) u)	MFO
33	Whale sightings are to be confirmed with DBCA at the start of each day before commencing the maritime trial piling exercise.		MFO
34	The MFO will keep records of all details of marine fauna observations on suitable marine fauna observation sheets.	EPBC Approval 2024/10031 – 8) t) EPBC Approval 2024/10031 – 8) u)	MFO
35	After any stoppage of 30 minutes or longer duration, the instruction for maritime works to recommence will only occur after the safety zones have been visually inspected for the presence of marine fauna by the MFO who has confirmed that no marine fauna have been observed in the safety zones.	EPBC Approval 2024/10031 – 8) t) EPBC Approval 2024/10031 – 8) u)	MFO

Item	Specific control	Reference	Responsibility
36	To confirm the application of the relevant safety zones, records of actions (standby, stop works) and hours of operation, records submitted by the MFO are to be reviewed and validated by the SEO.		SEO
Seagrass meadow specific controls			
37	No seagrass is to be disturbed or cleared during the maritime trial piling exercise.	EPBC Approval 2024/10031 – 2) b)	Marine field ecologist
38	Auxiliary vessels and equipment must not moor in seagrass avoidance areas.	EPBC Approval 2024/10031 – 16) a) EPBC Approval 2024/10031 – 16) b) EPBC Approval 2024/10031 – 16) c)	Marine field ecologist
Little penguin and Indo-Pacific bottlenose dolphin specific controls			
39	No vessels are to exceed a speed of 4 knots when travelling in the Careening Bay Action area or the little penguin departure area, except vessels conducting security operations or emergency operations.	EPBC Approval 2024/10031 – 24) b)	Marine field ecologist
40	In the event that a little penguin suffers an injury, the SEO is to notify and seek advice from a seabird ecologist. The stop-work procedure for marine fauna injury in Appendix C of this document is to be initiated and implemented accordingly.	2024/10031 4	SEO
Biosecurity specific controls			
41	To prevent spread of carpet sea squirt, instructions laid out by biosecurity alerts are to be followed.	EPBC Approval 2024/10031 – 8) y) EPBC Approval 2024/10031 – 8) z)	Marine field ecologist
42	To prevent spread of carpet sea squirt, Asian green mussel, and white colonial sea squirt, the nationally aligned vessel management plan is to be followed.	EPBC Approval 2024/10031 – 8) y) EPBC Approval 2024/10031 – 8) z)	Marine field ecologist
43	Cockburn Sound including approved Action areas within Careening Bay and Armament Wharf is a carpet sea squirt Control Category 3 – Management. Vessels movements that remain within the Control Category 3 area (e.g. between HMAS Stirling and Henderson) are required to follow standard best practice biofouling management.	EPBC Approval 2024/10031 – 8) y) EPBC Approval 2024/10031 – 8) z) Carpet sea squirt (*Didemnum vexillum*) Management Guidelines	Marine field ecologist
44	Vessel movements outside of Control Category 3 area (outside of Cockburn Sound) will need to comply with the following: – Inspected for carpet sea squirt – If carpet sea squirt detected report to DPIRD within 24 hours. – DPIRD will advise on a case-by case basis with minimum controls to be adhered to include: a) All treated surfaces must be free from any visible macro-fouling, or the fouling must have been rendered unviable	EPBC Approval 2024/10031 – 8) y) EPBC Approval 2024/10031 – 8) z) Carpet sea squirt (*Didemnum vexillum*) Management Guidelines	Marine field ecologist

Item	Specific control	Reference	Responsibility
	b) All collected material must be disposed of on land by an accredited waste management company and in compliance with the requirements of all relevant local authorities c) Provide the department with evidence of the treatment if requested. The vessel should depart immediately after treatment.		
Underwater noise			
45	The maritime trial piling exercise duration will be limited to the minimal a period within which sufficient data can be captured to fulfil the requirements of the exercise. The number of unmitigated pile strikes will be minimised as practical to capture noise data sufficient to inform the exercise.	EPBC Approval 2024/10031 – 8) r)	Acoustic expert
46	All underwater noise generated from the trial piling activity will be acoustically monitored.	EPBC Approval 2024/10031 – 8) r)	Acoustic expert

8. Monitoring requirements

Maritime trial piling exercise monitoring requirements are provided in Table 7. The hydrophones deployed during the maritime trial piling exercise are for the purposes of collecting data from the maritime trial piling exercise to facilitate addressing Condition 8) r), and do not form a part of the task monitoring requirements for the purposes of managing compliance across the management controls nominated for the task.

The proposed location of the maritime hydrophones is outlined in Figure 1.

Regular Construction Contractor CEMP site inspections and compliance audits will be undertaken by the Construction Contractor and SEO respectively, in accordance with the CEMP and at the frequencies specified in:

– Noise and Vibration Management Annexure (Annexure A4)
– Soil and Water Quality Management Annexure (Annexure A3)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
– Also of relevance is the Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) which draws from the Syngnathid Management Plan (GHD, 2026b). The Trial Pile and Syngnathid Technical Memorandum (GHD, 2026c) can be found at Appendix B.

Monitoring requirements relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna during the completion of the trial piling exercise are also included in Table 7 below.

Table 7 Maritime trial piling exercise monitoring requirements

Location	Monitoring Requirement	Frequency	Record	Responsibility
Pre-commencement of maritime trial piling exercise				
Action area	Prior to commencement of the maritime trial piling exercise invasive marine species visual survey for carpet sea squirt, limited to opportunistic observations by divers alongside the Syngnathids translocation tasks.	Prior to the commencement of the trial piling exercise	Site records	Marine field ecologist
Action area and Cockburn Sound	Prior to the commencement of each day's activities a sweep will be undertaken up to 7 km from the trial pile location to observe for the presence of low frequency cetaceans.	Prior to the commencement of each day of piling operations of the trial piling exercise	Marine Fauna Observer Prestart forms (Appendix F) Marine Fauna Observation forms (Appendix G)	MFO
Action area	Prior to the commencement of each day's activities MFO will visually monitor for marine fauna from a high vantage point.	For at least 30 mins prior to commencement each day for the duration of the trial piling exercise	Marine Fauna Observer Prestart forms (Appendix F) Marine Fauna Observation forms (Appendix G)	MFO
Post-commencement of the maritime trial piling exercise				
Action area	During all maritime works, MFO are to monitor the safety zones and the observation zones.	For the duration of the trial piling exercise	Marine Fauna Observer Prestart forms (Appendix F) Marine Fauna Observation forms (Appendix G)	MFO

Location	Monitoring Requirement	Frequency	Record	Responsibility
Lines and marker buoys in Armament wharf area	All lines and marker buoys are to be checked to ensure they are not lost, and to ensure they are removed from the environment as soon as possible.	Daily	Site inspection checks	Marine field ecologist
Post-completion of the maritime trial piling exercise				
Syngnathid translocation receiver sites	Undertake monitoring surveys at Syngnathid translocation receiver sites in accordance with the Syngnathid Management Plan (GHD, 2026b).	1, 3, and 6 years following completion of the maritime works	Syngnathid Management Plan (GHD, 2026b)	Marine field ecologist

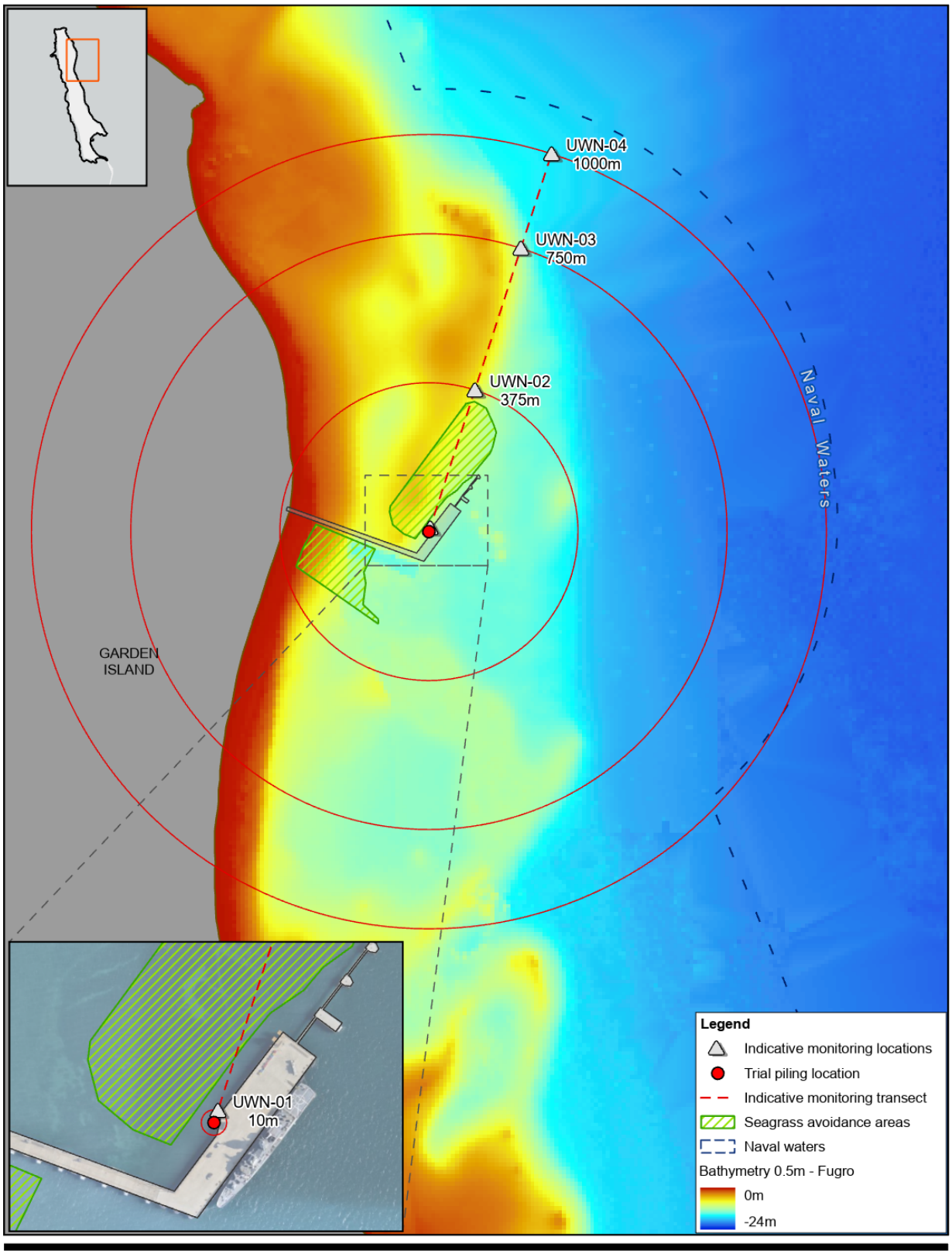
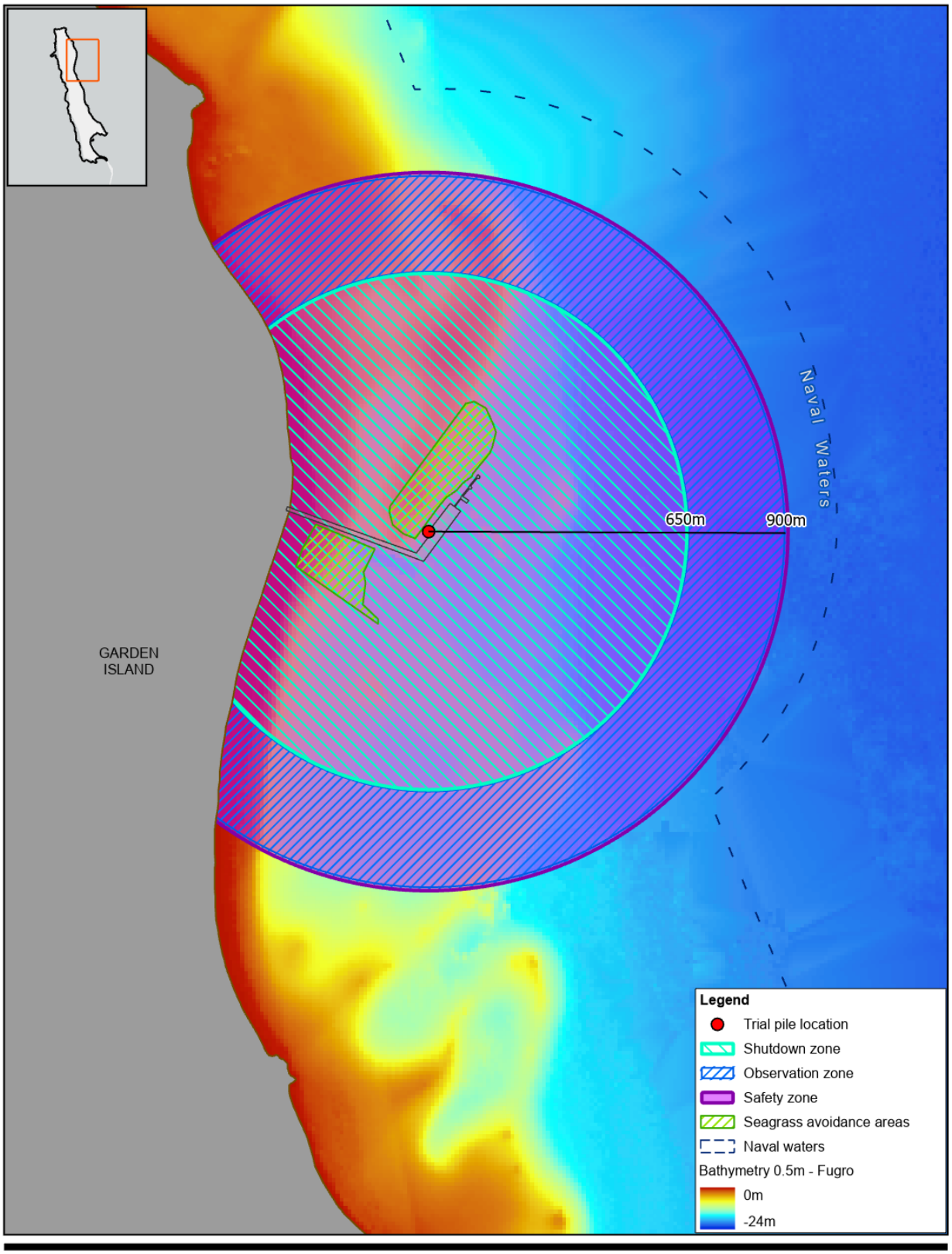


Figure 1 *Proposed hydrophone monitoring locations*



Paper Size ISO A4

0 100 200 300

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

DEPARTMENT OF DEFENCE
SEA1010-1 USW SUPPORT FACILITIES AND INFRASTRUCTURE PROGRAM SRF-W PRIORITY WORKS
CEMP MARITIME TEST PILE MANAGEMENT ANNEXURE

MARITIME TRIAL PILING EXERCISE SAFETY ZONES

Project No. 12613283
Revision No. B
Date 10/02/2026

FIGURE 2

\\ghdnetghd\AU\Canberra\Projects\23\12613283\GIS\Maps\Working\12613283_Marine_Noise_A.aprx
Print date: 10 Feb 2026 - 09:42

Data source: Light Grey Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Nearmap WMS Server: . Created by: ocollins2

Figure 2 *Maritime trial piling exercise safety zones*

9. Adaptive management measures

Amendments to management actions will be completed on an as-needed basis. The review and updates to this annexure may include, but are not limited to:

- updates to management actions that are identified as not achieving the desired outcome and/or to achieve a greater environmental outcome
- additional management actions required as a result of adaptive management processes
- amendments to relevant legislation that may affect the implementation of management actions
- improvements to practices, achieving a greater environmental outcome
- any change in maritime trial piling exercise methodology that occurs following the publication of this annexure.

If monitoring results, instances of non-conformances or audit results determine that the management controls identified in this annexure are not effective, the construction process generating the adverse outcome will be paused. Alternative management controls and monitoring requirements will be determined in accordance with the environmental management framework set out within the CEMP and associated annexures. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP. Monitoring will continue to determine if the alternative management controls and monitoring requirements are effective.

Adaptive management measures relating to little penguins are included in Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) (Section 7.2.2.3). Adaptive management measures relating to terrestrial noise and vibration are included in the Noise and Vibration Management Annexure (Annexure A4).

Table 8 presents the management triggers and adaptive management measures for this annexure.

Table 8 Maritime trial piling exercise management triggers and responses

Trigger	Adaptive Management Measure
Disturbance to seagrass outside of the approved disturbance areas	– Conduct investigation in accordance with the CEMP. – Revise protocol to include outcomes of incident investigation. – Implement appropriate corrective actions. – Undertake an investigation to determine the cause of the non-compliance. Contingency actions will be implemented, including review of management measures, improving training and education for all personnel, improving and implementing increased protective measures and monitoring the success of these Actions. – Any damage caused by the Construction Contractor to seagrass outside the approved disturbance areas must be reinstated at the Construction Contractor's cost and in consultation with DEPAC and the relevant authorities (DBCA, DWER and DCCEEW).
Program slippage later than March 2026 leading to higher probability of low frequency marine cetaceans in vicinity of Cockburn Sound	– Revision to the maritime trial piling exercise methodology to expand pre-works observation areas is to be considered by the SEO, in consultation with the PMCA, an acoustic expert, and a marine field ecologist. – To cover an expanded observation area, an increase in the numbers of MFO is to be considered by the SEO, in consultation with the PMCA, an acoustic expert, and a marine field ecologist.
Marine fauna is found injured or deceased within the Action area or safety zones	– The stop work procedure is to be triggered immediately. – Follow incident response in the Marine Fauna Observation, Rescue and Relocation Protocol (Appendix C of this annexure). – Ecologist/wildlife carer will assess the cause and propose amended management measures. – SEO and ecologist/ wildlife carer confirm updated management measures – If an effective way to eliminate the risk of additional deaths and injuries cannot be determined, the specific construction process will be paused by the Contractor until the risk is mitigated.

Trigger	Adaptive Management Measure
	– SEO to complete an Environment Incident and Event Report (Appendix F of the CEMP)
Marine fauna is found oiled or entangled within the Action or safety zones	– The stop work procedure is to be triggered immediately. – Follow incident response in the Marine Fauna Observation, Rescue and Relocation Protocol (Appendix C of this annexure) and in accordance with the HMAS Stirling OSCM. – Ecologist/wildlife carer will assess the cause and propose amended management measures. – SEO and ecologist/wildlife carer confirm updated management measures – If an effective way to eliminate the risk of additional deaths and injuries cannot be determined, the specific construction process will be paused by the Contractor until the risk is mitigated. – SEO to complete an Environment Incident and Event Report (Appendix F of the CEMP).
If behavioural harm to marine fauna is identified or suspected during the course of the maritime trial piling exercise	– The SEO and marine field ecologist will conduct incident response including investigation, implementation of corrective actions and reporting in accordance with the CEMP (refer to Section 7.3 and Appendix F). The actions outlined in Appendix C will be taken when an impact to marine fauna is identified or suspected. – Review the findings of the preliminary trial pile exercise underwater noise monitoring results of representative piling activities and undertake any modification to the safety zones or management controls where monitoring shows variance from the predicted noise levels. Adopted management controls or monitoring requirements and their respective dB reduction are to be incorporated into a future Underwater Noise and Vibration Management Annexure, to be published prior to the commencement of maritime construction. – Before continuing the maritime trial piling exercise, implement additional control measures. For example, this may involve reviewing and/or modifying plant, equipment and construction approach or modifying safety zones. – Update relevant annexures and CEMP with revised procedures.
Relocation of Syngnathids leading to death or injury of fauna individuals	– Cease relocation while investigation is conducted. – Report to the SEO within 4 hours via phone and email. The SEO has the responsibility to report to the PMCA, the ESM, DEPAC and where directed, to the Command Team at HMAS Stirling. DEPAC are responsible for reporting to DCCEEW in accordance with Section 7.3 of the CEMP. – Investigate incident (in consultation with the Syngnathid ecologist) – Review and revise the Marine Fauna Observation, Rescue and Relocation Protocol (Appendix C of this annexure).
Identification of invasive marine species during maritime trial piling exercise	– Within 2 businesses days of detection, consult with a marine field ecologist (as defined in the EPBC Act approval 2024/10031) to determine and implement suitable control measures. – A marine field ecologist is to identify the species, likely origins, potential pathways for dispersal and the biosecurity risk level. – Restrict movement of equipment from affected area, until control measures are identified. – Assess likely origin, and revise hygiene procedures as needed. – Review and update this annexure.

10. Reporting and documentation

All reporting requirements of the CEMP with reference to the EPBC Act approval 2024/10031 are detailed in Section 7 of the CEMP.

All compliance documents and records required by this annexure must be maintained and stored in accordance with the document control requirements specified in Section 12.2 of the CEMP. Compliance records may be subject to audit and/or be used to verify compliance with the conditions of approval in accordance with Section 12 of the CEMP.

In consultation with DEPAC, all fauna sightings will be uploaded to the Atlas of Living Australia and other relevant state biodiversity databases, as decided by ecologists and in consultation with DEPAC.

Table 9 presents the reporting requirements for this annexure.

The reporting requirements in the following annexures are also relevant to meeting the EPBC Act approval 2024/10031 for the protection of flora and fauna in the Action area:

– Heritage Management Annexure (Annexure A2)
– Noise and Vibration Management Annexure (Annexure A4)
– Soil and Water Quality Management Annexure (Annexure A3)
– Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
– Maritime trial piling exercise and Syngnathid Technical Memorandum (GHD, 2026c) (Appendix B to this Annexure).

Table 9 Maritime trial piling exercise reporting requirements

Reporting Requirement	Frequency
Construction Contractor must provide the SEO, and the PMCA with a detailed record of the procedures employed during operations.	– Within 2 weeks of maritime trial piling exercise completion
Construction Contractor must provide the SEO, and the PMCA with a report on the findings of the maritime trial piling exercise, including location, date, start and completion of the maritime trial piling exercise, information of the piling rig (hammer weight, drop height, pile size, number of piles, no. of impacts per pile etc.)	– Within 2 weeks of maritime trial piling exercise completion
The SEO must provide the PMCA with a report of all Environment Incident and Events relevant to these works (Appendix F of the CEMP).	– Within 2 weeks of maritime trial piling exercise completion
The MFO must provide the SEO, and the PMCA with a report of all MFO prestart forms relevant to these works (Appendix F of this annexure).	– Within 2 weeks of maritime trial piling exercise completion
The MFO must provide the SEO with the marine fauna observation forms from each day of works (Appendix G of this annexure).	– At the end of each day of works
The SEO must provide the PMCA with a report of all marine fauna observation forms relevant to these works (Appendix G of this annexure).	– Within 2 weeks of maritime trial piling exercise completion
MFO must provide the fauna register to the SEO, and the PMCA.	– On request – Within 2 weeks of maritime trial piling exercise completion
Marine field ecologist to provide the SEO, and the PMCA with georeferenced spatial data indicating the actual extent of direct seagrass disturbance (including placement of the Syngnathid translation structures)	– Within 2 weeks of maritime trial piling exercise completion)

Reporting Requirement	Frequency
Construction Contractor must provide other reporting in line with the CEMP to the SEO, including but not limited to daily/weekly checks and incident reporting.	– As required – On request – Monthly reporting updates
In the event that an incident or event requires the implementation of the Defence OSCM, the SEO is to ensure reporting procedures per the OSCM are followed.	– As required
The Construction Contractor will prepare a post activity report to the SEO within 28 working days after the completion of the activity. This post activity report will provide documentation and evidence of compliance with the management requirements in this document.	– Within 28 working days after the completion of the activity
The SEO will prepare a post activity report to the PMCA within 28 working days after the completion of the activity. This post activity report will provide documentation and evidence of compliance with the management requirements in this document. It will combine the Construction Contractors report with all environmental reporting obligations	– Within 28 working days after the completion of the activity

11. Continuous improvement and review

If monitoring determines that the controls identified in this annexure are not effective, the maritime trial piling exercise activity generating the adverse outcome will be paused by the SEO. Alternative management controls will be determined in accordance with the environmental management framework set out within the CEMP and in accordance with the measures identified in Table 8 of this annexure. Once these management controls have been determined and approved by the SEO, they must be implemented, and works can resume. The SEO will notify stakeholders as required and implement the change management process as outlined in Section 12.3 of the CEMP.

Environmental management plans such as this annexure are not static documents. Environmental management annexures will be updated during the course of the approved Action to reflect new information and changes to management controls, in accordance with the triggers and revision processes described in section 12.3 of the CEMP.

In accordance with Section 12.3.2 of the CEMP a working Change Notice Register will be maintained to capture continuous improvements to this annexure of the CEMP, arising from but not limited to outcomes of incident reviews, corrective actions, and adaptive management techniques that are identified. The Change Notice Register will be used to inform future CEMP reviews.

Appendices

Appendix A

Maritime Trial Piling Exercise Methodology Technical Memorandum

Maritime Trial Piling Exercise Methodology Technical Memorandum

1. Introduction

An underwater noise impact assessment (UNIA) of proposed dredging and piling construction activities for the SEA1010-1 SRF-West Priority Works project was undertaken by GHD (GHD, 2024). The aim of the UNIA was to assess the potential impacts on marine fauna likely to occur in the study area. The UNIA was prepared to support the referral for the proposed Action as required under the EPBC Act.

The EPBC Act approval (EPBC 2024/10031) for the approved Action was based on this assessment and includes a number of conditions relevant to underwater noise.

Condition 8r) requires that:

The CEMP must specify that piling, as part of the maritime works, will only commence following completion of a trial piling exercise to achieve the following outcomes:

> *i) Validate the modelled predictions for noise levels,*
>
> *ii) Quantify the rate of sound attenuation with distance from the piling site to validate modelled predictions,*
>
> *iii) Evaluate the efficacy of adopted noise mitigation measures to be implemented during the piling construction period at Armament Wharf Action area, and*
>
> *iv) Based on the monitoring results, re-evaluate the dimensions of the safety zones that will prevent harm from noise to marine fauna.*

1.1 Purpose of this memorandum

This Technical Memo is provided to outline the intended approach and basis for the overall methodology for the maritime trial piling exercise. This acoustic monitoring methodology has been designed to facilitate the requisite monitoring of the activity to occur such that Condition 8r) can be met.

2. Syngnathid salvage / translocation

Noting that the trial piling exercise will generate significant noise and vibration in the marine environment salvage / translocation of the identified Syngnathid population surrounding the Armament Wharf within the 60 m permanent threshold shift (PTS) onset threshold distance of the trial pile location will be undertaken. The 60 m will be applied as a radius around the centre point of the trial pile location and forms the source area to be surveyed. A soft start procedure (as per EPBC Act Approval 2024/10031 Condition 8t)) for piling will be used as a precautionary management control technique.. A detailed Syngnathid translocation strategy has been developed and is included as part of the CEMP Maritime Trial Piling Exercise Management Annexure (Annexure A6), with relocation activities proposed to occur over a three-day period prior to the trial piling exercise commencement.

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3. Trial piling exercise methodology

3.1 Objective

Noise monitoring during the trial piling exercise will be undertaken to:

– Collect underwater noise data during the trial piling exercise (with and without noise mitigation) to calculate the noise attenuation achieved for a number of scenarios (no bubble curtain, one bubble curtain, two bubble curtains and with a pile cushion)
– Evaluate the efficacy of noise mitigation measures implemented during the trial piling exercise
– Quantify the rate of sound attenuation with distance from the trial piling site and validate modelled predictions
– Verify and refine modelled predictions for noise levels for final selected pile types and re-calculate safety zones for marine fauna
– Prepare separate reports for monitoring and remodelling.

3.2 Trial pile type

To meet the requirements of Condition 8r) a 41 m long (1x23 m and 1x18 m spliced) 2/400WC328 Grade 350 trial pile (H) has been nominated for installation in the trial piling exercise at Armament Wharf. The H pile was selected as representative of the design pile configurations above and with cognisance of the limited anecdotal empirical data available for H-type piles compared to tubular piles for use in noise model development.

The trial pile will remain in situ following the trial piling exercise with cutoff proposed at 0.5 m above final design bed level subject to pending Navy approval.

3.3 Underwater monitoring locations

Monitoring will be undertaken utilising hydrophones during the trial piling exercise across a range of distances from the noise source as per Table 1. The water depth at the Project area and its surrounds ranges from approximately 8 m to 25 m. Each hydrophone monitoring location will be:

– located to the north-east of the trial piling location at Armament Wharf
– Deployed at a mid-water column location and at least 3m from the seabed
– Located away from vessel traffic routes (to the extent that is reasonable and feasible).

Table 1 Proposed hydrophone monitoring locations (unattended)

Location ID	Distances from trial pile	Purpose	Indicative depth, m (MSL)
UWN-01	10 m*	Obtain near-field source level	-11 m
UWN-02	375 m**	Intermediate field propagation validation	- 8 m
UWN-03	750 m	Comparison against approval condition 8.O.ii *160 dB re 1μPa² s (SEL) and 190 dB re 1 μPa (peak) for single pile strikes*	-12 m
UWN-04	1000 m	Far field propagation validation 1000 m***	-16 m

*The location of UWN-01 will be confirmed to ensure that it is sufficiently clear of bubble curtains 1 and 2, nominally located at an offset of 0.5 m and 1 m from the pile.

** The location of UWN-02 has been positioned to be clear of identified seagrass avoidance areas on the same transect alignment as UWN-03 and UWN-04.

*** UWN-04 has been limited to 1,000 m from the source to remain within Naval Waters

Figure 1 shows proposed hydrophone monitoring locations.

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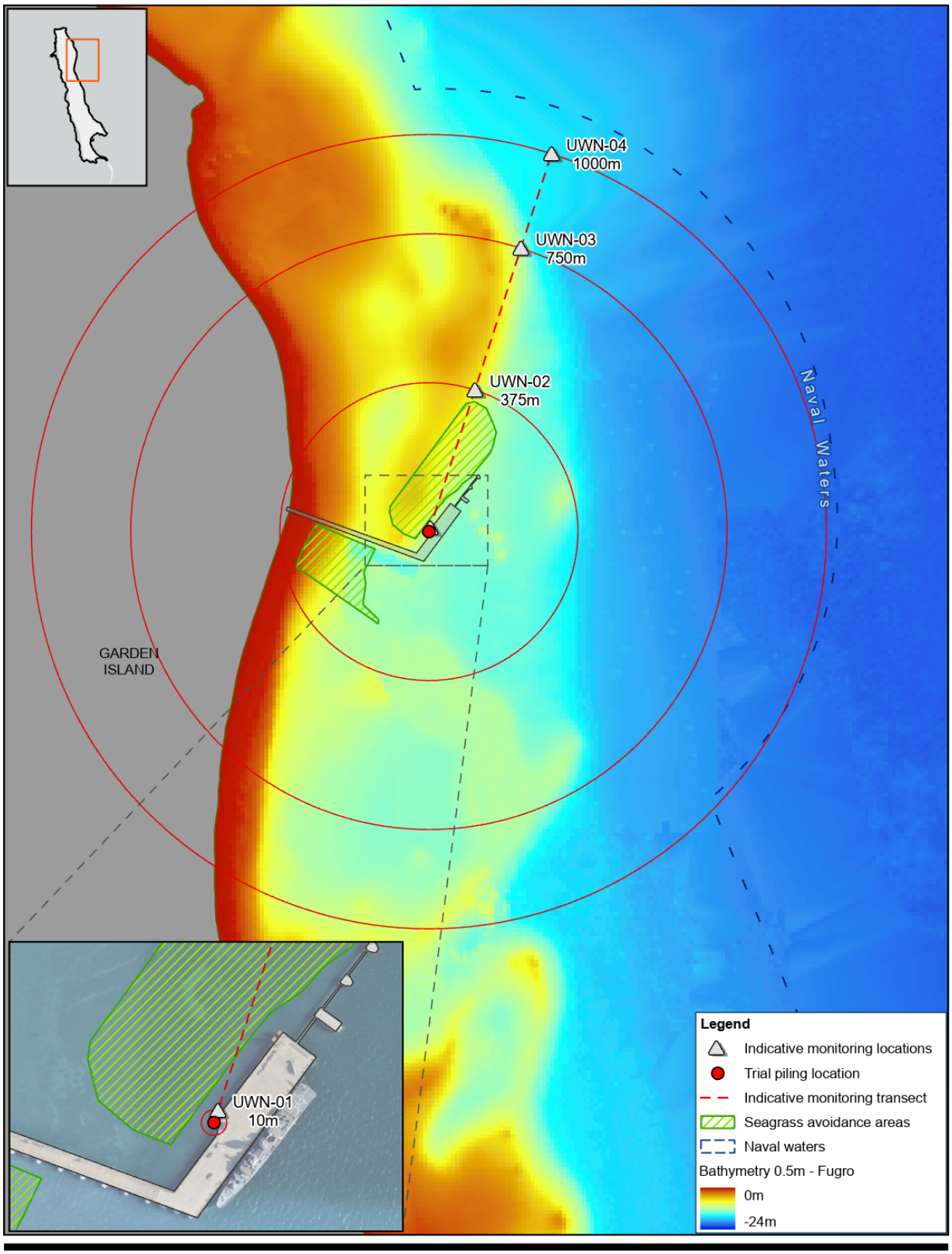


Figure 1 *Proposed hydrophone monitoring locations*

3.4 Trial piling exercise scenarios

Noise levels are proposed to be measured for a number of Scenarios as follows:

- Scenario 1: Without any piling activities, representative of the ambient underwater noise level
- Scenario 2: Impact piling with no mitigation: Measure peak sound pressure levels (SPL), root mean square (RMS), and sound exposure levels (SEL) for individual strikes and cumulative exposure. Noise levels will be measured continuously for a minimum of 10 pile strikes or when the pile has progressed 1m in depth (whichever is reached first)
- Scenario 3: Impact piling with selected mitigation implemented: Measure peak sound pressure levels (SPL), root mean square (RMS), and sound exposure levels (SEL) for individual strikes and cumulative exposure. Noise levels would be measured continuously for a minimum of 10 pile strikes or when the pile has progressed 1m in depth (whichever is reached first). Scenario 3A utilises a single unconfined bubble curtain, and Scenario 3B utilises a double unconfined bubble curtain.
- Scenario 4: Impact piling of Scenario 3 with the addition of a pile cushion(this scenario will be utilised on day 2 of trial piling noise monitoring only).

The scenarios above are proposed to be combined into 'cycles' with day one cycles consisting of Scenarios 1, 2, 3A and 3B completed in a maximum day one pile drive length of 5 m.

Day two cycles will include Scenarios 1, 2, and 4 (3A/B) to maximise the ability to collect data to inform underwater noise modelling to verify required noise reduction levels for future maritime works in the Careening Bay Action area as stated in Condition 8s) as follows:

8s) *The CEMP must specify that for the duration of maritime works within the Careening Bay Action Area, the most protective combination of mitigation measures that achieves at least a 15 dB reduction in underwater noise, will be implemented. The 15 dB reduction must be based on the Armament Wharf Action area underwater noise monitoring results specified in condition 8r.*

Condition 8t) requires the implementation of a soft start procedure of at least 10 minutes prior to the commencement of the trial piling exercise to enable marine fauna to move away from the area. This is further detailed in Section 3.5.

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3.5 Trial piling exercise program implementation

Initial consideration of the tasks required to complete the trial piling exercise program indicate that a multi-day program of works is required and to commence early March 2026.

Two days of trial piling are proposed. Prior to trial piling commencing the following logistics activities will be undertaken:

- Initial morning marine fauna monitoring survey (on vessel) out to 7 km
- Collect noise loggers and hydrophones from Armament Wharf and deploy at the 4 nominated locations (refer to Figure 1)
- Complete trial pile driving and monitoring activities
- Retrieve the 4 noise loggers and hydrophones and return to Armament Wharf for overnight storage at HMAS Stirling

Noting the limitations on early morning and late afternoon vessel movements in Moresby Harbour and Careening Bay associated with little penguins, it is proposed to mobilise from Fremantle to maximise the time available to complete required activities. Accordingly, Base approval for sea access to Armament Wharf will be required to support vessel operations.

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3.6 Trial piling exercise methodology

Condition 8t) requires that:

The CEMP must specify that, after any stoppage of 30 minutes or longer duration, maritime works will only commence: after the safety zones have been visually inspected for the presence of little penguins, Indian Ocean bottlenose dolphins and other marine fauna by a suitably qualified marine fauna observer, who has confirmed that no marine fauna have been observed in the safety zones, and if undertaking an impulsive noise generating activity, such as impact piling, a soft-start procedure will be used in which the piling impact energy or noise level is gradually increased from nil to full power over at least 10 minutes, allowing time for fauna to move away from the noise source and reduce the potential for injury.

Condition 8u) requires that:
The CEMP must specify that during all maritime works, a suitably qualified marine fauna observer will monitor the safety zones, and that all maritime works will shut down immediately if any marine fauna is observed within the shutdown zone or is about to enter the shutdown zone from the low power zone or observation zone.

To comply with the requirements of Condition 8t and 8u the following standard operational procedures for the trial piling exercise will be incorporated into the CEMP Maritime Trial Piling Exercise Management Annexure (Annexure A6).

Pre-start procedure: Marine Fauna Observers (MFOs) will visually monitor for marinefauna from a high vantage point for at least 30 minutes before starting the soft-start procedure for piling. This is to visually determinethat the area, especially the shut-down zone. , is clear of cetaceans, pinnipeds and penguins.

Soft-start procedure: If no marine fauna are observed, the Contractor can begin the soft start, gradually increasing piling impact energy over 10 minutes. This procedure is also required after any break in piling longer than 30 minutes to alert marine life and allow them to move away. Visual observations of marine fauna within the safety zones will be maintained by the MFO throughout soft starts. The soft start procedure is an added safeguard that can be used to alert marine fauna to forthcoming noise disturbance..

Normal operation procedure: Full impact piling can proceed if no marine fauna are detected during the soft start. Visual monitoring by the MFOs must continue, and the pre-start checks are repeated after significant breaks (≥ 30 minutes) or visibility issues (i.e. smoke, fog, heavy rain).

Stand-by operations procedure: If marine fauna is spotted in the observation zone during operations, the piling rig operator must be on stand-by to shut-down the piling rig should the animal enter the shut-down zone.

Shut-down procedure: Piling must stop immediately if marine fauna enters or is about to enter the shut-down zone. Operations can resume with a soft start once the animal leaves the zone or after 30 minutes without sightings, unless visibility is poor, in which case operations remain halted until conditions improve.

Compliance and sighting report: The Contractor and MFOs are required to keep a detailed record of the procedures employed during operations and information on any marine fauna sighted during the activities and their behavioural response to the activity. A report on the activity will include location, date, start and completion of the piling activities, information of the piling rig (hammer weight, drop height, pile size, number of piles, no. of impacts per pile etc.). The GHD MFO team will lead this activity in collaboration with the Contractor. The report will be accompanied by marine fauna observation forms including details of the animal position, species, sighting cue behaviour, direction of travel and mitigation taken.

Without additional mitigation measures, the safety zones for marine fauna are calculated to be as follows:

– For hydraulic impact piling involving 1,500 pile strikes in a 24-hour period, the shut-down zone and observation zones for low frequency cetaceans were calculated in the Environment and Heritage Assessment (GHD, 2025a) to be between 6 and 9 km.

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Noting that migratory species such as humpback whales (low frequency) are not expected in the area during the proposed trial piling exercise window, and daily pile strikes are anticipated to be below 1,000 (strikes/day max calculated for the trial piling exercise) an initial morning survey out to a 7 km radius will be completed to ensure that no low frequency cetaceans are within 7 km of the piling. This aligns to the Joint Nature Conservation Committee (JNCC). (2010). *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals for piling noise* and EPBC Policy Statement 2.1 – Interaction between offshore seismic exploration and whales: industry guidelines (DEWHA, 2008).

For unmitigated impact piling (1,000 pile strikes/day max calculated for the trial piling exercise), the identified safety zone for high frequency cetaceans (i.e. dolphins) is 644 m plus a 250 m buffer.. This relates to a 900 m observation zone and a 650 m shutdown zone for the trial piling exercise. Being a condensed observation zone, MFOs will cover the observation zone during piling works with one at the Armament Wharf and the second on vessel at approximately 500 m.

4. Underwater noise monitoring methodology

4.1 Equipment specifications

The equipment selected for undertaking the underwater noise moniotring allows collection of underwater noise to capture the detailed measurements from discrete events such as pile driving, in addition to reporting of the average underwater noise levels at regular intervals. Due to the sensitivity of the equipment, attempts will be made to deploy at a safe distance from the piling noise source to ensure no overloading of the hydrophone occurs.

The full system will be calibrated in accordance with Section 4.3 of the ISO 18406:2017 and conform to IEC 60565. Additionally, an in-situ system calibration will be undertaken immediately prior to and post deployment.

Between logger retrievals and redeployments, field calibrations will be undertaken. Calibration will be completed using a GRAS pistonphone that produces a signal of known amplitude and frequency, and the RTSYS auto-calibration system (calibration on electrical signal change using a precise voltage).

4.2 Equipment installation / retrieval

A bottom-mounted system is proposed for the underwater noise monitoring because it offers several advantages including a fixed location and accurate recording of acoustic data collection. A demersal float will be used to maintain the logger at a position of 3 m above the seabed (as is required for ISO 18406:2017), and a ground line with a surface float will be used for quick deployment and retrieval (see Figure 2). This method also avoids capture of background noise data resulting from the acoustic recorders deployment directly from vessels or from the unintended movement/splashing against surface float.

The installation of the noise monitoring system will follow the general procedure:

– For system deployment, the noise monitoring system will be lowered into the water via crane/davit on a vessel.
– The noise logger and hydrophone will first be lowered into the water along with the demersal float. The weighted ground line and secondary weight will then be lowered.
– For system retrieval, the float will be retrieved, and the crane/davit will be used to retrieve the system.

A suitably qualified acoustic consultant and a marine fauna observer will conduct tasks from the vessel.

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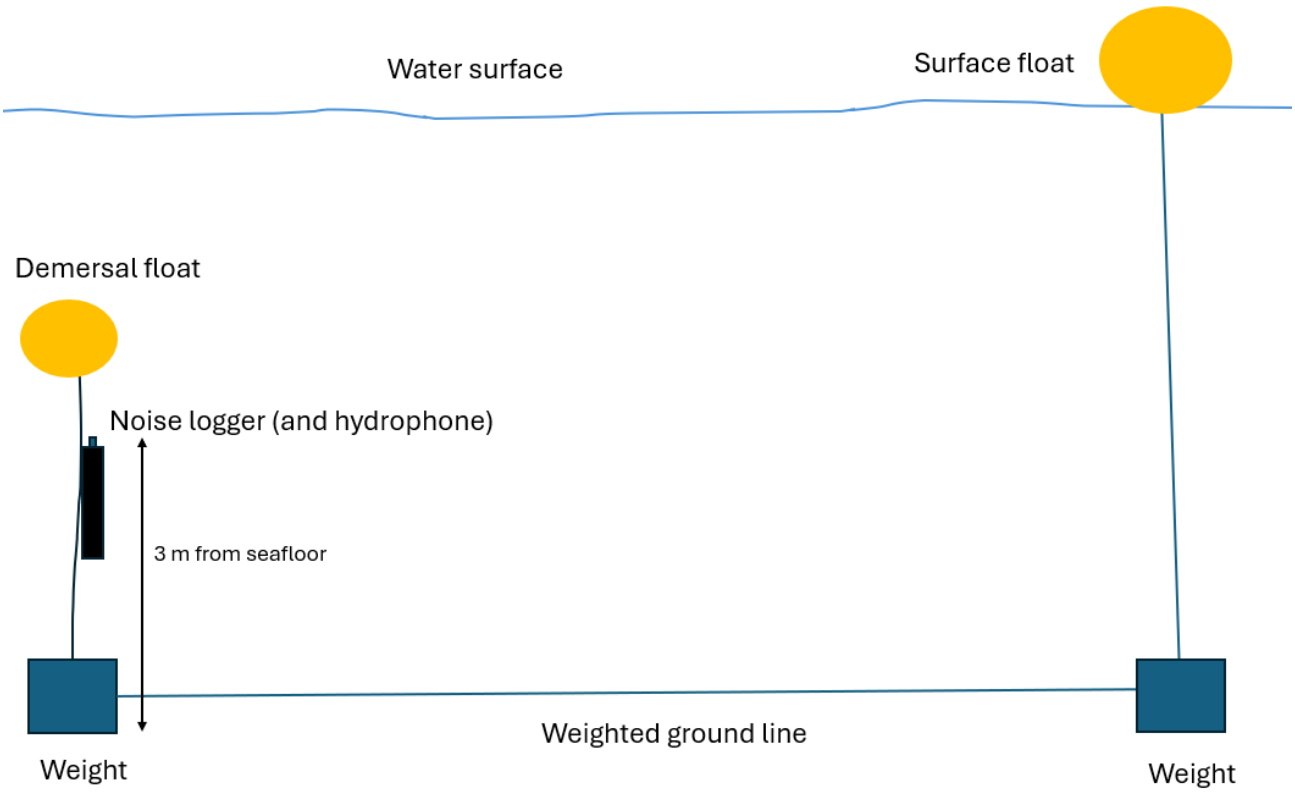


Figure 2 *Equipment installation method*

A second qualified acoustic consultant will conduct tasks from the Armament Wharf, where terrestrial attended acoustic monitoring will also be undertaken. The second MFO will also be stationed on Armament Wharf.

Our program assumes that hydrophones / loggers are retrieved at the completion of day one trial piling exercise activities and that a weekend or at least a one-day standdown is allowed to enable data extraction, interrogation and assessment to confirm if required noise reduction targets have been achieved. Day two of the trial piling exercise activities will be refined based on the results achieved from day one and the implementation of Scenario 4 mitigation will also be trialled to capture a complete suite of mitigation measures. A third contingency day has been provisioned should additional monitoring be required due to unforeseen issues or weather and on the basis that there is adequate pile length remaining to complete further cycles.

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Appendix B

Maritime Trial Piling and Syngnathid Technical Memorandum

Maritime Trial Piling and Syngnathids Technical Memorandum

1. Introduction

1.1 Purpose of this memorandum

This Technical Memorandum provides information about Syngnathid considerations for the upcoming trial piling exercise.

The trial piling exercise will take place over a short period (2 days of active piling) and at a single pile location. To meet the requirements of Condition 8r), a 41m long (1x23m and 1x18m spliced) 2/400WC328 Grade 350 test pile (H) (welded width being 800 mm wide) will be driven at Armament Wharf.

Based on the results of the preliminary underwater noise modelling, precautionary distances for mortality and recoverable injuries are 10 m and 60 m respectively (noting that the modelling was based on the sound exposure levels accumulated from 1,500 pilings).

Salvage pre-clearance surveys will be undertaken prior to piling in the area up to 60 m from the source, and Syngnathids will be moved to suitable habitat outside the area of potential impact (defined as >330 m from the noise source). Based on baseline surveys, it is estimated that potentially up to 50 pipefish and up to 100 seahorses will need to be translocated prior to the trial piling (GHD, 2026b).

1.2 Syngnathid Management Plan

The Syngnathid Management Plan (SMP) (GHD, 2026b) was developed following the completion of Syngnathid baseline surveys for the approved Action. The SMP was prepared to address Conditions 25, 26, 27 and 28of the EPBC Act approval 2024/10031 relating to Syngnathid management including translocation. The primary management control strategy identified for Syngnathids consists of a translocation and post-translocation monitoring program, prior to the commencement of Maritime construction activities. Translocation will involve the targeted capture and transfer of individuals to ecologically suitable receiver sites.

The SMP follows a phased implementation, in accordance with the recommendations outlined in the *National Policy Guidelines for the Translocation of Live Aquatic Animals* (Department of Agriculture, Water and the Environment, 2020). This approach facilitates a systematic risk assessment and enables adaptive management of the SMP throughout its execution.

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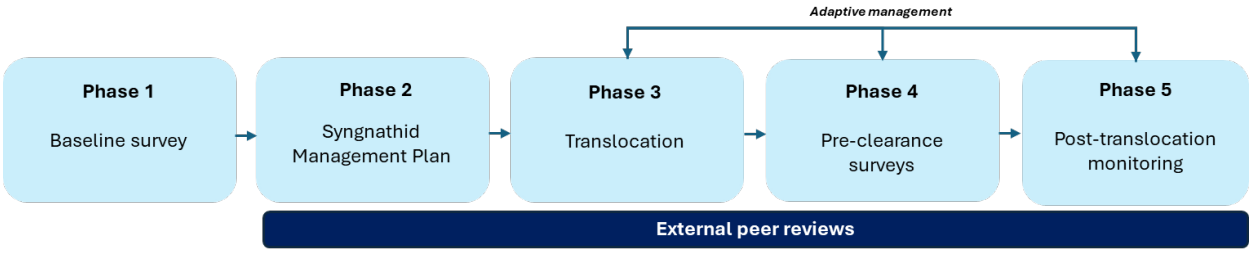


Figure 1-1 Phased approach of Syngnathid management for SRF-West

Referencing the phased approach to Syngnathid management for SRF-West (refer Figure 1-1) per the SMP (GHD, 2026b), and acknowledging that Action-wide translocation activities have not yet commenced, it is determined that pre-clearance surveys (Phase 4) will be required for the trial piling exercise and no post-translocation monitoring/tagging will be necessary. Syngnathids management limited to pre-clearance surveys is considered appropriate for the size and scale of the pre-construction trial piling exercise.

Syngnathids translocated during pre-clearance surveys will be included in broader Action-wide monitoring following the completion of translocation of Syngnathids ahead of the commencement of the maritime construction activities of the Action.

1.3 Rationale for trial piling exercise pre-clearance survey

The trial piling exercise has the potential to disturb and impact Syngnathids from direct, physical disturbance in the vicinity of the piling, and through exposure to high-intensity underwater noise and vibration. The limited mobility and strong habitat fidelity of Syngnathids makes them particularly susceptible to such impacts. Given that the hearing range of Syngnathids overlaps with that of pile driving, it is possible that Syngnathids exposed to the trial piling exercise could experience:

– Behavioural impacts: stress responses for individuals within the permanent threshold shift (PTS, 60 m) could be expected from acute noise exposure caused by the trial piling exercise (Anderson *et al*, 2010).
– Stress and physiological effects: exposure to chronic noise (up to 1 month) resulting in weight loss, immunosuppression and declining body condition (Anderson *et al*, 2010).
– Potential displacement: Syngnathids may leave their habitat if pile driving noise is nearby their habitat (Iafrate *et al*, 2016), but noting their physiology constrains their ability to escape harm.

To reduce the risk of harm, Syngnathids will be translocation from the source area. The source area is defined as a 60 m radius from the centre of the trial pile location. This area was determined from a review of the permanent threshold shifts (PTS) for bony fish considering the anticipated noise exposure of the trial pile exercise (GHD, 2024). To reduce potential risk of harm, translocating individuals present within a 60 m radius around the trial pile exercise location to a location greater than 330 m outside the potential area of influence (adopted as temporary threshold shift (TTS) in this context), will ensure compliance with EPBC Act Approval 2024/10031 Conditions 25, 26d and 27.

Of note, these threshold limits are theoretical, not well studied, and represent a conservative estimate based on 1500 pile strikes. However, given the length of the trial piling exercise is constrained temporally, priority should be given to translocation of any individuals within 60 m of the noise source. The salvage translocation will be undertaken per the timeframes defined in the Condition 27, being '*undertaken on the same day and immediately prior'* to the trial piling exercise, where practicable. Adaptative management measures will be implemented where diver safety or other construction conditions do not allow translocating to occur on the same day as or immediately prior to the trial piling exercise.

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2. Pre-clearance translocation survey approach

2.1 Timing

Salvage clearance surveys will be undertaken prior to the trial piling exercise commencement. To facilitate a safe working environment for divers, and adherence to AS/NZS 2299.1:2015, it is not safe to be in the water during preparation works necessary to establish the piling equipment and during active piling.

Given the distance between the translocation site and the trial piling area, the home range and limited swimming ability of Syngnathids, the likelihood that the translocated individuals will return to the source site in the time during the salvage clearance survey and the piling is low. However, it is acknowledged that some individuals may move into the PTS zone from adjoining habitat outside of the 60 m source area.

2.2 Permits

2.2.1 Commonwealth

Under Part 13, Division 4 of the EPBC Act, a permit is required for any of the following in a Commonwealth Area as defined in Section 525 to:

– Take an action that results in the death or injury of a member of a listed marine species (other than a cetacean or a member of a listed marine species that is also a listed threatened species or listed migratory species); and
– Take, trade, keep or move a member of a listed marine species (other than a cetacean or a member of a listed marine species that is also a listened threatened or migratory species).

A General Permit for a Listed Marine Species (Section 258) is therefore required to take or move Syngnathids in and out of Commonwealth Area. However, both the source and the translocation site are in Coastal Waters. Accordingly, the translocation will not take place in a Commonwealth Area. Further, the activity is a requirement under the conditions of approval for EPBC 2024/10031, therefore an EPBC permit will not be required.

2.2.2 State

The Western Australian Department of Primary Industries and Regional Development (DPIRD) generally requires approval to be sought prior to translocating live fish or other marine species for both commercial and non-commercial uses. The standard approval process may take at least 10 days due to the need for a risk assessment. This permitting pathway applies only to the translocation of non-endemic species entering the state or non-endemic species being moved into Western Australia and therefore, a translocation permit is not required.

Under the *Fish Resource Management Act (FRMA) 1994*, an Instrument of Exemption (IoE) is issued by DPIRD for interacting with aquatic resources within state coastal waters, unless an exemption is granted. There are specific purposes the DPIRD can grant an exemption to obtaining an IoE, including:

– Research
– Environmental protection
– Public safety
– Public health
– Commercial purposes.

DPIRD has provided advice that should works be constrained to Naval Waters, that an exemption of any state permits can apply. As all translocation activities are constrained to Naval Waters, DPIRD has exempted this exercise from any state permits.

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2.3 Locations

2.3.1 Source sites

Syngnathids were recorded at Armament Wharf, both on the piles and in adjacent seagrass habitat. Syngnathids within a radius of 60 m of the trial piling location, considered the area within which death or recoverable injury may occur (PTS), will be translocated outside of the area of influence (considered the temporary threshold shift, TTS), given as 330 m (GHD, 2024).

The trial piling location is in approximately 11 m of water, and the 60 m radius is provided in Figure 2-1.

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Figure 2-1 *Salvage area*

2.3.2 Indicative translocation site (receiver site)

GHD will translocate individuals to natural habitat, which is supplemented by artificial habitat structure placed alongside, in line with the requirements of the National Policy Guidelines for the Translation of Live Aquatic Animals 2020 (DAWE, 2020), which requires receiver sites to be a like-for-like replacement.

GHD will translocate individuals in groups as they are found in the source sites and release in those same groups. This will help to reduce potential disruption to breeding pairs.

Two potential translocation (receiver) areas have been identified. GHD has identified two areas to service populations at Armament Wharf in the north and southern areas (i.e. Diamantina Pier, Moresby Harbour) to reduce handling time. Indicative latitude and longitude boundaries are provided in Figure 2-2.

The Garden Island North Translocation Site is located 400 m, and the Garden Island South Translocation Site is 610 m from the shoreline within Naval Waters. Syngnathids present at Armament Wharf during the trial piling exercise within the 60 m salvage area will be taken to the Garden Island North Translocation Site.

A standardised diver transect survey will be undertaken to characterise the benthic environments at the indicative translocation (receiver) sites and quantify Syngnathid abundance and diversity.

GHD will deploy artificial habitat enrichment to the receiver site locations, in line with the recommendations of the SMP (GHD, 2025b). This will allow attachment opportunities, vertical habitat complexity to provide a like-for-like habitat of the source sites (i.e. piles vertical habitat), provide protection from predation and supplement natural seagrass habitat.

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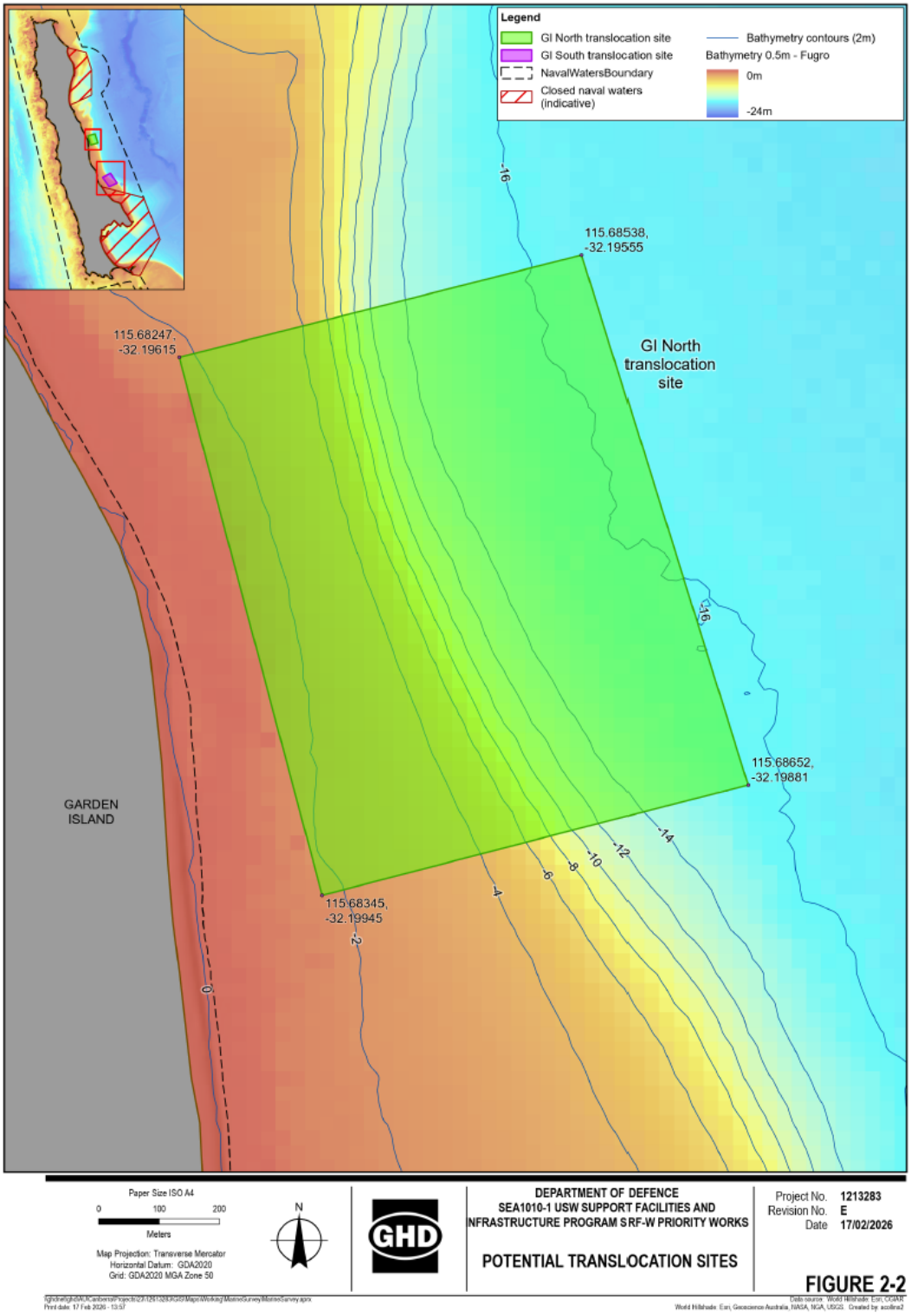


Figure 2-2 Translocation (receiver) indicative site for Syngnathids

2.3.2.1 Artificial habitat enrichment

Artificial habitat (i.e. seahorse hotels) represents an important conservation tool in managing Syngnathid populations given their vulnerability to impacts from maritime construction and the declining natural habitat in Cockburn Sound. To ensure compliance with the National Policy Guidelines for the Translation of Live Aquatic Animals 2020 (DAWE, 2020) and with the SMP, placement of artificial habitat will allow for a like-for-like habitat replacement. The artificial habitat will sit alongside natural habitat so that both seahorses

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and pipefish habitat preferences and requirements are considered. GHD will place artificial rebar structures in the receiver site (Figure 2-2) to supplement natural seagrass habitat.

The placement of the artificial habitat will take place immediately prior to the translocation. The structure will allow for vertical habitat complexity, attachment opportunity and protection from predation while the population establishes itself in the receiver site. This will maximise the chances of survival.

GHD will deploy up to three structures spaced 2-3 m away from each other. The structure is provided in Figure 2-3 . GHD will deploy these structures horizontally on the seabed in water depths of at least 8 m.

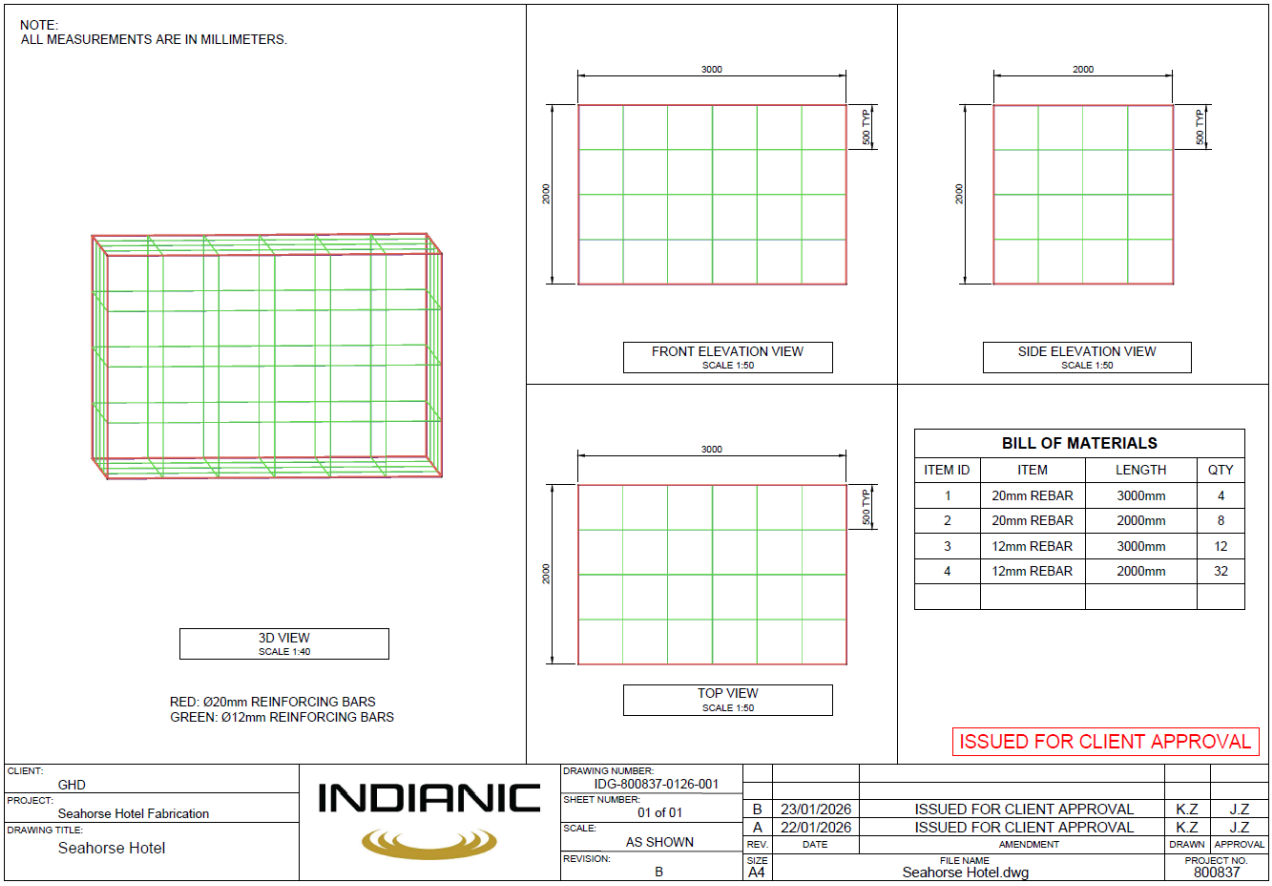


Figure 2-3 Proposed artificial habitat structure

2.4 Equipment

All Syngnathid translocation must be undertaken by suitably qualified marine field ecologists (marine ecologist) and directed by suitably qualified Syngnathid ecologists (Syngnathid ecologist). The translocation must be as efficient as possible and will be undertaken using a team of local commercial divers on SSBA cycling compressed air and enriched air nitrox (EAN) that allows the translocation effort to maximise dive time and reduce surface intervals. Due to the logistical constraints of this program (i.e. time and estimated population size at source sites), it is not appropriate to use SCUBA due to the inherent and significant inefficiencies of SCUBA.

The equipment requirements for Syngnathid relocation includes:

– Rigid transport containers/ coolers (≥10 L)
– Additional buckets for mixing acclimation water
– Additional insulating materials
– Battery powered air pumps as backup aeration
– Digital thermometers

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- Holdfast structures (i.e. rope, mesh, seagrass, macroalgae)
- YSI water quality probe
- SSBA dive equipment including diver cameras
- Sanitised dive gloves
- Headlamp / UV light
- Power free nitrile or latex disposable gloves
- Grab containers with secure lids
- Soft measuring board or callipers for sizing
- Weighing scales
- Underwater slate and pencil
- Translocation proforma field sheets
- Scoop net
- Vessel
- Handheld GPS
- Tags
- Shade cloth.

2.5 Resources

2.5.1 Suitably qualified Syngnathid ecologists and suitably qualified marine field ecologists

GHD has prepared this technical memo under the guidance of the SMP (GHD, 2026), prepared by marine ecologists and reviewed by external Syngnathid ecologists. GHD proposes to use the same resources for consistency of program and approach. To deliver the program, Syngnathid ecologists (Table 2-1) and marine ecologists (Table 2-2) will carry out the Syngnathid management. Key roles pertinent to the delivery of the Syngnathid salvage translocation are provided in Table 2-1

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Table 2-1 External peer reviewers - suitably qualified Syngnathid ecologists

Personnel	Abridged bio	Mapping against definition of suitably qualified Syngnathid ecologist and marine field ecologist (EPBC 2024/10031)
Dr. Glenn Moore ***Education:*** *PhD (Zoology)* *MSc (Research)* *BSc (Hons) (Zoology and Botany, MSc,*	**Position:** Curator of Fishes, Department of Aquatic Zoology. Western Australian Museum. Adjunct Research Fellow, School of Animal Biology, University of Western Australia. Adjunct **Experience:** Glenn is an experienced ichthyologist; Glenn has been researching Western Australia's fishes for more than 30 years. He is the state's recognised authority for the identification and taxonomy of both marine and freshwater fish. He actively collaborates on many and diverse projects with a range of research agencies, government and community stakeholders. His research involves taxonomy, genetics, biodiversity, biogeography, ecology and evolution, with a proven publication record on fishes as well as other fauna and museology. Glenn is an experienced field-based researcher, including extremely remote marine and terrestrial regions, with proficiency in planning, collection and preservation methods, data collection and	*Designing and implementing surveys and translocations for Syngnathids* Glenn has been surveying Syngnathid fishes in a professional capacity since 1995. His research on the reproductive behaviour of the Western Australian Seahorse involves *in situ* surveys of multiple populations across the greater Perth metropolitan area. This includes population size estimates, sex ratio, home range mapping and breeding. This was intensive from 1995-2000 and 2007-2008 but continues intermittently. This project included constant handling of seahorses – hand capture, removal from water, collecting a range of morphometric data, attaching a collar tag, taking a small fin clip and sampling embryos from the pouch before returning to the site they were collected. Glenn has undertaken surveys for Syngnathids (especially seahorses and pipefishes) during extensive fish surveys across Western Australia. This includes Kimberley (across 14 years), Pilbara (5 years), Mid-west coast (3 years), South-west coast (30 years), South coast (10 years). These surveys include SCUBA, large and small trawl, seine, intertidal surveys and collections. Glenn provided expert advice to consultants undertaking Syngnathid surveys and translocations during infrastructure development for the Department of Defence Preston Point jetty in the Swan River in 2014/2015. *Writing and implementing management plans for Syngnathids* Glenn's role does not include writing management plans. His recent project (Spatio-temporal distribution of Syngnathids of Cockburn Sound) included detailed consideration of the impacts of port construction and ongoing activities on Syngnathids and recommendations for mitigation. This required compilation of contemporary literature on Syngnathid conservation risks and mitigation strategies from across the world.

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Personnel	Abridged bio	Mapping against definition of suitably qualified Syngnathid ecologist and marine field ecologist (EPBC 2024/10031)
	post-trip processes. He regularly uses outreach opportunities to engage with the public, raising awareness about fish through popular publications, media, public enquiries and citizen science initiatives.	Glenn provided expert advice to consultants undertaking Syngnathid surveys and translocations during infrastructure development for the Department of Defence Preston Point jetty in the Swan River in 2014/2015. *Experience with Syngnathids, with both aquaculture (capture and movement) expertise and an ecological (in-situ population) expertise* Glenn has considerable experience with *in situ* observations of seahorse behaviour, comprising more than 800 hours on SCUBA. This includes population surveys, home range mapping, recording courtship and general ecological behaviours. As part of wide-ranging fish surveys, he also has *in situ* experience with other Syngnathids. He has considerable experience in handling of seahorses, including hand capture and release, removal from water, collecting a range of morphometric data, attaching collar tags, taking small fin clips and sampling embryos from the pouch. He has collected pipefishes from seines and trawls, undertaken basic measurements and released. Glenn has tagged and tracked hundreds of seahorses *in situ* to determine home-range movements Glenn has also performed breeding experiments on seahorses in both aquaria (5 years) and *in situ* cages (2 years). *Can give authoritative assessment and advice regarding Syngnathids and Syngnathid habitat using relevant protocols, standards, methods and/or literature* As the State authority for fish identification, taxonomy and distribution, Glenn holds the most extensive knowledge on Western Australian Syngnathid fishes. Having recently completed a large meta-analysis of existing and new data for the Syngnathids of Cockburn Sound, he has demonstrated expertise for this region. He has substantial understanding of the challenges of surveying and collecting Syngnathid fishes including methodology, habitat preferences and seasonality. He established the citizen science initiative: *Seahorses pipefishes and seadragons of Western Australia.*
Dr. David Booth ***Education:*** PhD (Zoology) MSc (Fish Biology) BSc (Zoology) ***Associations:*** *Australian Coral Reef Society*	**Position:** Professor of Marine Ecology (University of Technology Sydney) and Research Associate (Sydney Institute of Marine Science) **Experience:** David is a highly cited marine researcher whose work over many years has heightened awareness of the impact of anthropogenic forces, such as pollution and climate change on fish. As a Professor of Marine Ecology, David has more than 180 papers on fish ecology,	*Designing and implementing surveys and translocations for Syngnathids* David has 20 years' experience, of his total 45 years of experience, in the field of Syngnathid ecology including for the design and implementation of surveys and translocation advice for Syngnathids. *Writing and implementing management plans for Syngnathids*

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Personnel	Abridged bio	Mapping against definition of suitably qualified Syngnathid ecologist and marine field ecologist (EPBC 2024/10031)
AMSA *Australian Society of Fish Biology* *International Coral Reef Society*	climate change and other anthropogenic impacts on fish and fisheries. David is a leader in Australia on fish, including Syngnathids. David's research focusses on the ecology and behaviour of threatened fishes such as seadragons and seahorses, black rockcod and white sharks. David's research spans artificial structures from understanding the positive and negatives of small artificial reef structures through to offshore oil and gas structures. David has shown leadership in Australian marine sciences, serving as President, Australian Coral Reef Society (2015-2017) President NSW Branch Australian Marine Sciences Association (2001-2004), Earthwatch Scientific Advisory Committee (2016-present). and Chair SAC Sydney Institute of Marine Sciences (2011-2014). David is a member of the Sustainable Australian Seafood Assessment panel (2013-present), the Ocean Science Council of Australia (2015-present). He has been an invited speaker at the 12th International Coral Reef Symposium in 2012, the NSW Royal Society of Zoology 2008 and Australian Society of Fish biology 2010 (invited seminar and talk: climate change and fish distribution), ACRS Annual conference 2013 (Keynote speaker), and regularly speaks in public forums, such as Bondi Ocean Lovers' Festival and has an extensive media engagement. David is also a member of IUCN SSC Seahorse, Pipefish and Seadragon Specialist Group.	David has been the chief investigator for the 'co-restoration of Posidonia seagrass and White's seahorse in NSW estuaries. As the only EPBC listed threatened species of Syngnathid, David is well versed in the writing and implementation of management plans for Syngnathids. *Experience with Syngnathids, with both aquaculture (capture and movement) expertise and an ecological (in-situ population) expertise* David has experience in over 20 projects in locations including eastern Australia, Pacific Islands, Caribbean. 1980-present, with a focus on ecology of fishes. He is a highly cited marine researcher whose work over many years has heightened awareness of the impact of anthropogenic forces, such as pollution and climate change, on fisheries. He is Professor of Marine Ecology in the School of Life Sciences at UTS, has published more than 200 papers about reef-fish ecology, climate change and other anthropogenic impacts on fishes and fisheries, in the Caribbean, Hawaii, and the Great Barrier Reef and is a strong advocate of sustainable fisheries and marine parks, and a supporter of citizen science. *Can give authoritative assessment and advice regarding Syngnathids and Syngnathid habitat using relevant protocols, standards, methods and/or literature* David has 45 years of experience in the field of fish ecology and behaviour including 20 years specifically in Syngnathid research.

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Table 2-2 GHD personnel – suitably qualified marine field ecologists

Personnel	Abridged bio	Mapping against definition of suitably qualified Syngnathid ecologist and/or marine field ecologist
Dr. Justin Meager ***Education:*** *PhD, Marine Ecology* *BASc(Hon, Marine Biology)* *BASc(Ecology)* ***Associations:*** *Australian Marine Sciences Association* *World Wildlife Fund Marine Turtle Expert Advisory Panel*	**Position:** Technical Director – Marine Ecology **Experience:** Justin is a leading technical director at GHD in the field of marine ecology with 30 years of experience across academia, government and consulting in a wide range of marine environments. Justin has substantial experience in managing large, complex projects, across regulatory frameworks and conservation management of wildlife having help positions on numerous national and international working groups and expert advisory panels. Justin has extensive experience working on marine projects across a number of jurisdictions including Australia, Europe, the Middle East, Philippines and the Pacific. Justin has authored over 100 scientific articles/major reports/book chapters on topics including marine mammals, fishes, marine turtles, birds and marine invertebrates, the impacts of water quality, pollution, aquaculture, floods and noise on fauna. He has acted as an expert reviewer on grant applications, reports, regulations, strategic documents, recovery plans and on 107 scientific articles. Justin has also acted as an independent reviewer for DBCA in WA.	Justin has 30 years of experience as a marine field ecologist/ marine fish ecologist, and three years of fieldwork experience in Western Australia. He is eligible to be authorised under the Western Australian Government for the capture and handling of wildlife. Justin will work under guidance and direction of Dr Glenn Moore and Dr David Booth. Prior to working at GHD, Justin was a senior marine scientist for the Aquatic Threatened Species Program for the Queensland Government for 11 years, where he was responsible for fishes and other threatened marine species. He was also responsible for approvals of translocation plans for threatened freshwater fishes. Justin's postgraduate and postdoctoral research focused on fish, including Syngnathids. At GHD, Justin is responsible for technical review and guidance on environmental impact assessments and management plans for Syngnathids.
Madelaine Hooper ***Education:*** *MEnvSc* *BEnvSc(Biology)(Environmental Monitoring)* *BIntBus* *BCom(Economics)* ***Associations:*** *Environment Institute of Australia and New Zealand* *Australian Marine Sciences Association*	**Position:** Marine Science Lead NSW **Experience:** Madelaine is a leading marine scientist with over 13 years' experience across tier one consulting and specialist consulting firms and in scientific research. Madelaine has experience in large-scale, nationally and internationally significant environmental assessments and ecological monitoring programs delivered under international, Commonwealth and state regulatory frameworks. Madelaine has experience working on marine projects across numerous jurisdictions including Australia, Middle East and across the Pacific. Madelaine's technical areas of expertise include technical direction and lead scientist, conservation management, design and implementation of complex ecological monitoring programs including targeted species assessment to fit regulatory and scientific objectives, marine ecology, habitat mapping, threatened species impact assessments, artificial reef design and marine pollution.	Madelaine has 13 years of experience as a marine ecologist, relevant qualifications and is eligible to be authorised under the Western Australian Government for the capture and handling of wildlife. During Madelaine's 13-year career in marine science, Madelaine has led and contributed to the design of Syngnathid surveys and translocation advice (including site selection and advice on habitat requirements and translocation considerations and approach) and can give an authoritative assessment and advice of targeted species assessments, including presence of Syngnathids given an in depth understanding of Syngnathids. Madelaine has worked on numerous projects involving the Commonwealth listed endangered White's Seahorse (*Hippocampus whitei*). Madelaine is competent to give an authoritative assessment and advice regarding Syngnathids and habitat using relevant protocols, standards, methods and/or literature.

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Personnel	Abridged bio	Mapping against definition of suitably qualified Syngnathid ecologist and/or marine field ecologist
Professional Association of Scientists and Engineers *Australian Coastal Society*		Madelaine will work under guidance and direction of Dr. Glenn Moore, Dr. David Booth and Dr. Justin Meager.

Table 2-3 Key roles associated with Syngnathid salvage translocation to support the trial piling exercise

Role	Responsibilities
Suitably qualified marine field ecologist (marine field ecologist)	– Holds relevant qualifications (biology, ecology, science). – Has at least 3 years' experience implementing surveys and/or translocations for Syngnathids. – Can give authoritative assessment and advice on the presence of Syngnathids. – Handle Syngnathids and maintain husbandry while on board the vessel and undertaking of handling for the purposes of gathering health information, tagging (where applicable) and releasing to the commercial diver team to place in receiving habitat. – Preparation of the Syngnathid management plan. – Provide post translocation reporting.
Suitably qualified Syngnathid ecologist (Syngnathid ecologist)	– Holds relevant qualifications (biology, ecology, science). – Has at least 5 years' experience designing and implementing surveys and translocations for Syngnathids. – Has at least 5 years' experience writing and implementing management plans for Syngnathids. – Has at least 5 years' experience with Syngnathids, with both aquaculture (capture and movement) and an ecological (in-situ populations expertise. – Can give authoritative assessment and advice on the presence of Syngnathids. – Provide oversight of: • the implementation of the Syngnathid management plan or provide delegated authority to the marine ecologist. • Selection and preparation of appropriate receiver site locations, such as natural habitat or other suitable habitat. – Provide an authoritative assessment of the need and methods by which, reference Syngnathid specimens are to be provided to the Cockburn Sound Syngnathid eDNA library. – Review of Syngnathid management plan.

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	– Review post translocation reporting.
Commercial diver	– Must hold a minimum of an ADAS 2 qualification with nitrox endorsement (enriched air nitrox) in accordance with AS/NZS 2299.1 standard and have demonstrated experience in commercial diving activities within HMAS Stirling waters. – Syngnathid diver survey experience and with proposed methods at HMAS Stirling. – Safely and efficiently collect Syngnathids in the area defined by the marine ecologist / Syngnathid ecologist using methods defined by the Syngnathid management plan. – Transfer individual specimens to the vessel dry dock ready for translocation. – Actively communicate to the dive supervisor any incidents of Syngnathid welfare concerns to the dive supervisor and on board marine ecologist / Syngnathid ecologist as soon as reasonably practicable. – Follow the guidance, for the purposes of the implementation of the Syngnathid management plan, of the marine ecologist and/or Syngnathid ecologist at all times.
Dive supervisor / vessel master	– Must hold a minimum of an ADAS 2 qualification with nitrox endorsement (enriched air nitrox) in accordance with AS/NZS 2299.1 standard, have demonstrated experience in commercial diver supervision activities within HMAS Stirling waters, hold a minimum certification of SSBA to 30 m Supervisor and meet the requirements for competencies listed under the ADAS SSBA to 30 m Supervisor certification. – Syngnathid diver survey experience and with proposed methods at HMAS Stirling. – Must conduct pre-dive safety checks on all commercial divers. – Follow and enforce strict safety protocols for diving operations, including managing air supply and decompression if required. – The safety and command of the vessel, crew, passengers and cargo. – The operations and navigation of the vessel including route planning, navigation and compliance with all relevant legislation and license conditions. – Maintain official logbook, 15-minute daily logs and communication with Port Services. – Follow the guidance, for the purposes of the implementation of the Syngnathid management plan, of the marine ecologist and/or Syngnathid ecologist at all times.

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2.6 Method

Monitoring will be undertaken in line with the monitoring requirements described in the SMP (GHD, 2026b). The translocation method to support the trial piling exercise is outlined in Table 2-3.

Table 2-4 Syngnathid salvage and clearance methods summary for species noted present during the baseline survey

Translocation method	Prepare	Salvage/capture/locate	Release
In-situ *Diver based hand capture*	**West Australian Seahorse, Tiger Pipefish and other Syngnathids** – Agreement of receiver sites from DEPAC and Syngnathid ecologists – Prepare onboard vessel fish transport systems and establish stable water quality using source water. – Translocation proforma preparation. – Field logistics pre-mobilisation.	**West Australian Seahorse and other Syngnathids** – Two divers search the trial pile location out to a radius of 60 m. – Syngnathids located to be captured by hand and placed in an extended catch bag or similar so that individuals are not injured from crushing or abrasion (e.g. storing individuals in zip lock bags filled with water and then placed in the catch bag). Syngnathids should always be submerged in marine water. – Maintain low density in bags, 2 – 4 per 10 L container. Placement of holdfast structures into the transport containers (i.e. rope, mesh, plants) to allow natural grip behaviour. – Pairs or nearby groups of individuals are not to be separated and are to be placed in the same bag and storage on the vessel during transit to the receiver site. – Place Syngnathids into vessel-based fish transport systems, ensuring water quality controls are in place and stable, systems are shaded, and the light environment is low. – On board complete translocation proforma	**West Australian Seahorse, Tiger Pipefish and other Syngnathids** – Visual inspection of individuals. – Begin floating the transport bag in the receiver site water for 30 minutes. Monitor both temperatures until within 1 – 2 °C. – Gradual water exchange. Open the transport bag and begin to slow drop acclimation process. Add small amounts of receiver site water to the transport containers every 10 – 15 minutes. This gradual mixing allows Syngnathids to adjust to any differences in salinity, pH and other physical water quality parameters. This process will occur over at least 1 hour. – Observe the behaviour of Syngnathids throughout this process for indications of stress, including colour changes, loss of balance, unusual swimming or rapid breathing. The correct physical response for seahorses includes upright posture, normal gill movement. If stress is visible, slow the acclimation process. – Plan release for either early morning or late afternoon to avoid full sun and the heat

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Translocation method	Prepare	Salvage/capture/locate	Release
		including metrics on species, physical characteristics. **Tiger Pipefish and other pipefish** – As above, however translocation method may also involve a scoop net rather than hand capture for both the translocation and pre-clearance.	of the day. Consider tidal cycles secondary to time of day and select slack tide or incoming tide before strong currents develop. – Individuals carefully placed in the receiving habitat as close to the seafloor or structure as possible and observed to be responsive to stimulus or have attached to benthic habitat features. Release in small groups or individually, releasing pairs together as captured from source site. Observe for 15 minutes to ensure attachment and survey for predation. – Finalise translocation proforma.

3. Biosecurity

In Western Australia, biosecurity in the aquatic environment operates under the *Fisheries Resource Management Act 1994* and *Biosecurity and Agriculture Management Act 2007.*

Together they govern certain pests and diseases that require reporting if they are known or suspected. The *Fisheries Resource Management Act 1994* lists noxious fish. The *Biosecurity and Agriculture Management Act 2007* define diseases that are known as reportable diseases and are listed on the WA reportable aquatic animal diseases website (DPIRD, 2025).

The avenue for reporting aquatic pests is as follows:

– Contact FinFish 24-hour hotline 1800 815 507
– Email **animalbiosecurity@dpird.wa.gov.au**
– Lodge on the MyPestGuide app

Notifiable diseases defined under the *Biosecurity and Agriculture Management Act 2007* include (DPIRD, 2025):

– *Aeromonas salmonicida* subsp. *salmonicida* infection (Furunculosis)
– *Aeromonas salmonicida* infection – atypical strains (Goldfish ulcer disease)
– Bacterial kidney disease (*Renibacterium salmoninarum*)
– Enteric redmouth disease (*Yersinia ruckeri*)
– Enteric septicaemia of catfish (*Edwardsiella ictaluri*)
– Epizootic haematopoietic necrosis
– Infectious pancreatic necrosis
– Infectious salmon anaemia
– Infectious spleen and kidney necrosis virus
– Piscirickettsiosis (*Piscirickettsia salmonis*)
– Red sea bream iridovirus
– Salmonid alphavirus
– Scale drop disease virus
– Singapore grouper iridovirus (ranavirus)
– Spring viraemia of carp
– Tilapia lake virus (TiLV) disease

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- Epizootic ulcerative syndrome (*Aphanomyces invadans*)
- Gyrodactylosis (*Gyrodactylus salaris*)
- Herpesvirus infection of Koi carp (Cyprinid herpesvirus 3)
- Infectious haematopoietic necrosis
- Turbot reddish body iridovirus
- Viral encephalopathy and retinopathy
- Whirling disease of salmonids (*Myxobolus cerebralis*)

The standard biosecurity precautions outlined in Table 3-1 will be employed. Personal Protective Equipment, training and fish husbandry procedures will be used to minimise stress of captive fish, and to reduce the risk of disease transfer. Individual fish will also be visually examined for overall health and condition prior to translocation. Syngnathids that are deemed to be unsuitable for translocation because of disease transfer risk will be euthanised for necropsy/examination by a veterinarian or Syngnathid ecologist. Disease risk will also be managed by translocating fish to a location with a similar disease prevalence to the source location, and by minimising the geographical distance between source and recipient locations.

The divers will opportunistically report on the presence of any carpet sea squirt (*Didemnum vexillum*) while undertaking the translocation activity.

Table 3-1 Standard biosecurity measures to be employed for the salvage translocation

	Biosecurity measures
Pre-translocation	– Liaison with DPIRD for advice on potential threats to biosecurity from the translocation – Finalisation of emergency response procedure
Transport and handling	– Use transport water from the receiving site to house Syngnathids from the source sites – Use of secure containment that prevents stress and therefore reduces any potential disruption of the immune system – All equipment must be thoroughly cleaned and disinfected before and after use and between sites – Team members must wash hands between sites – Release individuals together at the receiver site that were captured together at the source sites to maintain genetic integrity – Take detailed records of health status of translocation Syngnathids to establish a baseline to allow for traceability of disease outbreak – Establish appropriate containment procedures for Syngnathids that exhibit diseases prior to release at the receiver site
Post-translocation	– Transport water must not be discharged into Cockburn Sound and must be disposed of on land – Implement monitoring program (Phase 5) to assess effectiveness and impact of the translocation – Establish contingency plans and emergency response procedures to control any outbreaks or diseases noted during the transport and handling of the translocation

4. References

Anderson, P., Berzins, I., Fogarty, F., Hamlin, H., and Guillette, L. (2010). Sound, stress and seahorses: The consequences of a noise environment to animal health. Journal of Aquaculture, 311, 1-4, pp.129-138.

GHD (2026b). Syngnathid management plan; prepared for Department of Defence.

GHD (2024). Underwater noise impact assessment; prepared for Department of Defence.

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Appendix C

Marine Fauna Observation, Rescue and Relocation Protocol

Table 10 Marine fauna observation, rescue and relocation protocol

Step	Action
1 – Marine Fauna Observation Shutdown	If marine fauna is spotted in the observation zone during the soft-start or the normal course of the maritime trial piling exercise, the fauna must continue to be observed and readiness for shutdown communicated to the Construction Contractor. If marine fauna is spotted in the shutdown zone during the soft-start or the normal course of the maritime trial piling exercise, the activity is to be shut down completely. Resume when fauna is outside the shutdown zone, or when >30 minutes has elapsed since the last sighting. Line of view to marine fauna is to be maintained, and the observation is to be recorded in accordance with Appendix G of this annexure. The individuals on site will be assessed to determine if they are injured. If an injured little penguin is encountered, proceed to Step 2. If an injured Indo-Pacific bottlenose dolphin, or other marine mammal is encountered, proceed to Step 3. If the animal is deceased, proceed to Step 4. If the animal is a little penguin, refer to the Little Penguin Monitoring and Management Plan (RPS, 2025). Completion of the Marine Fauna Observation Form (Appendix G of this annexure)
2 – Assessment of animal injury (little penguin)	If a little penguin, SEO to notify and seek advice from a seabird ecologist. A seabird ecologist to assess the extent of injury and level of care required. If expert or prolonged care is required, seabird ecologist is to be contacted to retrieve the penguin. If seabird ecologist is not on-site, Ventia is to be contacted to retrieve the penguin. Photographs of injured penguin are to be taken, the location of injury is to be recorded, and the event is to be reported to the Wildcare Helpline on (08) 9474 9055. If necessary, a seabird ecologist is to collect the little penguin from the water, and place individual in carrier. SEO is to ensure WA Wildlife (via the Wildcare Helpline on (08) 9474 9055) is alerted that a penguin is inbound (if applicable). The penguin is to be transported to an appropriately qualified veterinarian or wildlife carer for treatment and rehabilitation. SEO is to ensure that the primary contact seabird ecologist is made aware of the event if not able to be contacted initially. If expert or prolonged care is not required, instructions provided by seabird ecologist for treatment of injured penguin are to be followed. Photographs of injured penguin are to be taken, the location of injury is to be recorded, and the event is to be reported to the Wildcare Helpline on (08) 9474 9055. SEO is to ensure that the primary contact seabird ecologist is made aware of the event if not able to be contacted initially.
3 – Assessment of animal injury (Indo-Pacific bottlenose dolphin, or other marine mammal)	If an Indo-Pacific bottlenose dolphin, or other marine mammal, SEO to notify and seek advice from marine field ecologist. SEO is to keep animal in line of sight until it can be handed over to marine field ecologist. Ecologist to assess extent of injury and level of care required. Ecologist to call Wildcare Helpline on (08) 9474 9055 and/or veterinarian if required. If expert or prolonged care is required, follow instructions provided by Wildcare Helpline for treatment of the injured animal. Photographs of injured animal are to be taken, and location of injury is to be recorded. If expert or prolonged care is not required, photographs of injured animal are to be taken, and location of injury is to be recorded.
4 – Deceased animals	The marine field ecologist, or an authorised person (per the DBCA Fauna Taking (Relocation) Licence), will take photographs of the deceased animal and record the coordinates. They will then collect the animal and dispose of it appropriately. Handling of any and all deceased little penguin is to be in accordance with the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).

Step	Action
	If little penguin, collect from water, place individual in carrier and seek advice from seabird ecology team. If marine mammal, keep line of sight (do not approach) and call Wildcare Helpline on (08) 9474 9055. Contractor to notify SEO as soon as possible, within 4 hours. SEO to notify seabird ecologist if a little penguin. SEO to notify marine field ecologist if a marine mammal. SEO to attend site with ecologist. Ecologist to take photographs of dead animal and record locations. Ecologist to collect animal and dispose of appropriately. Deceased little penguins must be collected and frozen in the Ventia freezer. SEO to investigate and identify cause of death and provide recommended corrective actions to contractor. SEO to record incident and corrective measures undertaken. Contractor to undertake recommended corrective actions within 48 hours. SEO to notify the PMCA, ESM, and DEPAC within one business day of incident. DEPAC is to notify DCCEEW within 2 business days of stop work incident. DEPAC to provide incident report to DCCEEW within 12 business days.
5 – Monitoring	Visual checks will be carried out in the safety zones to check that no work activities impacting marine fauna have occurred or have potential to occur. Further monitoring requirements are provided in Table 7 of this annexure, and Table 7 of the Flora and Fauna Management Annexure (Annexure A1).
6 – Documentation	The SEO must, in consultation with DEPAC, ensure all fauna sightings recorded during the specified monitoring are uploaded to the Atlas of Living Australia or the DBCA database. A DBCA-approved “Return of Fauna Relocated” form is required on completion of the approved Action (including nil taking details) (licence number FR28000499 – refer to Appendix A of the Flora and Fauna Management Annexure (Annexure A1) for licence conditions). The SEO must ensure all fauna sightings, removals, deaths or injuries are recorded in a register. The register must identify: – date, time and location – type and number of fauna – status (for example, dead/alive/injured) – method of removal – location of removal – details of person (name, contact, registration/licence details etc) – action undertaken.
7 – Reporting death or injury to native fauna	Any fauna death or injury during the maritime trial piling exercise will be recorded by the Construction Contractor and reported to the SEO within 4 hours via phone and email. The SEO has the responsibility to report environmental incidents (including near-misses) to the PMCA, the ESM, DEPAC and where directed, to the Command Team at HMAS Stirling.

Step	Action
	If any little penguin or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure. The SEO must complete the Environmental Incident Reporting Form (Appendix F of the CEMP) If injury or death is to a little penguin, a qualified seabird ecologist must complete a Little Penguin Event Form in Appendix C of the little penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) Reporting in accordance with Section 7 of the CEMP.
Notes	Personnel involved in marine fauna observation, rescue and relocation must meet the definition of suitably qualified per the conditions of approval. Persons nominated for these tasks are to be: – listed in the register tracking fauna sightings, removal, deaths, and injuries – vetted and approved by DEPAC for undertaking the task. Personnel and their roles, qualifications and experience must be included in the summary of nominated personnel submitted to DCCEEW. If third parties contributed to the reporting or analysis of incident data, their details and roles must also be included.

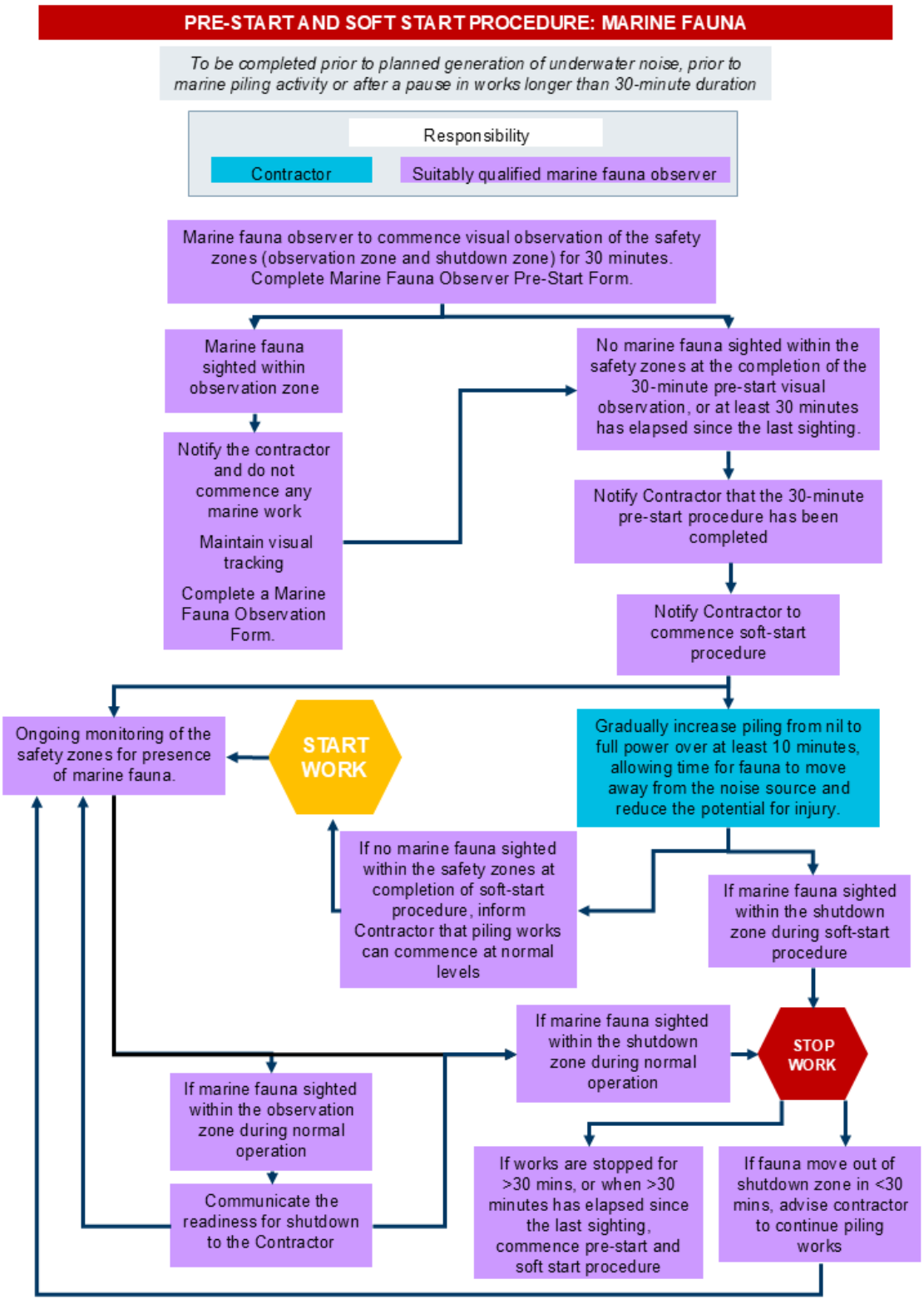


Figure 3 *Prestart and soft start procedure: Marine fauna*

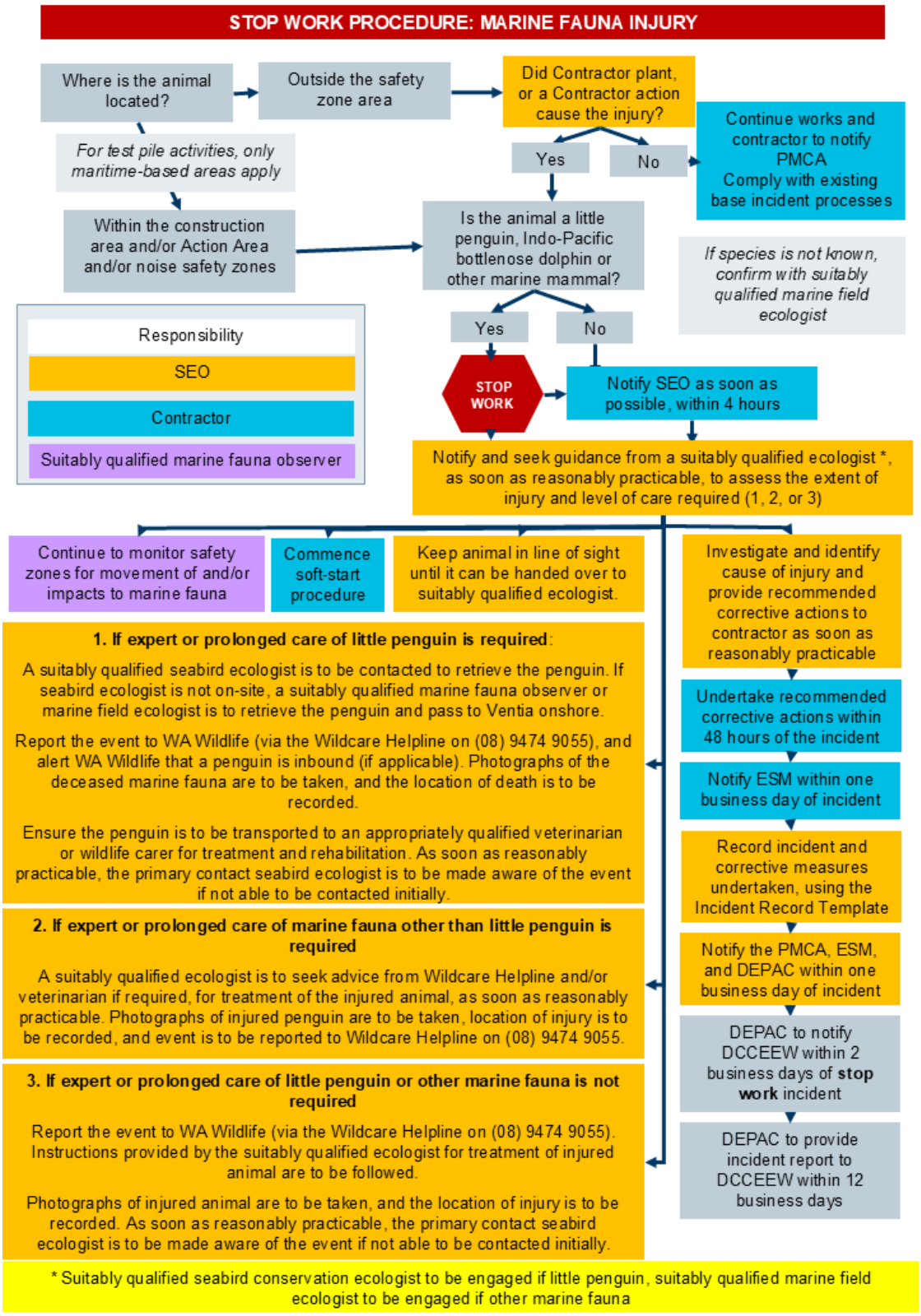


Figure 4 *Stop Work Procedure: Marine fauna injury*

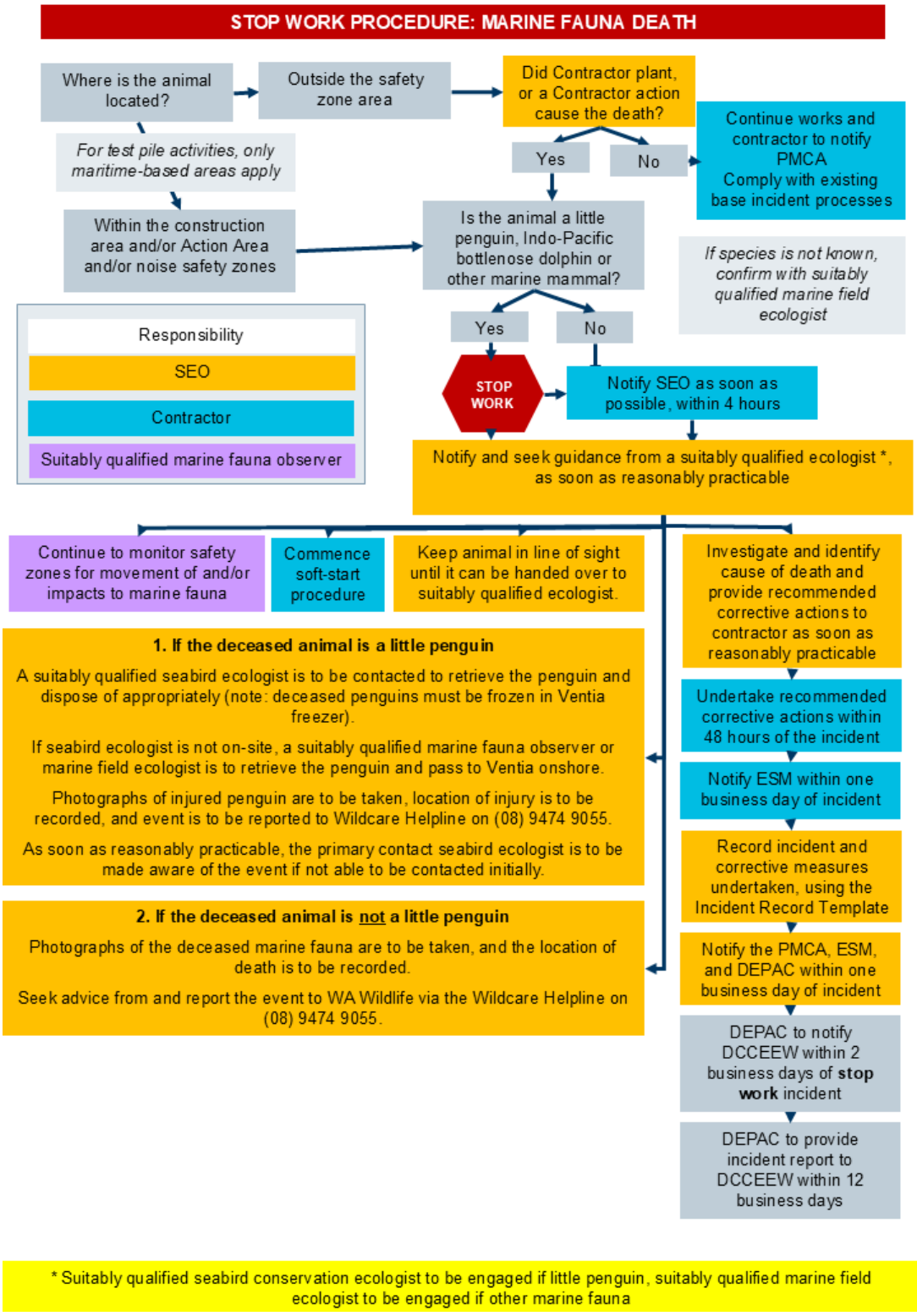


Figure 5 *Stop Work Procedure: Marine fauna death*

Appendix D

Biosecurity target species

A primary objective of biosecurity management for the SRF-West Project is to prevent the introduction and spread of pathogens and invasive species to Garden Island/*Meeandip* or Cockburn Sound/*Derbal Nara* that could harm the environment.

The invasive marine species targeted in this annexure comprise sea squirts, worms, and mussels. Examples include but are not limited to:

- Carpet sea squirt (*Didemnum vexillum*)
- White colonial sea quirt (*Didemnum perlucidum*)
- European fan worms (*Sabella spallanzanii*)
- Asian green mussel (*Perna viridis*)

Appendix E

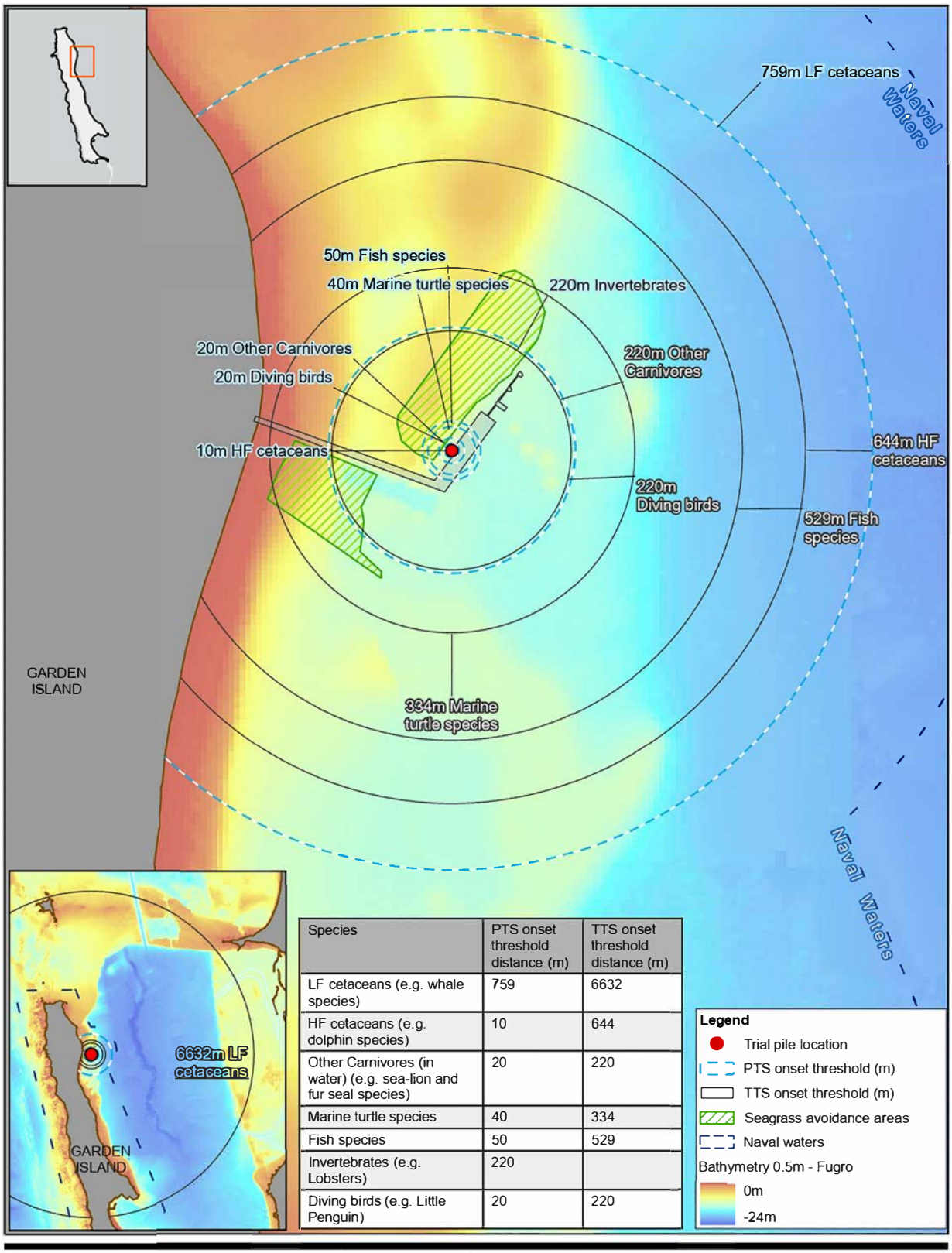
Summary of PTS and TTS impacts

A summary of distances to meet PTS (Permanent Threshold Shift) and TTS (Temporary Threshold Shift) SEL_{24hr} onset thresholds is provided below in Table 11, for piling (1,000 strikes) in Sulphur Bay. The distances are based on an average of the values calculated in Section 7.1 of the Underwater Noise Impact Assessment Report (GHD, 2024).

Table 11 Summary of PTS and TTS impact distances (R95%) from 1,000 pile strikes in a 24-hour period (Sulphur Bay)

Species	PTS onset threshold distance, m	TTS onset threshold distance, m
Low frequency (LF) cetaceans (e.g. whale species)	759	6632
High frequency (HF) cetaceans (e.g. dolphin species)	10	644
Other Carnivores (in water) (e.g. sea-lion and fur seal species)	20	220
Marine turtle species	40	334
Fish species	50	529
Invertebrates (e.g. lobsters)	220	-
Diving birds (e.g. little penguin)	20	220

These distances are indicated in Figure 6 below.



Species	PTS onset threshold distance (m)	TTS onset threshold distance (m)
LF cetaceans (e.g. whale species)	759	6632
HF cetaceans (e.g. dolphin species)	10	644
Other Carnivores (in water) (e.g. sea-lion and fur seal species)	20	220
Marine turtle species	40	334
Fish species	50	529
Invertebrates (e.g. Lobsters)	220	
Diving birds (e.g. Little Penguin)	20	220

Paper Size ISO A4
0 100 200
Meters
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

DEPARTMENT OF DEFENCE
SEA1010-1 USW SUPPORT FACILITIESAND INFRASTRUCTURE PROGRAM SRF-W PRIORITY WORKS
CEMP MARITIME TEST PILE MANAGEMENT ANNEXURE

PTS AND TTS IMPACT DISTANCES (95%) FROM 1000 PILE STRIKES IN A 24HR PERIOD (SULPHUR BAY)

Project No. 12613283
Revision No. B
Date 10/02/2026

FIGURE 6

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Print date: 10 Feb 2026 - 08:12

Data source: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
NearMap WMS Server: , Created by: jcollins2

Figure 6 *PTS and TTS Impact Distances (95%) from 1000 pile strikes in a 24hr period (Sulphur Bay)*

Appendix F

Marine Fauna Observer Prestart Form

Marine Fauna Observer Pre-Start Form

To be completed after any stoppage 30 minutes or longer for all maritime activities.

Name of Observer:

Role of Observer:

Name of SEO:

Date:	
Time:	
Weather (wind speed, Beaufort swell):	
Activity planned:	
Safety zone (circle appropriate, if simultaneous select largest safety zone)	Piling: XXX m / Bed leveling: XX m / other maritime construction XX m
Marine fauna observed	Yes / No
If yes:	Complete **Marine Fauna Observation Form** and recomplete prestart form after marine fauna has left the safety zone
If no:	**Commence activity**, continue to monitor for marine fauna within the safety zone.
Notes	

Appendix G

Marine Fauna Observation Form

Marine Fauna Observation Form

To be completed when any marine fauna is observed within the safety zones (little penguin, dolphin, whale, seal or sealion)

Name of Observer:

Role of Observer:

Name of SEO:

Date:		Sighting No:	
Time:		Depth(m):	
Weather (wind speed, Beaufort swell):			
Activity:		MFO location (on vessel, pier)	
Vessel speed, heading, status (e.g. in transit etc)			
Latitude/longitude			
Range to animal (m)		Bearing to animal: (relative)	
Species:			
Sighting cue: (pick from below)		Observation method:	Binoculars / Eye
Confidence level of species ID:	Probable / Certain	No. of individuals:	
Behaviour (pick from below):			
Direction of travel relative to vessel: (pick from below)			
Management control in response to sighting: (e.g. slow down, change course, stop work etc)			
Notes			

Sighting cue: body, dorsal fin, breach, surface activity, other (specify in notes)

General behaviour: swimming, bow riding, breaching, diving, feeding, milling/resting, tail/pectoral slapping, other (specify in notes)

Direction of travel: parallel same direction, parallel opposite direction, across bow/stern, towards vessel unknown, other (specify in notes)

Appendix B

EPBC Act approval conditions

Table B.1 Conditions of approval reference table for this CEMP

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
EPBC Act Approval 2024/10031			
Clearing Limits			
1a-c	*The approval holder must not:* – *a) Clear outside of the Action area.* – *b) Construct outside of the Action area.* – *c) Harm protected matters within the avoidance areas.*	Section 3.1 identifies the location of activities managed by the CEMP and Section 3.2 includes general site layout and access figures that clearly identify the Action area and avoidance areas.	Section 3.1 (Location) Section 3.2 (Site layout and avoidance areas) Sections 6, 7 and 8 of the Flora and Fauna Management Annexure (Annexure A1) Table 4 and Table 5 of the Heritage Management Annexure (Annexure A2)
2a	*The approval holder must not clear more than:* – *a) 1.78 hectares (ha) of Perth slider habitat.*	Avoidance, management and monitoring measures are provided in the 'Management controls' and 'Monitoring requirements' sections of the Flora and Fauna Management Annexure (Annexure A1) for this condition.	Table 4 of the Flora and Fauna Management Annexure (Annexure A1)
2b	– *b) 1.00 ha of seagrass within the seagrass disturbance area.*	N/A - Will be addressed in an updated CEMP prior to maritime activities commencing. Note no seagrass clearing is required for the maritime trial piling exercise.	Not addressed, except for requirement in Maritime Trial Piling Exercise Management Annexure (Annexure A6) that there is no seagrass clearing during test piling activities.
3a-d	*The approval holder must ensure that, from the commencement of the Action until completion of the Action:* – *a) no dredging occurs outside the dredge areas,* – *b) at the Diamantina Pier dredge area, the total volume of material dredged (dredge volume) does not exceed 6,500 cubic metres (m3) and the maximum depth of dredging (dredge depth) does not exceed 12.8 m below the Low Water Mark Fremantle, and* – *c) at the Moresby Harbour dredge area, the total dredge volume does not exceed 2,100 m3 and the*	N/A - Will be addressed in an updated CEMP prior to maritime activities commencing.	Not addressed

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	dredge depth does not exceed 3.3 m below the Lowest Astronomical Tide, – *d) at the Armament Wharf dredge area, the total dredging volume does not exceed 13,000 m3 and the dredge depth does not exceed 12.8 m below the Low Water Mark Fremantle.*		
Injury avoidance and veterinary care			
4	*From the commencement of the Action until the completion of the Action, the approval holder must arrange for veterinary care or assistance from an experienced wildlife carer for any native terrestrial or marine animal found injured within the Action area.*	Rescue plan protocols outlined in the Flora and Fauna Management Annexure (Annexure A1) state the process for veterinary care to be accessed, should terrestrial fauna be found injured within the Action area. Rescue plan protocols outlined in Appendix C of Maritime Trial Piling Exercise Management Annexure (Annexure A6) state the process to be followed should marine fauna be found injured within the Action area.	Appendix B (Fauna Relocation and Rescue Protocols) of the Flora and Fauna Management Annexure (Annexure A1) Appendix C of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
5	*The approval holder must ensure that, from the commencement of the Action until completion of construction, if any little penguin, Perth slider or marine mammal is found injured or killed within the Action area, the approval holder must immediately initiate a stop works procedure.*	Controls are detailed in the Noise and Vibration Management Annexure (Annexure A4) and in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5).	Section 6.3, Section 9.2, Appendix C of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025f).
Construction Environmental Management Plan (CEMP)			
6	*To avoid and mitigate harm on protected matters, the approval holder must prepare and implement a Construction Environment Management Plan (CEMP) that complies with Conditions 7 and 8a-bb and must not be inconsistent with the conditions of this approval. The approval holder must ensure the CEMP is prepared by a suitably qualified professional before the commencement of the Action. The approval holder must commence implementation of the CEMP no later than the commencement of the Action. The approval holder must continue to implement the CEMP until the completion of construction.*	This CEMP has been prepared to meet this condition. Refer to Conditions 7 and 8a-bb. Section 6 assigns responsibility for engaging a suitably qualified professional for preparation of the CEMP prior to commencement of construction and implementation of the CEMP until the completion of construction.	Section 1.2 (Purpose of this CEMP) Section 6 (Environmental management roles and responsibilities)
7a-b	*The approval holder must engage a suitably qualified professional who is responsible for managing and reporting on the implementation of the CEMP to comply*	Section 7.20 requires, 6 months after commencement of the Action, preparation of a CEMP implementation report that is submitted to DCCEEW.	Section 7 (Reporting)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	with condition 6 from the commencement of the Action until completion of construction. The approval holder must submit a CEMP implementation report to the department every 6 months following commencement of the Action, until completion of construction. Each CEMP implementation report must: – *a) be prepared by a suitably qualified professional, and* – *b) include an assessment, and supporting evidence, of CEMP implementation made and collected by a suitably qualified professional.*	Section 6 assigns responsibility for engaging a suitably qualified professional for preparation of the CEMP prior to commencement of construction and implementation of the CEMP until the completion of construction.	Section 6 (Environmental management roles and responsibilities)
8	*All commitments in the CEMP, including environmental outcomes, management measures, non-compliances, incident procedure, stop work procedure, corrective measures, thresholds and performance indicators, must be SMART.* *The CEMP must be consistent with the Environmental Management Plan Guidelines and the approval holder must ensure the following:*	Commitments in this CEMP and performance criteria (key commitments) and management controls in environmental management annexures have been set to be SMART (Specific, Measurable, Attainable, Relevant and Time-bound) (refer to Section 11). This CEMP has been prepared and structured to be consistent with the DCCEEW EMP Guidelines. Environmental management annexures have been prepared to align with DCCEEW EMP Guidelines requirements to support this CEMP. As a result, environmental management annexures focus on DCCEEWW EMP Guidelines requirements not already addressed in this CEMP. Each environmental management annexure includes: – objectives – performance criteria (key commitments) – management controls – triggers for adaptive management measures – incident and non-conformance procedure. Refer to Appendix D for demonstrated consistency with DCCEEW EMP Guidelines.	Section 11 (Environmental management measures) – including all environmental management annexures Referenced in this section. Appendix A (All environmental management annexures) Appendix D (DCCEEW Environmental Management Plan Guidelines Requirements)
Governance			
8a	*The CEMP must specify a responsible party to co-ordinate all construction associated with the Action to ensure the conditions of this approval are met.*	Section 6 specifies that the Site Environment Officer (SEO) appointed by the PMCA has the oversight of day-to-day construction activities to check these comply with the CEMP and associated environmental management annexure.	Section 6 (Environmental management roles and responsibilities)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
		Section 6 specifies roles that have responsibility to check the CEMP and its implementation complies with the conditions of EPBC Act approval 2024/10031 and to approve, and declare accuracy of this CEMP (refer to Cover Page as required by DCCEEW EMP Guidelines).	
8b	*The CEMP must identify all construction risks, define all controls required to avoid and minimise risks to protected matters from construction, and specification of governance and responsibilities, monitoring and reporting, and incident reporting and management requirements.*	Section 10 outlines all construction risks that were rated medium and above and identifies the relevant environmental management plan (or annexure) where the environmental management measures required to avoid or minimise risks to protected matters are identified. The environmental management measures, including monitoring requirements are provided in Section 11. Section 6 summarises environmental management roles and responsibilities. Section 7 summaries the reporting requirements including incident and non-conformance reporting requirements.	Section 10 (Potential environmental impacts and risks) Section 11 (Environmental management measures) Section 6 (Environmental management roles and responsibilities) Section 7 (Reporting)
Dredging, turbidity and contaminants			
8c	*The CEMP must include a water quality monitoring program that is sufficient to detect daily changes in water quality parameters and any exceedance of water quality threshold levels attributable to construction from the commencement of the Action until completion of construction. The water quality monitoring program must:* – *i) Include the monitoring of comparable control sites to determine the value of water quality parameters not subject to construction.* – *ii) During construction, require comparison on a daily basis, of both the Action area monitoring site water quality parameter results and the control site water quality parameter results against the water quality threshold levels.* – *iii) Specify values for the water quality threshold levels based on the normal range of values recorded at the control sites.* – *iv) Trigger a stop works procedure if water quality threshold levels are exceeded.*	Section 8 of the Soil and Water Quality Management Annexure (Annexure A3) identifies the water quality monitoring required for the early works activities, enabling works, construction of landside facilities including the CIF**,** and the maritime trial piling exercise described in Section 3 of the CEMP. Marine water quality will be addressed in future versions of this CEMP prior to maritime works commencing.	Section 7 and Section 8 of the Soil and Water Quality Management Annexure (Annexure A3)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
8d	*The CEMP must include measures and procedures to ensure the following:* – *i) The dredging rate does not exceed 500 m3 /hour, consistent with a medium size Cutter Suction Dredger.* – *ii) A silt curtain is installed for the duration of all dredging works carried out at Armament Wharf Action area, unless otherwise advised by a suitably qualified seabird conservation ecologist.* – *iii) No dredging and spoil disposal is carried out in the Careening Bay Action area during the little penguin breeding period or little penguin moulting period or as otherwise advised by a suitably qualified seabird conservation ecologist.* – *iv) The dredge plume extent does not exceed the worst-case scenario modelling presented in the Dredge Plume Modelling Report.* – *v) The dredge spoil pipelines are placed to avoid harm to seagrass and little penguins.*	N/A - Will be addressed in a future CEMP version prior to maritime activities commencing.	Not addressed
8e	*The CEMP must include measures to ensure that any instantaneous increase in Suspended Sediment Concentration (SCC) of 2 mg/L or more does not occur for more than 14 cumulative days during maritime works, including dredging and dredge spoil disposal, associated with the Action.*	N/A - Will be addressed in a future CEMP version prior to maritime activities commencing.	Not addressed
8f	*The CEMP must include a risk assessment, including modelled analysis of the existing containment cap and environmental impacts of potential Tributyltin (TBT) release. This risk assessment must include a TBT monitoring program that can detect, within 24 hours, if TBT is being released into marine ecosystems.*	N/A - Will be addressed in a future CEMP version prior to maritime activities commencing.	Not addressed
8g	*The CEMP must include a commitment that any TBT release is remediated to ensure it causes no harm to protected matters.*	N/A - Will be addressed in a future CEMP version prior to maritime activities commencing.	Not addressed
Vibration and terrestrial noise			
8h	*The CEMP must include measures to undertake a pre-construction survey of the structural condition of all little penguin nesting sites prior to the commencement of construction, to determine any structural reinforcement*	A (pre-construction) structural condition assessment of little penguin nesting sites has been completed. The geotechnical inspection of the revetments did not identify areas or individual rocks that could be	Structural Condition Assessment of Little Penguin Nesting Sites (GHD, 2025d)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	measures that need to be implemented to prevent collapse or damage arising from construction.	considered as precarious and readily prone to dislodgement from vibrations generated by the anticipated construction works. The existing environment description of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) includes a qualitative assessment of the penguin nesting sites and the roles and responsibilities of the seabird ecologist including providing ongoing advice as needed.	Section 6.3 and Section 9.1 of the Little Penguin Monitoring (RPS 2026) (Annexure A5)
8i	*The CEMP must include a noise and vibration monitoring program, prepared by a suitably qualified acoustic expert in consultation with a suitably qualified seabird conservation ecologist. The noise and vibration monitoring program must:* – *i) Specify terrestrial noise threshold levels (dB) and vibration threshold levels (mm/s) that will not be exceeded at any little penguin nesting sites during construction to avoid harm to little penguins and little penguin nesting sites, including the methodology relied on to establish these acoustic parameters. Vibration threshold levels and noise threshold levels must be specified for each of the following periods to reflect their different sensitivities (i) little penguin arrival period, (ii) little penguin departure period, (iii) little penguin day-time period and (iv) little penguin night-time period.* – *ii) Specify how noise and vibration levels generated by the Action during construction will be continuously monitored in order to detect any exceedance of the acoustic parameters that may harm little penguins.* – *iii) Be capable of detecting any exceedance of the terrestrial noise threshold level or vibration threshold level at the little penguin nesting sites.* – *iv) Trigger implementation of a stop works procedure if a noise threshold level or vibration threshold level is exceeded.*	A Noise and Vibration Monitoring Program has been developed for the duration of construction activities. The Program has been developed in consultation with a seabird ecologist and includes the following: i) Through a review of available scientific literature, relevant proxy criteria from other environmental standards, and in consultation with a ecologist, 2 terrestrial threshold levels have been established for both noise and vibration. This approach ensures that the adopted thresholds are evidence-informed while remaining practical for implementation within a construction monitoring context. ii) Continuous unattended noise and vibration monitoring will be undertaken at 4 locations adjacent to little penguin nesting sites. Requirements for continuous monitoring and appropriate acoustic parameters have been specified. iii) Alerts will be triggered when the noise or vibration thresholds are exceeded: • Noise: ≥ LAeq(5min) 85 dBA (review); ≥ LAeq(5min) 93 dBA (stop work) • Vibration: Peak Particle Velocity (PPV) ≥ 5 mm/s (review); PPV ≥ 15 mm/s (stop work); iv) A stop-work procedure is triggered when either the ‘stop work’ noise or vibration threshold is exceeded. This includes: • immediate alerts sent to the relevant stakeholders	Section 3 and Section 5 of the Noise and Vibration Management Annexure (Annexure A4) Sections 7.4.2 and Section 7.4.3 of the Little Penguin Monitoring (RPS 2026) (Annexure A5)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
		• ceasing construction work if the stop-work threshold is breached and construction source to be verified • seabird ecologist to assess for potential harm • implementation of additional management measures • logging of all exceedances and responses before works resume. Note that: The trial piling exercise will not be undertaken near the little penguins. Terrestrial noise and vibration will not be undertaken for the trial piling exercise works and the thresholds in the Noise and Vibration Annexure (Annexure A4) will not apply.	
8j	*The CEMP must specify that impact piling will not be used for construction within the Controlled Industrial Facility (CIF).*	Section 3 specifies activities managed by this CEMP. Impact piling will not be used for construction within the Controlled Industrial Facility (CIF).	Section 3.5.4 (Project description)
8k	*The CEMP must specify that maritime works in the Careening Bay Action Area only occur during the period commencing 30 minutes after sunrise and ending 30 minutes before sunset, to avoid harm to the little penguins during their arrival, departure and rafting periods.*	The works are not being undertaken in the Careening Bay Action area. The only activity relevant to this condition is the unplanned return of vessels into port where the vessel is unable to access Fremantle Port in unplanned circumstances. The Maritime Trial Piling Exercise Management Annexure (Annexure A6) requires activities associated with the maritime trial piling exercise to only occur during the period commencing 30 minutes after sunrise and ending 30 minutes before sunset, to avoid harm to the little penguins during their arrival, departure and rafting periods. This condition will also be addressed in future versions of the CEMP prior to maritime works commencing.	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
8l	*The CEMP must specify that terrestrial construction in the Careening Bay Action Area within the period commencing at sunset and ending at sunrise, will:* – *i) only occur under exceptional circumstances and be minimised,*	Section 3 sets construction working hours that comply with this condition for the early works activities defined in that Section. Section 11.1.1 requires work times to be specified in the Construction Contractor's CEMP and construction	Section 3 (Project Description) Section 11.1.1 (Construction Contractor environmental site controls)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *ii) be particularly avoided or minimised during the little penguin arrival period and little penguin departure period,* – *iii) not exceed the relevant noise threshold levels and vibration threshold levels specified in condition 8i, and* – *iv) only involve the use of the quietest available equipment that is capable of doing the task.*	activities will be avoided or minimised between sunset and sunrise. For noise-generating works within the period commencing at sunset and ending at sunrise, an out-of-hours work permit application is to be prepared outlining how the requirements of condition 8. i) will be met and to be approved by the SEO. See Sections 2.1, 2.3 and 6.1 of the Noise and Vibration Management Annexure (Annexure A4)	Section 2 and Section 6 of the Noise and Vibration Management Annexure (Annexure A4)
Little penguin behaviour monitoring			
8m	*The CEMP must include a little penguin monitoring program to detect changes in little penguin behaviour and nest stability during construction to inform adaptive management. The little penguin monitoring program must:* – *i) detail the methodology and frequency of monitoring efforts that will be carried out to obtain accurate and reliable behavioural data, and* – *ii) give overarching responsibility to a suitably qualified seabird conservation ecologist to coordinate and oversee monitoring efforts.*	The little penguin monitoring program is described within the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). It details the methodology and frequency of monitoring efforts and clearly articulate the responsibilities of the seabird ecologist to coordinate and oversee these monitoring efforts.	Sections 7 and 9.1 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
8n	*The CEMP must specify the implementation of adaptive management measures in response to the detection of changes of behaviour in little penguins.*	The Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) specifies the triggers for adaptive management in response to detection of change in a range of little penguin behaviours including potential movements in and out of burrows, and changes in nesting behaviour and nesting success.	Section 7 of the Little Penguin Monitoring and Management (RPS 2026) (Annexure A5)
Underwater noise			
8o	*The CEMP must require that noise producing maritime works must not exceed:* – *i) The little penguin Temporary Temporal Shift value of 188 (re 1µPa2s) Sound Exposure Level (SEL) weighted for Other Carnivores in Water (OCW) and 226 peak dB (re 1 µPa) at a distance greater than 20 m from the source of sound.* – *ii) 160 dB re 1µPa² s (SEL) and 190 dB re 1 µPa (peak) for single pile strikes, at 750 m from the source or as otherwise advised by a suitably qualified acoustic specialist, to avoid behavioural*	The maritime trial piling exercise as required by Condition 8r is required to determine adequate management measures for noise generating maritime activities. The maritime trial piling exercise will require a limited number of unmitigated pile strikes to be made to fulfil Condition 8r(i). Sound exposure levels specified in Condition 8o cannot be guaranteed during the test piling activity. The Maritime Trial Piling Exercise Management Annexure (Annexure A6) includes additional	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	disturbance to Indian Ocean bottlenose dolphins located in Cockburn Sound.	management measures to limit Sound Exposure Levels during the maritime trial piling exercise including elevated marine fauna observation. Compliance with Condition 8o will be addressed in an updated CEMP prior to maritime activities commencing, specifically nominating management measures that can be validated following the completion of the maritime trial piling exercise	
8p	*The CEMP must specify safety zones that are calculated by a suitably qualified acoustic expert and based on the modelled and verified noise levels produced by construction, to avoid harm to protected matters. The safety zones must be based on the behavioural and physiological (Temporary Temporal Shift and Permanent Temporal Shift) underwater noise threshold levels for little penguins, Indian Ocean bottlenose dolphins and other relevant marine fauna, as per Table 4.9 of Underwater Noise Impact Assessment Report (Appendix B).*	The Maritime Trial Piling Exercise Management Annexure (Annexure A6) specifies safety zones that have been calculated by an acoustic expert. The maritime trial piling exercise will be used to verify noise levels and update the safety zones in future CEMP versions. Following completion of the maritime trial piling exercise, any update to safety zones informed by the exercise will be addressed in future versions of this CEMP prior to maritime works commencing.	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
8q	*The CEMP must include details of underwater noise monitoring to be implemented for the duration of the maritime works at the Armament Wharf Action area.*	The Maritime Trial Piling Exercise Management Annexure (Annexure A6) includes details of underwater noise monitoring to be undertaken limited to the maritime trial piling exercise to inform the Condition 8r(i). The requirement for underwater noise monitoring for the maritime works at the Armament Wharf will be addressed in a future version of the CEMP, informed by the outcomes of the maritime trial piling exercise.	Section 8 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
8r	*The CEMP must specify that piling, as part of the maritime works, will only commence following completion of a trial piling exercise to achieve the following outcomes:* – *i) Validate the modelled predictions for noise levels,* – *ii) Quantify the rate of sound attenuation with distance from the piling site to validate modelled predictions,* – *iii) Evaluate the efficacy of adopted noise mitigation measures to be implemented during the piling construction period at Armament Wharf Action area, and*	The Maritime Trial Piling Exercise Management Annexure (Annexure A6) specifies that maritime piling included in the approved Action must not commence before the completion of the trial piling exercise. This includes meeting the outcomes listed in Condition 8r, and the specification of safety zones that will prevent harm from noise to marine fauna.	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *iv) Based on the monitoring results, re-evaluate the dimensions of the safety zones that will prevent harm from noise to marine fauna.*		
8s	*The CEMP must specify that for the duration of maritime works within the Careening Bay Action Area, the most protective combination of mitigation measures that achieves at least a 15 dB reduction in underwater noise, will be implemented. The 15 dB reduction must be based on the Armament Wharf Action area underwater noise monitoring results specified in condition 8r.*	N/A - Will be addressed in future versions of the CEMP, informed by the outcomes of the maritime trial piling exercise prior to maritime works in the Careening Bay Action area commencing.	Not addressed
8t	*The CEMP must specify that, after any stoppage of 30 minutes or longer duration, maritime works will only commence:* – *i) after the safety zones have been visually inspected for the presence of little penguins, Indian Ocean bottlenose dolphins and other marine fauna by a suitably qualified marine fauna observer, who has confirmed that no marine fauna have been observed in the safety zones, and* – *ii) if undertaking an impulsive noise generating activity, such as impact piling, a soft-start procedure will be used in which the piling impact energy or noise level is gradually increased from nil to full power over at least 10 minutes, allowing time for fauna to move away from the noise source and reduce the potential for injury.*	The Maritime Trial Piling Exercise Management Annexure (Annexure A6) includes the stop works requirements listed in this condition. This requirement will be addressed in future versions of the CEMP, prior to maritime works commencing.	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
8u	*The CEMP must specify that during all maritime works, a suitably qualified marine fauna observer will monitor the safety zones, and that all maritime works will shut down immediately if any marine fauna is observed within the shutdown zone or is about to enter the shutdown zone from the low power zone or observation zone.*	The Maritime Trial Piling Exercise Management Annexure (Annexure A6) requires marine fauna observation during the maritime trial piling exercise and includes stop works requirements if marine fauna are observed within or are about to enter the shutdown zone. This requirement will be addressed in future versions of the CEMP, prior to maritime works commencing.	Section 7, Section 8 and Section 9 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
Leaks and spills			
8v	*The CEMP must include:*	Performance criteria and management controls are detailed in Sections 6 and 7 of the Soil and Water Quality Management Annexure (Annexure A3)	Section 7 of the l Soil and Water Quality Management Annexure (Annexure A3)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *i) measures to prevent leaks and spills during construction, including but not limited to hydrocarbons, and* – *ii) appropriate measures to respond to leaks and spills in a timely and effective manner to prevent and minimise impacts to protected matters.*	Performance criteria and management controls relevant to trial piling exercise are detailed in Sections 6 and 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6).	Section 6 and Section 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
Perth slider			
8w	*The CEMP must specify that:* – *i) within 2 weeks prior to clearing in the CIF area, a suitably qualified field ecologist will undertake an initial Perth slider salvage survey using the methods specified in the Survey guidelines for Australia's threatened reptiles* – *ii) immediately prior to undertaking clearing in the CIF area, a suitably qualified field ecologist will undertake a secondary Perth slider salvage survey, including by raking or causing similar surface disturbance to detect and relocate any Perth slider present, and* – *iii) a suitably qualified field ecologist will oversee all clearing in the CIF area to minimise harm to the Perth slider.*	Sections 6 and 7 of the Flora and Fauna Management Annexure (Annexure A1) includes performance criteria and management controls that address this condition. Suitably qualified person is defined and the requirement for ecologist oversight of clearing activities is captured in the Flora and Fauna Management Annexure (Annexure A1) (Section 5).	Section 2, Section 7, Section 8 and Appendix B of the Flora and Fauna Management Annexure (Annexure A1)
Heritage			
8x	*The CEMP must include outcomes and detailed measures to avoid impacts to heritage values of Garden Island and address the recommendations of the Heritage Impact Assessment Report.*	Performance criteria and management controls in Sections 6 and 7 of the Heritage Management Annexure (Annexure A2) include site induction requirements, temporary fencing of historic heritage sites, and protocols for chance finds of historic heritage and human remains.	Section 4 and Section 7 of the Heritage Management Annexure (Annexure A2)
Biosecurity			
8y	*The CEMP must specify biosecurity measures that will be implemented during construction to ensure the Action is undertaken in a manner that prevents:* – *i) the introduction of new pathogens, environmental weeds, or exotic marine and terrestrial species to Garden Island or Cockburn Sound that could harm the environment, and*	Performance criteria, management controls and monitoring requirements are identified in Sections 6, 7 and 8 of the Flora and Fauna Management Annexure (Annexure A1) that address these requirements. Performance criteria and management controls relevant to marine pests are identified in Sections 6 and 7 of the Maritime Trial Piling Exercise	Section 6, Section 7 and Section 8 of the Flora and Fauna Management Annexure (Annexure A1) Section 6 and Section 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *ii) the spread of pathogens, environmental weeds, and exotic marine and terrestrial species to areas where they were not previously present.*	Management Annexure (Annexure A6) that address these requirements.	
8z	*The CEMP must specify biosecurity measures that will be implemented during construction for the following: Phytophthora species, polyphagous shot-hole borer, carpet sea squirt, Asian green mussel, white colonial sea squirt, and black rat.*	Performance criteria and management controls are identified in Sections 6 and 7 of the Flora and Fauna Management Annexure (Annexure A1) that address these requirements. Performance criteria, management controls, and monitoring requirements for marine pests relevant to the maritime trial piling exercise are detailed in Sections 6, 7 and 8 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6) that address these requirements.	Flora and Fauna Management Annexure (Annexure A1) Section 6, Section 7 and Section 8 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
Cumulative Impacts			
8aa	*The CEMP must include a commitment that the schedule and timing of construction activities will be planned in consultation with a suitably qualified seabird conservation ecologist to avoid and minimise harm to little penguins, including but not limited to cumulative impacts.*	A commitment to consult a suitably qualified ecologist is included in the CEMP. Controls are detailed in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) which has been prepared in consultation with a seabird ecologist.	Section 3.6 of the CEMP. Section 3 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
8bb	*The CEMP must include a construction lighting management plan that:* – *i) is consistent with the Light Pollution Guidelines for Wildlife* – *ii) ensures all lighting from construction is directed away from little penguin nesting sites and little penguin arrival areas, and* – *iii) specifies mitigation measures to minimise the impacts of spill-over light from construction lighting on little penguins and little penguin nesting sites.*	A light management plan and associated controls will be detailed in the Contractor's CEMP as required in Section 11 of the CEMP. Controls are also addressed as relevant in Sections 7 and 8 of the Flora and Fauna Management Annexure (Annexure A1). In addition, the roles and responsibilities of the seabird ecologist defined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) capture the provision of advice.	Section 11.1.1.3 Construction Lighting Plan Section 7 and Section 8 of the Flora and Fauna Management Annexure (Annexure A1) Section 9.1 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5)
LITTLE PENGUIN – POPULATION MONITORING			
9	*Prior to commencement of the Action, the approval holder must submit to the department for approval, a report prepared by a suitably qualified seabird*	Refer Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) prepared prior to the	Little Penguin Monitoring and Management Plan (RPS 2026) (Annexure A5)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	conservation ecologist that establishes the baseline population of little penguins detailing how it was derived from relevant historical population data and why it is suitable for comparison to data collected after commencement of the Action.	commencement of the Action and approved by DCCEEW.	Population assessment of the little penguin colony on Garden Island, Western Australia from 2021 to 2024. Report to RPS (Cannell, 2025)
10	*From the commencement of the Action, until 6 years following completion of construction, the approval holder must ensure that the little penguin population is not reduced below its baseline population size as a result of the Action.*	The little penguin monitoring program outlined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) continues from the baseline monitoring period until 6 years following the completion of construction. The methodology for population monitoring and index of population size has been developed with an appropriate experimental design, within the constraints of the approved Action area, using a multiple lines of evidence approach to identify the potential source of impact to little penguins that may result in a reduction in population size below baseline levels.	Section 7.2, Section 7.3 and Section 7.4 of the Little Penguin Monitoring and Management Plan (RPS, 2026) – Annexure A5
11a-c	*The approval holder must implement from the commencement of the Action until 6 years following completion of construction, a monitoring program designed by a suitably qualified seabird conservation ecologist that:* – *a) effectively tracks the little penguin population,* – *b) identifies the location of all little penguin nesting sites in use within the Action area, and* – *c) is undertaken at regular intervals as advised by a suitably qualified seabird conservation ecologist.*	Species monitoring is discussed in Section 7 of the Little Penguin Monitoring and Management Plan which has been prepared in consultation with a seabird ecologist. The Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) describes the little penguin monitoring program which was prepared by seabird ecologists to achieve multiple objectives including tracking the little penguin population and identifying nesting sites in use throughout the Action area. The little penguin monitoring program is undertaken at regular intervals.	Section 7 and Section 9 of the Little Penguin Monitoring and Management Plan (RPS 2026) (Annexure A5)
12	*Annually, from commencement of the Action until 6 years following completion of construction, the approval holder must provide to the department a little penguin monitoring report prepared by a suitably qualified seabird conservation ecologist that compiles the little penguin monitoring data for the previous breeding period and compare the results to the baseline population. If the little penguin population has declined below the baseline population, the report must include an assessment of the underlying cause for the decline*	Responsibilities for compiling data and preparing the little penguin monitoring by a seabird ecologist are outlined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5). The annual report required by the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) will include analysis of the population size with comparison against historical trends and assessment of potential underlying causes of any measured declines in population size.	Section 9.

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	and provide recommended management measures to mitigate the little penguin population decline.		
13a-d	*Prior to the commencement of any dredging, the approval holder must provide the department with an updated Per- and polyfluoroalkyl substances (PFAS) Risk Assessment Report which has been informed by a PFAS monitoring and sampling program that includes:* – *a) assessment of the bioaccumulation pathways in Cockburn Sound,* – *b) assessment of impacts to sensitive receptors including little penguins and Indian Ocean bottlenose dolphins,* – *c) biota sampling that provides evidence to support the findings of 13a and 13b, such as sampling of little penguin prey species, non-invasive sampling of little penguins, or sampling of other higher trophic level species, and* – *d) details of any mitigation measures needed to maintain the current risk level as specified in Section 10 and 11 of the PFAS Risk Assessment Report.*	This requirement will be addressed in future versions of the CEMP, prior to maritime works commencing.	Not addressed
LITTLE PENGUIN – DIRECT DISTURBANCE AND OBSTRUCTION			
14	*The approval holder must ensure that, prior to commencement of clearing and construction, all little penguin nesting sites located within 50 m of the Action area are identified, clearly signed and demarcated and that signage is maintained until the completion of the Action.*	Section 7 of the Flora and Fauna Management Annexure (Annexure A1) requires the Construction Contractor to clearly sign and demarcate all little penguin nesting sites within 50m of the Action area in consultation with a seabird ecologist. Section 9.2 of the Little Penguin Monitoring and Management Plan (RPS, 2026) (Annexure A5) outlines the responsibilities for a seabird ecologist to advise of new nesting sites throughout construction.	Section 7 and Section 8 of the Flora and Fauna Management Annexure (Annexure A1) Section 9.1 and Section 9.3 of the Little Penguin Monitoring and Management Plan (RPS 2026) (Annexure A5)
15	*The approval holder must not, as a result of taking the Action, directly disturb little penguin nesting sites.*	Figure 3 of the CEMP identifies the avoidance area for little penguins. As per condition 14 Section 7 of the Flora and Fauna Management Annexure (Annexure A1) requires the Construction Contractor to clearly sign and demarcate all little penguin nesting sites within 50m of the Action area in consultation with a seabird ecologist.	Figure 3 (Site layout and avoidance areas) Section 7 of the Flora and Fauna Management Annexure (Annexure A1)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
16a-c	*The approval holder must ensure that construction vessels and equipment do not moor in the following areas:* – *a) Rafting avoidance area.* – *b) Little penguin arrival areas.* – *c) Seagrass avoidance areas.*	No construction vessels are required for the trial piling exercise. The Maritime Trial Piling Exercise Management Annexure (Annexure A6) includes management controls to address this condition. Performance criteria for seagrass avoidance are provided Section 6 of Annexure A6, and avoidance, mitigation and monitoring measures are provided in Section 7 and Section 8 of Annexure A6. This requirement will be addressed in future versions of the CEMP, prior to maritime works commencing.	Section 6, Section 7 and Section 8 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
LITTLE PENGUIN AND INDIAN OCEAN BOTTLENOSE DOLPHIN – LEAKS AND SPILLS			
17	*The approval holder must ensure that no little penguins are harmed as a result of leaks and spills, including but not limited to hydrocarbons, caused by the taking of the Action.*	Performance criteria and management controls are detailed in Sections 6 and 7 of the Soil and Water Quality Management Annexure (Annexure A3). Performance criteria and management controls relevant to the maritime trial piling exercise are detailed in Sections 6 and 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6).	Section 6 and Section 7 of the Soil and Water Quality Management Annexure (Annexure A3) Section 6 and Section 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
18a-e	*The approval holder must, prior to commencement of the Action, revise the existing Oil Spill Contingency Manual to:* – *a) include the new facilities, any new or upgraded spill response equipment, and standard operating procedures required to manage the risks associated with spills,* – *b) include a worst-case scenario of predicted spread of oil spills that considers a 30-knot easterly wind,* – *c) include specific incident management procedures for protecting sensitive values, including little penguin nesting sites, during pollution incidents,* – *d) remove plans for clean-up of the rock walls using high pressure hoses (as this may push oil into the little penguin nesting sites), and*	The HMAS Stirling Oil Spill Contingency Manual (RAN, 2026) has been revised to address Condition 18a-e.	HMAS Stirling Oil Spill Contingency Manual (RAN, 2026).

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *e) include all little penguin nesting sites in the priority areas and mapping*		
LITTLE PENGUIN – ARTIFICIAL LIGHTING			
19a-c	*To avoid and mitigate harm to Little Penguins from artificial light associated with the Action, prior to installation of any lighting, the following must be provided electronically to the department for approval by the Minister:* – *a) Final lighting plans.* – *b) A Light Impact Assessment Report, developed in consultation with a suitably qualified seabird conservation ecologist, that assesses and details impacts, including cumulative impacts to little penguins from new light installations associated with the Action.* – *c) A Light Management Plan, developed in consultation with a suitably qualified seabird conservation ecologist, that details measures that will be implemented to avoid (where possible) and mitigate potential impacts identified by the Light Impact Assessment Report in regard to little penguins and consistent with the Light Pollution Guidelines for Wildlife and details residual impacts remaining after avoidance and mitigation measures are implemented.*	This requirement will be met prior to the installation of lighting in proposed facilities within the Action area.	Not addressed
20	*The approval holder must implement the Light Management Plan prior to the installation of any new lighting and continue to implement it until completion of the Action.*	Associated controls will be detailed in the Contractor's CEMP as required in the Section 11 of the CEMP. In addition, the roles and responsibilities of the seabird ecologist defined in the Little Penguin Monitoring and Management Plan (RPS, 2026) (Appendix A5) capture the provision of advice.	Section 11.1.1.3 Construction Lighting Plan Section 9.1 of the Little Penguin Monitoring and Management Plan (RPS, 2025) (Annexure A5)
LITTLE PENGUIN – PREDATION			
21a-c	*The approval holder must, within 6 months of commencement of the Action, develop a Fox and Cat Management Plan for Garden Island. The Fox and Cat Management Plan must:* – *a) be prepared by a suitably qualified vertebrate pest control expert,*	The Garden Island Fox and Cat Management Plan (GHD, 2026a) has been prepared and is a reference document to the CEMP.	Garden Island Fox and Cat Management Plan (GHD, 2026a)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *b) seek to implement a combination of measures, which may include but are not limited to exclusion fencing, baiting, shooting, trapping, den fumigation or den destruction and* – *c) establish a monitoring and reporting plan that monitors progress towards fox removal.*		
22	*The approval holder must, within 6 months of commencement of the Action, begin implementation of the Fox and Cat Management Plan, and continue to implement it until at least 6 years after the completion of construction.*	The Garden Island Fox and Cat Management Plan (GHD, 2026a) has been prepared and is a reference document to the CEMP. Defence has existing fox control measures in place that will continue as part of and until the program of measures identified in the Fox and Cat Management Plan is underway.	Garden Island Fox and Cat Management Plan (GHD, 2026a)
23a-c	*The approval holder must ensure that in implementing the Fox and Cat Management Plan, the following environmental outcomes are achieved:* – *a) there is no fox or cat presence on Garden Island by the year 2030,* – *b) following eradication of foxes, Garden Island remains free of foxes until at least 6 years after completion of construction, and* – *c) Garden Island remains free of cats until at least 6 years after the completion of construction.*	The Garden Island Fox and Cat Management Plan (GHD, 2026a) has been prepared and is a reference document to the CEMP. The plan includes the environmental objectives of Condition 23 a-c. Defence has existing fox control measures in place that will continue until the program of measures identified in the Fox and Cat Management Plan (GHD, 2026a) are implemented.	Garden Island Fox and Cat Management Plan (GHD, 2026a)
LITTLE PENGUIN AND INDIAN OCEAN BOTTLENOSE DOLPHIN – VESSEL STRIKE			
24a-e	*From the commencement of the Action until the completion of the Action, the approval holder must avoid and minimise harm to little penguins and Indian Ocean bottlenose dolphins by ensuring that:* – *a) No auxiliary vessels and no construction vessels operate within the Careening Bay Action Area outside the period commencing 60 minutes after sunrise and ending 60 minutes before sunset.* – *b) No vessels exceed a speed of 4 knots when travelling in the Careening Bay Action area or the little penguin departure area, except vessels conducting security operations or emergency operations.*	No works are being undertaken in the Careening Bay Action Area for the trial piling exercise. The Maritime Trial Piling Exercise Management Annexure (Annexure A6) includes management controls to meet condition 24 a-e. No construction vessels are required for the maritime trial piling exercise. Vessels proposed for the maritime trial piling exercise are limited to auxiliary vessels. All requirements of condition 24 a-e will be addressed in a revised version of the CEMP prior to maritime construction activities commencing.	Section 6 and Section 7 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *c) All vessel strikes involving little penguins or Indian Ocean bottlenose dolphins are reported to the department as an incident.* – *d) All construction vessels with outboard motors are fitted with propellor guards.* – *e) All construction vessels are fitted with a Vessel Monitoring System.*		
SYNGNATHIDS			
25	*The approval holder must, before the commencement of maritime works, develop a detailed strategy to minimise harm to Syngnathids. The strategy must be prepared by a suitably qualified Syngnathid ecologist and must use best practice to translocate Syngnathids from the disturbance area to a receiver site such as natural habitat, or other suitable habitat, prior to the commencement of maritime works.*	The Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c) which draws from the Syngnathid Management Plan (GHD, 2026b) sets out a strategy to minimise harm to Syngnathids for the purpose of the maritime trial piling exercise. The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on harm minimisation and translocation of Syngnathids, for future maritime activities associated with the approved Action.	Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c).
26a-e	*The approval holder must ensure that all maritime works involving Syngnathids or Syngnathid habitat are planned and overseen by a suitably qualified Syngnathid ecologist. These activities must include:* – *a) Preparing a risk assessment for translocation, with consideration of the National Policy Guidelines for the Translocation of Live Aquatic Animals.* – *b) Developing and overseeing baseline and monitoring surveys which include both diving and environmental DNA (eDNA) methodologies to:* • *i) establish the baseline species presence, abundance and distribution within the disturbance area, and* • *ii) monitor receiver sites at 1, 3, and 6 years following completion of the maritime works.* – *c) Developing and overseeing the implementation of the translocation process, including translocation surveys.* – *d) Selecting and preparing appropriate receiver site locations, such as natural habitat or other suitable habitat.*	Conditions 26 a, c, d are addressed in the Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c) which draws from the Syngnathid Management Plan (GHD, 2026b). The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on Conditions 26 a to e, for future maritime activities associated with the approved Action.	Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c).

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	– *e) Contribute to Syngnathid knowledge in Cockburn Sound. Prior to the translocation surveys in the seagrass disturbance area, the suitably qualified Syngnathid ecologist must engage with West Australian Marine Science Institution (WAMSI) Westport Marine Science Program, and investigate opportunities to collaborate during translocation surveys by contributing reference Syngnathid specimens to the Cockburn Sound Syngnathid eDNA library.*		
27	*The approval holder must ensure a translocation survey is undertaken on the same day and immediately prior to harming any Syngnathid habitat, to avoid Syngnathids recolonising the disturbance areas. Translocation surveys must include diving surveys of pylons, which are more effective at capturing seahorses, and seine netting for more cryptic Syngnathids in seagrass disturbance areas.*	This requirement is addressed in the Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c) which draws from the Syngnathid Management Plan (GHD, 2026b) The Syngnathid Management Plan (GHD, 2026b) will guide future versions of the CEMP on translocations surveys, for future maritime activities associated with the approved Action.	Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c).
28	*The approval holder must ensure that at a minimum, translocation activities are carried out by a suitably qualified marine field ecologist, under the guidance of the suitably qualified Syngnathid ecologist.*	The translocation activities will be carried out by suitably qualified marine field ecologist, under the guidance of the suitably qualified Syngnathid ecologist.	Maritime Trial Piling Exercise and Syngnathid Technical Memorandum (GHD, 2026c).
Part B – Administrative conditions			
PLAN REVISION Note: Section 143A of the EPBC Act entitles the approval holder to apply for the Minister's approval of a revised version of a plan.			
29a-e	*The approval holder may choose to revise a plan required to be implemented under condition 19 without submitting it for approval under Section 143A of the EPBC Act, if:* – *a) The taking of the Action in accordance with the revised plan would be consistent with the approved Action,* – *b) The taking of the Action in accordance with the revised plan would be consistent with the conditions attached to this approval,* – *c) The taking of the Action in accordance with the revised plan would not be likely to have a new or increased impact, and* – *d) The approval holder notifies the department electronically that it has prepared a revised version*	N/A – Not relevant until installation of lighting. Note: For 29 d(vii): All reporting will be documented and submitted in the Annual Compliance Report (ACR) (Section 7.2 of the CEMP).	N/A – Not relevant until installation of lighting. Note: For 29 d(vii): Sections 7, 11.3, and 12 of the CEMP.

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	of the plan (the 'revised plan'). In notifying the department, the approval holder must specify each condition which references the plan and provide the department with: • *i) an electronic copy of the revised plan,* • *ii) an electronic copy of the revised plan marked up with track changes to show the differences between the plan and the revised plan,* • *iii) a comprehensive explanation of all differences between the plan and the revised plan,* • *iv) a declaration that the approval holder has read and understands the Guidance on 'new or increased impact' relating to changes to approved management plans under EPBC Act environmental approvals, Commonwealth of Australia 2017,* • *v) a comprehensive analysis and detailed discussion on the likelihood that taking the Action in accordance with the revised plan will not have, or will not be likely to have, a new or increased impact,* • *vi) written notice of the date on which the approval holder will implement the revised plan (the 'revised plan implementation date'), being at least 30 business days after the date of providing notice of the revision of the plan, or a date agreed to in writing with the department, and* • *vii) a copy of the compliance report for the latest Annual Compliance Report (ACR) period and a statement of any relevant history of compliance (including non-compliance) in relation to the plan.* – *e) The approval holder must commence implementation of the revised plan from the revised plan implementation date unless otherwise notified in writing by the Minister.*		
30a-c	*If the Minister notifies the approval holder that the Minister is satisfied that the taking of the Action in*	N/A – Not relevant until installation of lighting.	N/A – Not relevant until installation of lighting.

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	accordance with a plan which has been revised without submitting it for the Minister's approval would be likely to have a new or increased impact, then: – *a) the approval holder's ability to revise a plan without submitting the plan for Minister approval does not apply, or ceases to apply, in relation to the revised plan,* – *b) the approval holder must implement the plan in force immediately prior to that revised plan or a version of the plan specified by the Minister in the notice, and* – *c) the Minister may also notify that, for a specified period, the approval holder's ability to revise a plan without submitting the plan for Minister approval does not apply for one or more specified plans.*		
31	*The approval holder may, at any time by giving written notice to the department, revoke its choice to implement a plan which has been revised without submitting it for the Minister's approval. If the approval holder revokes the choice to implement a revised plan, the approval holder must implement the plan in force immediately prior to that revised plan.*	N/A – Not relevant until installation of lighting.	N/A – Not relevant until installation of lighting.
SUBMISSION AND PUBLICATION OF PLANS			
32	*Wherever these conditions require a plan, all such plans must be published on the website within 15 business days prior to implementation and must be submitted to the department electronically upon request within 5 business days.*	Section 7 includes this requirement.	Section 7 (Reporting)
33	*The approval holder must keep all plans published on the website, in a format that is easily accessible and downloadable, from the first date which that plan must be published and until the expiry date of this approval. This requirement applies to all current and superseded versions of plans.*	Section 12.2 includes the requirements of this condition.	Section 12.2 (Control of documented information)
34	*The approval holder is required to exclude or redact sensitive biodiversity data from any version of a plan before that plan is published on the website or otherwise provided to a member of the public. If sensitive biodiversity data is excluded or redacted from*	Section 12.2 includes the requirements of this condition.	Section 12.2 (Control of documented information)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	a plan, the approval holder must notify the department in writing of what exclusions and redactions have been made in the version published on the website.		
COMMENCEMENT OF THE ACTION			
35	*The approval holder must notify the department electronically of the date of commencement of the Action, within 5 business days following commencement of the Action.*	Section 7 includes notification of commencement of these activities as listed in the reporting requirements. Section 6 assigns responsibility for notification of commencement of these activities to DEPAC.	Section 7 (Reporting) Section 6 (Environmental management roles and responsibilities)
36	*The approval holder must not commence the Action later than 5 years after the date of this approval decision.*	The Action is intended to commence in August 2025. Refer to Section 1.1 and Section 3.6 for Project timing and indicative construction program	Section 1.1 (SRF-West Priority Infrastructure Works) Section 3.6 (Indicative construction program)
37	*The approval holder must notify the department electronically of the date of commencement of construction, commencement of maritime works, commencement of dredging and completion of construction within 5 business days following commencement of construction, commencement of maritime works, commencement of dredging and completion of construction, respectively.*	Section 7 includes notification of commencement of these activities as listed in the reporting requirements. Section 6 assigns responsibility for notification of commencement of these activities to DEPAC.	Section 7 (Reporting) Section 6 (Environmental management roles and responsibilities)
COMPLIANCE RECORDS			
38	*The approval holder must maintain accurate and complete compliance records and document the procedure for recording and storing compliance records.*	Section 12.2 documents the procedure for recording and storing compliance records.	Section 12.2 (Control of documented information)
39	*If the department makes a request in writing, the approval holder must provide electronic copies of compliance records to the department within the timeframe specified in the request.* *Note: Compliance records may be subject to audit by the department, or by an independent auditor in accordance with Section 458 of the EPBC Act, and/or be used to verify compliance with the conditions. Summaries of the results of an audit may be published on the department's website or through the general media.*	Section 12.2 includes the requirements of this condition.	Section 12.2 (Control of documented information)
40	*The approval holder must ensure that any monitoring data, surveys, maps, and other spatial and metadata required under the conditions of this approval are*	All reporting will be documented and submitted in the ACR (Section 7.2 of the CEMP).	Section 11.4 (Environmental monitoring) and Section 7 (Reporting) of the CEMP.

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	prepared in accordance with the Guidelines for biological survey and mapped data, Commonwealth of Australia 2018 and Guide to providing maps and boundary data for EPBC Act projects, Commonwealth of Australia 2021, or as otherwise specified by the Minister in writing. *The approval holder must submit all monitoring data, surveys, maps, other spatial and metadata and all species occurrence record data (sightings and evidence of presence) electronically to the department within 20 business days following the end of each Annual Compliance Report Period (ACR) period, except where otherwise specified in a plan.*	Section 8 of the Flora and Fauna Management Annexure (Annexure A1) provides the monitoring data requirements.	Section 8 of the Flora and Fauna Management Annexure (Annexure A1).
41	*The approval holder must upload, at least annually, to the Atlas of Living Australia or the relevant state biodiversity database, all fauna sightings recorded during the specified monitoring activities related to this Action.*	Section 7 lists this reporting requirement. Section 10 of the Flora and Fauna Management Annexure (Annexure A1) includes the requirement for compulsory upload by ecologists (in consultation with DEPAC) of fauna sightings to the Atlas of Living Australia, with a minimum annual upload. As part of DBCA licence number FR28000499, a fauna return of all relocated fauna will be submitted to DBCA as part of their fauna returns process. (Refer to Appendix A of Annexure A1 for licence conditions). The Flora and Fauna Management Annexure (Annexure A1) also require relocations or injuring incidents to be captured in incident reports and general sightings from monitoring programs to be summarised in monitoring reports. Section 10 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6) also requires relocations or injuring incidents to be captured in incident reports and general sightings from monitoring programs to be summarised in monitoring reports.	Section 7 (Reporting) Section 10 and Appendix A of the Flora and Fauna Management Annexure (Annexure A1) Section 10 of the Maritime Trial Piling Exercise Management Annexure (Annexure A6)
ANNUAL COMPLIANCE REPORTING Note: Compliance reports may be published on the department's website.			
42	*The approval holder must prepare a compliance report for each ACR period.*	Section 7.2.2 requires the preparation of an ACR every year.	Section 7.2.2 (Annual Compliance Report (ACR))

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
43a-d	*The approval holder must ensure each compliance report includes:* – *a) Accurate and complete details of compliance and any non-compliance with:* • *i) each condition attached to this approval decision, and* • *ii) all commitments made in each plan,* – *b) A schedule of all plans in effect in relation to these conditions during the ACR period.* – *c) Accurate and complete details of how each plan was implemented during the ACR period.* – *d) If any incident occurred, accurate and complete details of each incident.*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))
44	*The approval holder must provide to the department as an attachment to the compliance report, a copy of all monitoring and verification reports as required under a condition.*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))
45	*The approval holder must ensure each compliance report is consistent with the Annual Compliance Report Guidelines, Commonwealth of Australia 2023.*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))
46a-b	*The approval holder must, within 20 business days following the end of each ACR period, in a format that is easily accessible and downloadable, publish on the website:* – *a) each compliance report, and* – *b) a shapefile showing all clearing of protected matters, and their habitat, undertaken within the ACR period.*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))
47a-c	*The approval holder must:* – *a) Exclude or redact sensitive biodiversity data from each compliance report and shapefile published on the website or otherwise provided to a member of the public.* – *b) If sensitive biodiversity data is excluded or redacted from a version of a compliance report published or otherwise provided to a member of the public, submit the full compliance report to the department within 5 business days of its publication*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	on the website or provision to a member of the public, and notify the department in writing of what exclusions and redactions have been made in the version published on the website or otherwise provided to a member of the public. – *c) If sensitive biodiversity data is excluded or redacted from a version of a shapefile published or otherwise provided to a member of the public, submit the full shapefile to the department within 5 business days of its publication on the website or provision to a member of the public, and notify the department in writing of what exclusions and redactions have been made in the version published on the website or otherwise provided to a member of the public.*		
48	*The approval holder must notify the department electronically, within 5 business days of each date of publication, that the compliance report has been published on the website. In this notification, the approval holder must provide the department with the web address for where the compliance report and related shapefile are published on the website.*	Section 7.2.2 includes the requirements of this condition.	Section 7.2.2 (Annual Compliance Report (ACR))
49	*The approval holder must keep each compliance report and related shapefile published on the website from the first date which that compliance report must be published and until the expiry date of this approval.*	Section 12.2 includes this requirement.	Section 12.2 (Control of documented information)
REPORTING NON-COMPLIANCE			
50a-c	*The approval holder must notify the department electronically, within 2 business days of becoming aware of any incident. The approval holder must specify in each notification:* – *a) any condition or commitment made in a plan which has not been, or may have not been, complied with,* – *b) a short description of the incident, and* – *c) the location (if applicable, including co-ordinates), date and time of the incident.*	Section 7.3 specifies that DCCEEW must be notified within 2 business days of an incident and provides further details of what constitutes an incident and the reporting requirements. Reporting and documentation requirements outline the need for description, time and dates of incidents. There is a requirement for capture of incidents in the ACR.	Section 7.3 (Environmental incident and event reporting)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
51a-d	*The approval holder must provide to the department in writing, within 12 business days of becoming aware of an incident, the details of that incident. The approval holder must specify:* – *a) all corrective measures and investigations which the approval holder has already taken in respect of the incident,* – *b) the potential impacts of the incident,* – *c) the method and timing of any corrective measures that the approval holder proposes to undertake to address the incident, and* – *d) any variation of these conditions or revision of a plan that will be required to prevent recurrence of the incident and/or to address its consequences.*	Section 7.3 specifies that DCCEEW must be provided with the details of this condition within 12 business days of an incident. Section 7.3 provides further details of what constitutes an incident and the reporting requirements.	Section 7.3 (Environmental incident and event reporting)
INDEPENDENT AUDIT			
52	*The approval holder must ensure that an independent audit of compliance with the conditions is conducted for every audit period.*	Section 12.1 requires an independent audit of compliance with the conditions of EPBC Act approval 2024/10031 every 3 years.	Section 12.1 (Environmental auditing)
53	*The approval holder must submit details of the proposed independent auditor and their qualifications to the department within 10 business days following the end of each audit period.*	Section 12.1 includes the requirements of this condition.	Section 12.1 (Environmental auditing)
54	*The approval holder must ensure the scope of each independent audit is sufficient to determine the compliance status for each condition of approval, and each commitment made in each plan.*	Section 12.1 includes the requirements of this condition.	Section 12.1 (Environmental auditing)
55	*The approval holder must ensure the criteria for each independent audit and the undertaking of each independent audit are consistent with the Independent Audit and Audit Report Guidelines.*	Section 12.1 includes the requirements of this condition.	Section 12.1 (Environmental auditing)
56	*The approval holder must submit an audit report to the department for written agreement from the department within 3 months following the end of each audit period, or as otherwise directed by the Minister in writing.*	Section 12.1 includes the requirements of this condition.	Section 12.1 (Environmental auditing)
57	*The approval holder must ensure each audit report is completed to the satisfaction of the Minister and is consistent with the Independent Audit and Audit Report Guidelines to the extent that the Independent Audit and*	Section 12.1 includes the requirements of this condition.	Section 12.1 (Environmental auditing)

Condition number	Requirement	How requirement is addressed	Where requirement is addressed in CEMP or supporting documents
	Audit Report Guidelines are consistent with these conditions.		
58	*The approval holder must publish each audit report on the website, in a format that is easily accessible and downloadable, within 10 business days of the date the department agrees to that audit report in writing.*	Section 12.1 and Section 7 include the requirements of this condition.	Section 12.1 (Environmental auditing) Section 7 (Reporting)
59	*The approval holder must notify the department within 5 business days of the date the audit report is published on the website. In this notification, the approval holder must provide the department with the web address for where the audit report is published on the website.*	Section 12.1 and Section 7 include the requirements of this condition.	Section 12.1 (Environmental auditing) Section 7 (Reporting)
60	*The approval holder must keep each audit report published on the website from the first date which that audit report must be published and until the expiry date of this approval.*	Section 12.2 includes the requirements of this condition.	Section 12.2 (Control of documented information)
61	*Within 20 business days after the completion of the Action, or at least 20 business days prior to the expiry date of this approval, the approval holder must notify the department electronically of the date of completion of the Action and provide completion data. The approval holder must submit any spatial data that comprises completion data as a shapefile.*	This requirement covers the overall implementation of the Action. The proponent will be responsible for enduring notifications related to the Action.	N/A
62	*The approval holder must notify the department electronically at least 60, but not more than 70, business days prior to the expiry date of this approval, that the approval is due to expire.*	This requirement covers the overall implementation of the Action. The proponent will be responsible for enduring notifications related to the Action.	N/A

Appendix C

Legislative framework

Commonwealth legislation

As a Commonwealth agency, Defence is bound by Commonwealth legislation and International Treaties to which Australia is a signatory. Commonwealth requirements in relation to environmental assessment and management are principally specified by the EPBC Act.

In accordance with the EPBC Act, proposed actions with the potential to significantly impact matters protected by the EPBC Act require approval from the Australian Minister for the Environment and Water.

The Action under EPBC Act approval 2024/10031 includes conditions relevant for this CEMP. Refer to Section 2 and Appendix B.

Other key Commonwealth legislation relevant to the Action are considered in Section 3.1 of the EHA. Those relevant for this CEMP are summarised in Table C.1 below.

State and local legislation and policies

The works covered under this CEMP are located on Commonwealth land (Type 2, Plan WA; Lot numbers 9 and unnumbered). Commonwealth land is not subject to State (WA), local law or planning instruments as per Section 52(2) of the Australian Constitution. Defence aims to comply with the intent of State legislation to the extent that these provisions are not inconsistent with Commonwealth requirements.

Defence has not referred the proposed action to the Western Australian Environmental Protection Authority (EPA) for assessment in accordance with the Environmental Protection Act 1986 (WA) (EP Act), the Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016 and the Environmental Impact Assessment Procedures Manual (Part IV Divisions 1 and 2).

The key State legislation and local policy are considered in Section 3.2 of the EHA. Those relevant to the CEMP are summarised in Table C.2 below.

Table C.1 Commonwealth legislation requirements relevant for the CEMP

Commonwealth legislation	Key requirements/considerations relevant for the CEMP	Relevant section in CEMP
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* is Commonwealth legislation that can be used by Aboriginal and Torres Strait Islander people to make applications to protect places and objects from injury or desecration. The places or objects in question must be of particular significance in accordance with Indigenous tradition. The Action area has been assessed for Indigenous heritage values through desktop assessment and field investigations, and collaboration with Gnaala Karla Booja and Whadjuk Traditional Owners is ongoing (GHD, 2025a). Any potential Indigenous objects discovered during construction works will be managed in accordance with chance finds heritage protocols in the Heritage Management Annexure (Annexure A2).	Heritage Management Annexure (Annexure A2)
National Environment Protection (Assessment of Site Contamination) Measure 1999	National Environment Protection Measures (NEPM) establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices. The *National Environment Protection Measures (Implementation) Act 1998* (the Implementation Act) gives the Australian Government the power to implement NEPM on its own land and for its own activities. The Assessment of Site Contamination NEPM provides the national regulatory framework within which contaminated sites are assessed without exception and is therefore relevant and applicable to the proposed Action.	Soil and Water Quality Management Annexure (Annexure A3)
Biosecurity Act 2015	The *Biosecurity Act 2015* is the Australian Government's legislation for managing diseases and pests (such as Weeds of National Significance) that may cause harm to human, animal or plant health or the environment. While no Weeds of National Significance were identified within the proposed Action area, there remains a potential risk of diseases and pests being introduced though the construction of the proposed Action.	Appendix A-1 Flora and Fauna Management Annexure (Annexure A1)

Commonwealth legislation	Key requirements/considerations relevant for the CEMP	Relevant section in CEMP
	Appropriate biosecurity controls will be implemented through the CEMP to manage biosecurity risks during the construction and operation of the proposed Action.	
Australian Radiation Protection and Nuclear Safety Act 1998 (ARPANS Act)	The ARPANS Act provides for the protection of the health and safety of people and the environment from the harmful effects of radiation. The proposed Action involves the construction and operation of a controlled facility and possession of controlled material in accordance with Sections 30 and 31 of the Act. A licence will be required for the proposed Action. The design, construction and operational specifications approved by ARPANSA will be the basis for protection of the health and safety of people and the environment from potential radiological exposures.	N/A for this revision of the CEMP
Hazardous Waste Act 1989	This Act regulates the import, export, transit and sale of hazardous waste.	N/A for this revision of the CEMP
Work Health Safety Act 2011	This Act provides a nationally consistent framework to protect the health, safety and welfare of all personnel at work. It also protects the health and safety of all other people who might be affected by the work.	Construction Contractor CEMP

Table C.2 State and local legislation and policies relevant for the CEMP

State legislation	Key requirements/considerations relevant for the CEMP	Relevant section in CEMP
Aboriginal Heritage Act 1972 (Amended AH Act)	The Amended AH Act provides for the preservation of places and objects that are or have been of sacred, ritual or of ceremonial significance to persons of Indigenous descent. The proposed Action area has been assessed for Indigenous heritage values through desktop assessment, and collaboration with Gnaala Karla Booja and Whadjuk Traditional Owners is ongoing (GHD, 2024). While there are no known/reported State listed Indigenous sites within or adjacent to the proposed Action area, there is potential for unknown items to be found.	Heritage Management Annexure (Annexure A2)
Biodiversity Conservation Act 2016 (BC Act)	The BC Act provides for the conservation and protection of State biodiversity components, including native species, habitats, ecological communities, genetic material, ecosystems and ecological processes. No BC Act listed threatened flora species were recorded within the proposed Action area.	Flora and Fauna Management Annexure (Annexure A1)
Contaminated Sites Act 2003	The Contaminated Sites Act 2003 provides for the identification, recording, management and remediation of contaminated sites, to consequentially amend certain other Acts for related purposes. Contaminated sites are known to occur within the proposed Action area and will be managed in accordance with the Act. There is the potential for previously unrecorded contamination to be uncovered during ground-disturbing works.	Soil and Water Quality Management Annexure (Annexure A3)
Environmental Protection Act 1986 (EP Act)	The EP Act provides for the prevention and control of pollution and environmental harm, to conserve, preserve, protect, enhance, and manage the environment in WA. Part IV (Section 38) of the EP Act describes the referral and assessment of proposals, Part V (Section 49) describes pollution and unreasonable emissions, and Part V (Division 2) describes the assessment of clearing of native vegetation. The WA Environmental Protection Authority (EPA) administers a number of guidelines that are applicable to the proposed Action including but not limited to: – Environmental Factor Guideline – Human Health – Environmental Factor Guideline – Social Surroundings – Environmental Factor Guideline – Marine Environmental Quality – Environmental Factor Guideline – Marine Fauna – Environmental Factor Guideline – Benthic Communities and Habitats.	All environmental management documentation

State legislation	Key requirements/considerations relevant for the CEMP	Relevant section in CEMP
	The proposed Action disturbance footprint is located on Commonwealth land and is not likely to have a significant impact on EPA environmental factors; however, the proposed operations have the potential to interact with State air, lands (the seabed) and waters (the ocean).	
Rights in Water and Irrigation Act 1914 (RIWI Act)	The RIWI Act provides for the regulation, management, use and protection of water resources in WA. The Act vests the State's groundwater and surface water resources to the Crown. Licences are generally required for the taking and using of water. Permits are required for activities that may damage, obstruct or interfere with water flow or the beds and banks of watercourses and wetlands in proclaimed rivers, surface water management areas and irrigation districts. The DWER policy 'Managing unlicensed groundwater use' (DWER, 2020) identifies licence and permit exemptions for water taken on Commonwealth land and by Commonwealth agencies such as Defence. The proposed Action may require dewatering during construction when drilling Continuous Flight Auger (CFA) piles for the CIF foundation (depending on the drilling method employed).	Soil and Water Quality Management Annexure (Annexure A3)
State Environmental (Cockburn Sound) Policy 2015	The State Environmental (Cockburn Sound) Policy 2015 outlines the environmental values, environmental quality objectives and criteria, framework for monitoring and reporting guides and management to ensure the values of Cockburn Sound/*Derbal Nara* are considered in decision making of developments and ongoing uses of the Sound. The State Environmental (Cockburn Sound) Policy 2015 is backed by the powers in the WA EP Act and authorises the Cockburn Sound Management Council (CSMC) (established as an advisory council to the WA Minster for Environment) to report annually on the 'State of the Sound'. Supporting documentation with the policy are the Environmental Quality Criteria and Manual of Standard Operating Procedures for Environmental Monitoring. The Action area includes the marine environment of Careening Bay, Sulphur Bay and the wider Cockburn Sound/*Derbal Nara* which is subject to the State Environmental (Cockburn Sound) Policy 2015. The CSMC is also an important stakeholder in the management of Cockburn Sound's environmental values and consultation with them has been undertaken.	Soil and Water Quality Management Annexure (Annexure A3)

Appendix D

DCCEEW Environmental Management Plan Guidelines Requirements

Table D.1 Table demonstrating compliance with DCCEEW EMP Guidelines requirements

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
Cover page and Declaration of Accuracy	*Cover page detailing:* *• EPBC number* *• project name* *• proponent /approval holder and ACN or ABN* *• the proposed/approved action* *• location of the action* *• date of preparation of the environmental management plan* *• person accepting responsibility for the environmental management plan – signed declaration.*	Cover page.	Cover pages
Document Version Control	*The document version control should be a simple system that ensures that details of all key changes to the document over time are properly recorded. Identified changes should include details of timings, persons responsible and reasons for changes.*	Document version control table.	Page i
Table of Contents	*Table of contents page detailing:* *• all section headings and page numbers* *• all figures, tables, plans and maps (should be numbered)* *• all appendixes (with meaningful titles, including for sub-appendixes if any).* *If the appendixes contain a collation of data, include summary of the contents.*	Table of contents.	Page iii
Introduction	*The executive summary or introduction should note the key elements of the Project, the purpose of the document, the main potential impacts and the primary strategies planned to address these impacts.*	Notes the key elements of the approved Action, the purpose of the document, the main potential impacts and the primary strategies planned to address these impacts.	Section 1

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
Conditions of approval reference table	*When an environmental management plan is prepared after the Project has been approved under the EPBC Act, the management plan should include a table detailing the information noted below:* *• The EPBC Act approval condition requirements the plan is intended to address. These are best presented broken down into each of the individual actions that the conditions require.* *• The section and page numbers which address the approval conditions.* *• A summary of the key commitments relating to each of the approval conditions.*	Includes: – the EPBC Act approval condition requirements the CEMP addresses (Section 2 and Appendix B) – key commitments relating to each of the approval conditions are in the environmental management annexures (Appendix A).	Section 2 Appendix B Appendix A Appendix B
Project description	*The environmental management plan should provide a description of the Project as this provides context for the plan. The location of all project actions should be described and a map showing their location provided. Basic information on the environment at these locations should also be included, as this helps provide the environmental context to which the environmental management plan applies. The plan should include a description of the activities that will be undertaken as part of the Project including project details relevant to any approval conditions and with potential impacts on matters protected under the EPBC Act. The plan should distinguish between construction and operational activities, if relevant. A schedule of intended commencement and completion dates should be provided. Projects undertaken in stages should identify each stage in the schedule. Contingency schedules can also be included along with examples of events that could result in the use of the contingency schedules.*	Notes the project description including map the approved Action and basic environment information. The activities are described including where relevant to the approval conditions and with potential impacts on matters protected under the EPBC Act. This plan is for construction only. Indicative construction program is provided with target activity and completion dates.	Section 3

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
Objectives	*The environmental outcomes of the plan should be defined. These should be tailored to the environmental issues outlined in the plan.*	Objectives of the CEMP are stated in Section 4 of this document. Environmental outcomes (objectives) are defined further in each annexure in Appendix A.	Section 4 Appendix A
Environmental management roles and responsibilities	*Once an action is approved, the approval holder is responsible for complying with the conditions of approval, including the commitments made in environmental management plans. The plan should define the roles and responsibilities of personnel in charge of the environmental management of the Project. The roles and responsibilities of each relevant position should be documented, including the responsibilities of sub-contractors. The names of the responsible personnel do not need to be included; identification of the position titles, roles and responsibilities is sufficient. If the roles and responsibilities are expected to change over time, the long-term variations should also be documented.*	Defines and documents the roles and responsibilities of construction personnel in charge of the environmental management of the approved Action.	Section 6
Reporting	*An environmental management plan will usually require reporting arrangements for two purposes. Reporting arrangements assist with effective implementation and with external reporting. External reports may include reports on environmental incidences to the regulator, reports to stakeholders, reports to inform reviews of the plan and reports to meet the reporting requirements of the conditions of approval.* *The description of reporting requirements should include:* *• a list of required reports including where appropriate monitoring, environmental incidents, non-compliance, corrective action and auditing* *• a description of the standard report content* *• the schedule or triggers for preparing a report* *• who the report is provided to* *• document control procedures.*	Notes the internal and external reports required, standard content, who is responsible for the report, the frequency of reporting/triggers and who the report is provided to.	Section 7 Section 12.2

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	Reporting commitments should also be consistent with any reporting to us required by the conditions of approval.		
Environmental training	*All people involved with the Project should receive relevant environmental training to ensure they understand their responsibilities when implementing the environmental management plan. People to be trained include those at the site/s of all project activities and operations, including contractors, sub-contractors and visitors. The training should be tailored to the role of the individual in the Project.* *The environmental management plan should describe the training to be implemented and could include:* *• site inductions* *• identification of key points of environmental value and any relevant matters of national environmental significance* *• understanding the requirements of the environmental management plan and the individual's role* *• environmental incident emergency response procedures Environmental management plan guidelines* *• site environmental controls* *• an outline of the potential consequences of not meeting their environmental responsibilities.* *Records of all training conducted should be maintained and include:* *• the person receiving the training* *• the date the training was received* *• the name of the person conducting the training* *• a summary of the training.*	Training and inductions are described, including site inductions, key points of environmental values and matters, understanding of the environmental management plan, roles, emergency and incident response processes, site controls and potential consequences of not meeting responsibilities Records of induction will be kept and are to be made available upon request by the SEO during audits.	Section 8

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
Emergency contact and procedures	*The environmental management plan should identify the key emergency contacts responsible for managing environmental emergencies associated with the Project and their contact details. These personnel should have the power to stop and direct works so that they can manage emergencies effectively. In addition, the plan should establish procedures for managing environmental emergencies and ensure that those procedures are implemented and maintained.*	Key emergency contacts (with contact details) responsible for managing environmental emergencies associated with the approved Action are identified. Outlines the personnel that have the power to stop and direct works so that emergency contacts can manage emergencies effectively. Outline the procedures for managing environmental emergencies and outlines how those procedures are implemented and maintained.	Section 9
Potential environmental impacts and risks	***Potential environmental impacts and risks*** ***Threats to matters protected under the EPBC Act*** *The environmental management plan should summarise all the identified threats to matters protected under Part 3 of the EPBC Act in the management plan. The matters protected by the EPBC Act include:* *• the 9 matters of national environmental significance (listed in Appendix A)* *• the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).* *The plan should refer to relevant information provided in the EPBC Act assessment documentation, such as an environmental impact statement or preliminary documentation. If the Project has already been approved, the plan should detail all new information relevant to the conditions placed on the approval. The key sensitivities of the environmental values potentially impacted by the action should be identified.* ***Potential impacts*** *The potential impacts section of the plan should focus on identifying, locating and quantifying the*	Identifies threats to matters protected under Part 3 of the EPBC Act. Summarises potential impacts and provides a risk assessment for each. Environmental management annexures identify, document and manage potential impacts specific to matters protected under Part 3 of the EPBC Act.	Section 10 (Potential environmental impacts and risks) Appendix A Environmental management

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	potential impacts (direct and indirect) of the Project on the matters protected by the EPBC Act. It should discuss: *• the relevant impacts of the Project* *• the nature and extent of the potential short-term and long-term effects* *• any uncertainties regarding the predicted impacts.* *This may include a summary of any relevant information previously provided in assessment documentation, such as an environmental impact statement or preliminary documentation.* *Impacts from relevant stages of the action (for example, pre-construction, construction and operation) should be delineated in this section and should reflect the relevant conditions of approval. It may be necessary to divide the potential impacts into subsections reflecting the stages of the Project.* *For example, a 40-kilometre gas pipeline project traverses the habitat of a population of a hypothetical bird species which is listed as threatened under the EPBC Act. Impacts to this population because of changes to its nesting habitat are unavoidable. Potential impacts from the pre-construction and construction phases of the pipeline project that need to be considered include:* *• direct impacts on the species through habitat disturbance (including vegetation clearing, noise, traffic, waste disposal, light if working at night, etc) within the construction footprint* *• indirect impacts on the species such as displacement into adjacent areas which are less suitable and already occupied by other animals of the same or other species, weed infestation, erosion, altered vegetation age and fire regime*		

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	• short-term impacts on food supply and nesting habitat during pre-construction clearing and for six months following clearing and construction *• long-term impacts due to loss of nesting sites which will impact on population dynamics over multiple generations* *• uncertainty as to where individuals of this species have not been recorded but where high value habitat for this species is known to occur.* ***Risk assessment*** *Once the potential impacts of the proposal are clearly identified a risk assessment should be undertaken for each potential impact. This means that the likelihood and consequences of each potential impact need to be estimated. An example of a methodology for risk assessment is at Evaluating risk.* *The function of the risk assessment is not to repeat or supersede the original assessment of a project or its conditions of approval. Rather, it is to ensure that these risks are effectively translated into actual mitigation and management actions. Impacts with higher risk ratings usually require more management actions and controls. This minimises the likelihood of the risk occurring and reduces the consequences to acceptable levels.*		
Environmental management measures	*The environmental management plan should clearly state how the potential impacts of the proposal will be managed and this information usually forms the bulk of the content of the plan. For each potential impact, the plan should address:* *• environmental management activities, controls and performance targets* *• environmental management maps and diagrams*	Environmental management annexures have been developed for: – Fuel and oil spills – Dust and contamination – Noise and vibration – Water quality – Biosecurity – Flora and fauna, including relocation and rescue – Little penguin – Tammar wallaby	Section 11 Appendix A Environmental management

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	• monitoring programs with trigger values for corrective actions *• corrective actions and non-compliance reporting* *• environmental schedules.* *These topics are described in more detail below. It is helpful if management plans present the information on these topics for one potential impact at a time. This ensures that all the management measures for each potential impact are in the same section of the document and easy to locate.*	– Heritage – Traditional Owner engagement – Marine impacts from the maritime trial piling exercise. The Construction Contractor's CEMP will also include management of waste, and traffic and access.	
Environmental management activities, controls and performance targets	*The environmental management plan should describe all the environmental management activities and control measures that will be implemented to avoid or minimise environmental impacts. The description of each measure should also specify the timeframes for implementation and the performance targets or outcomes to be achieved. The timing of measures is often best presented in a timetable. Performance targets and outcomes should be quantitative and auditable.*	Each environmental management annexure includes the following sections: – Objectives (the key objectives for the environmental management annexure). – Performance criteria (describes the performance criteria for the environmental management annexure, which have been developed to be SMART). – Management controls (which includes all the environmental management controls to meet the performance criteria; where relevant, these include the timing of the measures, for example pre-construction, during construction or post construction).	Appendix AEnvironmental management
Environmental management maps and diagrams	*Environmental management maps and diagrams are useful visual tools that aid in environmental management activities. Maps can provide useful spatial information about areas that require environmental management. Diagrams can illustrate the design of environmental control measures and the flow of environmental management procedures. For example, a map could be used to show:* *• environmentally sensitive areas on or near a project site* *• vegetation that requires protection*	The environmental management map and diagrams that are required to be developed by the Construction Contractor are listed and include: – boundaries for avoidance areas and no-go zones – entry and exit points and vehicle/machinery routes – location of bunded areas for chemical storage/refuelling and emergency spill kits – location of waste disposal areas, including lidded general waste and recycling bins and skips – laydown and stockpile areas	Section 11.1.1 Section 11.2 Appendix A

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	• *buffer zones or 'no-go zones'* • *monitoring locations.*	– temporary structures (i.e. fencing and signage) and lighting. Where relevant for the specific aspects, the environmental management annexures include maps and diagrams for specific management controls including monitoring locations and shut down zones.	
Environmental monitoring	*The environmental management plan should specify how the effectiveness of environmental management measures will be monitored. It should include the methodology, frequency and duration of monitoring activities. It should also include trigger values or conditions under which corrective actions are taken. The plan should also specify if, and when, follow up action is required and how monitoring records will be maintained.*	Each environmental management annexures includes the following sections: – Monitoring requirements (which includes the locations, frequencies and methodology of the environmental monitoring requirements) – Adaptive management measures (which include SMART triggers and corresponding adaptive management measures[2]) In addition, an overview of the environmental monitoring requirements and adaptive management approach is provided in the CEMP.	Appendix A Section 11.4
Corrective actions	*The environmental management plan should include procedures for addressing:* • *monitoring results which exceed the trigger values for corrective action* • *potential corrective actions* • *reporting non-compliance with approval conditions to the relevant authority* • *environmental incidents and emergencies.* *The plan should also identify who is responsible for implementing the above procedures. Auditable systems should be developed for recording the implementation of these procedures and their outcomes.*	Each environmental management annexure includes the following sections: – Adaptive management measures (which include SMART triggers and corresponding adaptive management measures) – Reporting and documentation (which includes any aspect-specific reporting requirements) – Responsibilities (which includes specific responsibilities for the environmental management annexure), including responsibilities for specific activities or measures are identified in the management controls and monitoring requirement sections In addition, an overview of reporting, responsibilities and emergency and incident response is provided in the CEMP.	Appendix A Section 6 Section 7 Section 9
Audit and review	***Environmental auditing*** *The environmental management plan should include the schedule or triggers for auditing the*	CEMP audit and review process including reviewing content, frequency, triggers and reporting including documentation and communication requirements.	Section 12

[2] The CEMP and environmental management annexures refer to adaptive management measures which include corrective actions for specific triggers identified in the environmental management annexures. Adaptative management measures are required by conditions of the EPBC Act approval 2024/10031.

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
	implementation and effectiveness of the plan. It should address both internal and external audit requirements including who is responsible for undertaking the audits and reporting the results. ***Environmental management plan review*** *The environmental management plan should specify the schedule or triggers for reviews of the plan. A review should assess whether the plan is achieving its objectives and the requirements of any relevant approval conditions. A review should take into account environmental monitoring records, corrective actions and the results of any audits. The plan should also identify who will be responsible for undertaking the review. During the review process, any reasons for varying the environmental management plan should be documented.* *Review of an environmental management plan would typically be undertaken:* *• following significant environmental incidents* *• when there is a need to improve performance in an area of environmental impact* *• periodically for actions undertaken over long timeframes such as one, two or five years.* *However, if the person taking the action wishes to carry out any activity other than in accordance with the approved management plan specified in the approval conditions, the person taking the action is usually required to submit to us for the Minister's written approval a revised management plan. In these cases, the varied activity should not commence until the Minister has approved the varied management plan in writing. As a guiding principle, the Minister will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time.*		

DCCEEW EMP Guidelines Requirement	DCCEEW Environmental Management Plan Guidelines requirements	DCCEEW EMP Guidelines requirement addressed in this CEMP	Section of this CEMP/Annexure where the DCCEEW EMP Guidelines requirement is addressed
Glossary	*This should include any acronyms, all terms which are open to different interpretations or terms which are not in common use. Terms which are defined in the approval conditions should retain the same meaning as that used in the conditions.*	Glossary and abbreviations.	Section 13 Section 14

Appendix E

Record of accepting CEMP roles and responsibilities

ACKNOWLEDGEMENT AND ACCEPTANCE OF ROLES AND RESPONSIBILITIES – SRF-West CEMP

I [print name],

in my role as defined in the CEMP or an environmental management annexure		**by the EPBC Act approval 2024/10031 available at: Project Decision · EPBC Act Public Portal.**	
Site Environment Officer	☐	Experienced wildlife carer	☐
Construction Contractor (including Construction Contractor's Site Manager or delegate)	☐	Independent auditor	☐
Project Management Contract Administrator (PMCA) member	☐	Suitably qualified acoustic expert	☐
		Suitably qualified field ecologist	☐
Pest management technician	☐	Suitably qualified water expert	☐
Construction personnel	☐	Suitably qualified professional	☐
[add any other CEMP or annexure specific role]	☐	Suitably qualified seabird conservation ecologist	☐
		Suitably qualified marine field ecologist	☐
		Suitably qualified Syngnathid ecologist	☐
		Suitably qualified vertebrate pest control expert	☐

I acknowledge that I have read the CEMP document and the following annexures:

		Date
	CEMP document	☐
A-1	Flora and Fauna Management Annexure	☐
A-2	Heritage Management Annexure	☐
A-3	Soil and Water Quality Management Annexure	☐
A-4	Noise and Vibration Management Annexure	☐
A-5	Little Penguin Monitoring and Management Plan	☐
A-6	Maritime Trail Piling Exercise Management Annexure	☐

I have completed the required induction and training for my role. I understand and accept the responsibilities assigned to my role in the CEMP and annexures and commit to fulfilling those responsibilities.

PRINT NAME	
PRINT ROLE	
SIGNATURE OF ACCEPTANCE	
DATE	

Appendix F

Environmental incident reporting template

SRF-West Environment Incident and Event Report

OBSERVER IDENTIFICATION DETAILS

Contract Number:		
Company(s)		
Contact person	Name	Click to enter text
	Email	Click to enter text
	Phone	Click to enter text
Tenement number(s)	Click to enter text	
Report type	☐ Environmental Incident (as defined in Section 7.3.1 of CEMP) ☐ Environmental Event (as defined in Section 7.3.2 of CEMP)	

Is this relating to death/injury of Perth Slider/Little Penguin/marine mammal	☐ NO	☐ YES, Perth Slider	Also complete SECTION A below	☐ YES, Little Penguin	Also complete SECTION B below	☐ YES, marine mammal	Also complete SECTION C below

Enter text as required and click the + at right to add another row

INCIDENT/EVENT REPORT DETAILS

Date and time of incident/event	Click to enter text	
Date and time incident/event reported to SEO	Click to enter text	
SEO on site		
Date and time stop work enacted (if applicable)	Click to enter text	
Select other authorities notified and date of notification (if applicable)	☐ ESM	4/02/2026
	☐ DEPAC	4/02/2026
	☐ Other	4/02/2026
State the date a comprehensive report is to be provided to DCCEEW (where applicable)	4/02/2026	
Incident/event location	Provide details of the location of the incident and approximate area impacted (e.g. m^2, Ha, etc.). Include a map, plan and photos as required in the supporting information section overleaf.	

Coordinates	Latitude:		Longitude:	

Incident/event description	Describe circumstances constituting the incident. Attach separate sheet, if necessary.
Current status	Click to enter text
Probable cause	Click to enter text
Emergency or remedial actions (taken or planned)	Click to enter text

RELEVANT ENVIRONMENTAL OUTCOMES/OBJECTIVES, PROJECT CONDITIONS AND MEASUREMENT CRITERIA

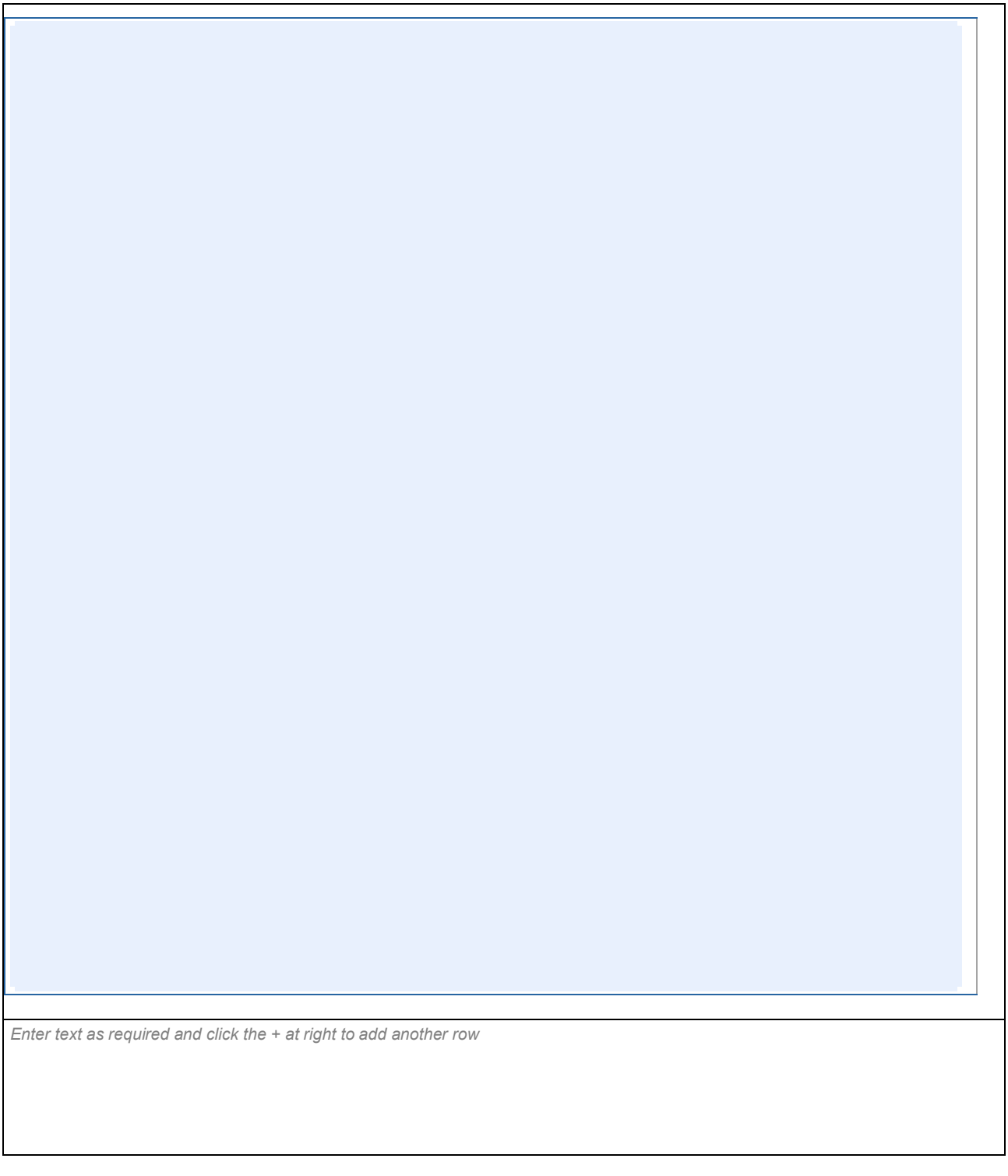
State the environmental outcome(s)/objectives or project condition(s) relevant to the incident/event	Click to enter text
State all relevant measurement criteria breached (or potentially breached)	Click to enter text

Provide any data relevant to the measurement criteria	Click to enter text

SUPPORTING INFORMATION

Additional information	Click to enter text

Provide a supporting map, plan or photos of the incident.



Enter text as required and click the + at right to add another row

INCIDENT/EVENT OUTCOMES

Actions following the incident/event (date, method, personnel, time of work recommencement if stop work was enacted)	Click to enter text
Recommendations for future actions (date, method, personnel)	Click to enter text
Relevant personnel informed (names and signatures)	Click to enter text

IF THE INCIDENT INVOLVED DEATH/INJURY TO PERTH SLIDER, LITTLE PENGUIN OR MARINE MAMMAL, COMPLETE SECTIONS A, B OR C BELOW

IN THE EVENT OF DEATH/INJURY TO PERTH SLIDER, LITTLE PENGUIN OR MARINE MAMMAL
SECTION A – Perth slider

Number of deceased/injured Perth sliders sighted	
Perth slider behaviour (injured, disoriented, deceased etc.)	
Fate of Perth slider (moved on, rescued and placed in a box in a quiet place and taken into care, deceased)	
Time of notification to suitably qualified ecologist	
Name of suitably qualified ecologist	Click to enter text
If taken into care, provide details	
If deceased, provide details of disposal	
Number of photos taken and file names	

SECTION B – Little penguin

Date and time Seabird Ecologist notified	
Seabird Ecologist name and advice provided	
Area of activity (e.g. CIF, Moresby Harbour, Diamantina Pier)	
Ambient light levels (e.g. daytime, nighttime, dusk, dawn)	
Observations	
Number of affected birds sighted	
Bird ID if possible (also please take photos)	
Bird behaviour (e.g. injured, disoriented, deceased etc.)	
Fate of bird (e.g. bird moved on, rescued and placed in quiet place in box and taken into care, deceased)	
If taken into care, provide details	
If deceased and stored, provide details of storage	
Action taken in relation to the construction activity (e.g. stop work)	
Number of photos taken and file names	
Time of remote camera checks	
Observations / initial findings from remote camera footage	
Action taken in relation to the construction activity (e.g. stop work, no construction at the time of observation)	
Review	
Have all preventative actions been reviewed by the SEO and implemented? Provide detail (if relevant)	

SECTION C – Marine mammals

Date and time suitably qualified ecologist notified	
Suitably qualified ecologist name and advice provided	
Number and species of marine mammal sighted	
Ambient light levels (e.g. daytime, nighttime, dusk, dawn)	
Area of activity (for example, Armament Wharf, Careening Bay, Moresby Harbour)	
Weather (wind speed, Beaufort swell)	
Marine mammal ID if possible (also please take photos)	
Marine mammal behaviour (injured, disoriented, deceased, breaching, tail/pectoral slapping etc.)	
Fate of marine mammal (taken into care, deceased)	
If taken into care, provide details	
If deceased and stored, provide details of storage	
Action taken in relation to the construction activity (stop work, no construction at the time of observation etc.)	
Number of photos taken and file names	
Review	
Have all preventative actions been reviewed by the SEO and implemented? Provide detail (if relevant)	

Appendix G

Out-of-hours work permit application form and procedure

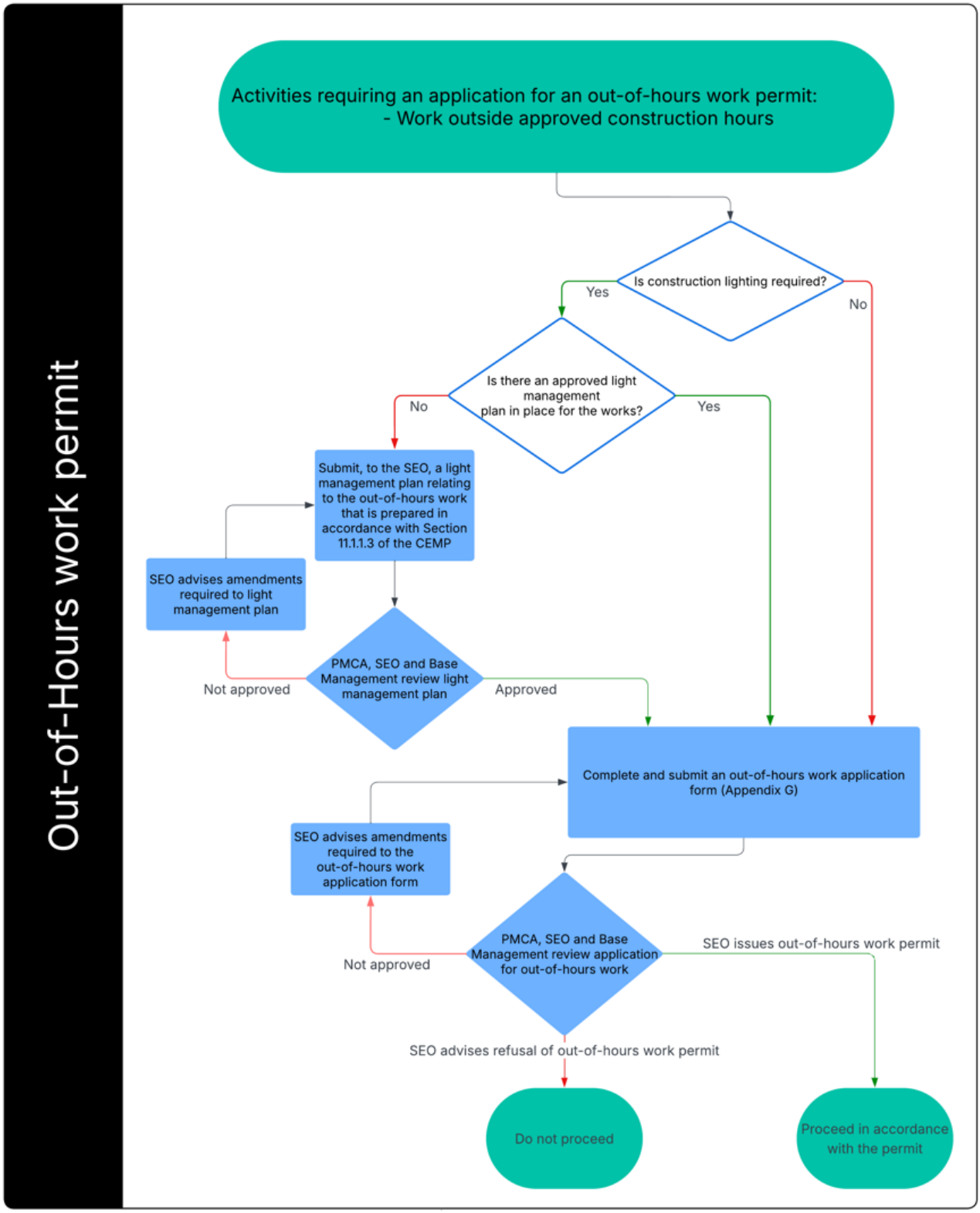


Figure G-9 ***Out-of-hours work permit procedure***

Out-of-hours work permit application form (Construction Contractor to complete and submit to the SEO)

Out-of-hours work permit [INSERT PERMIT APPLICATION NUMBER]		
Applicant details	**Applicant response**	**Status**
Applicant company name		
Contact person and position		
Phone		
Email		
Description of work (attach information if required)	**Applicant response**	**Status**
Will the work involve use of construction lighting? (note: if yes, an approved Lighting Management Plan is required).		
Step by step work methodology		
List of plant and equipment to be used (including any lighting)		
Location of the works, including: – co-ordinates and a map showing the closest distance of the work to little penguin nesting sites (metres), – lighting installations – expected area within which plant and equipment will be operated		
Timing and duration of work		
Timing and duration for use of construction lighting		
List any noise generating plant and equipment proposed for use, including relevant safe working distances per Noise and Vibration Management Annexure (Annexure A4)		
List any vibration-intensive equipment proposed for use, including relevant safe working distances per Noise and Vibration Management Annexure (Annexure A4)		
Detail expected traffic routes		
Evidence to support compliance with EPBC Act approval 2024/10031 (attach information if required)		
EPBC Act approval requirement	**Applicant response detailing management measures demonstrating compliance:**	**Status**
Approved Lighting Management Plan		
The exceptional circumstances requiring the work to occur outside of approved construction hours (refer to Section 11.1.1.5 of the CEMP for approved construction hours)		
How the extent of work outside of approved construction hours has been minimised		
How the work will be particularly avoided or minimised during the little penguin arrival period and little		

Out-of-hours work permit [INSERT PERMIT APPLICATION NUMBER]		
penguin departure period (refer to Section 11.1.1.5 of the CEMP for details relevant periods)		
How the out-of-hours work will be conducted so as not to exceed the relevant noise threshold levels (dB) and vibration threshold levels (mm/s) specified Section 4 of Noise and Vibration Management Annexure (Annexure A4)		
Describe whether or not the selected equipment is the quietest available that is capable of achieving the task required for construction, including other equipment options considered and why they were discounted.		
How the use of any vibration intensive plant or equipment complies with the relevant safe working distance as shown in Table 12 of the Noise and Vibration Management Annexure (Annexure A4)		
Describe whether or not works will occur outside of the corresponding vibration safe working distance/s for the nearest little penguin nesting site as shown in Table 15 of the Noise and Vibration Management Annexure (Annexure A4) Note: where works are required within the safe working distance/s described in Table 15 of the Noise and Vibration Management Annexure (Annexure A4), a noise management plan is to be prepared by the Contractor and approved by the SEO in consultation with the Seabird Ecologist prior to commencing works.		
Describe whether or not the required separation distances between construction equipment and little penguin nesting sites at Area D will be maintained. Note: where works are required within the safe working separation distances, a noise management plan (Refer Appendix A of the Noise and Vibration Management Annexure (Annexure A4)) is to be prepared by the Contractor and approved by the SEO in consultation with the Seabird Ecologist prior to commencing works.		
Measures to avoid or minimise potential impacts on sensitive receivers as a result of traffic routes and vehicles required for the work		
Measures to avoid or minimise potential impacts on fauna as a result of traffic movements outside of approved construction hours		

Out-of-hours work permit [INSERT PERMIT APPLICATION NUMBER]		
including for deliveries and loading/unloading.		
Decision (approved subject to the following conditions. [or] refused).		
Condition(s) (if approved)		
1.	All work must be undertaken in accordance with the description of work in the out-of-hours work permit application.	
2.	All work undertaken must be compliant with conditions of EPBC Act approval 2024/10031.	
3.	[INSERT ANY ADDITIONAL CONDITIONS REQUIRED BY THE SEO, PMCA OR BASE MANAGEMENT]	
Date of Base management review (if applicable)		
Date approved by the PMCA		
Issuing signature (SEO)		
Date issued		
Period of validity		
Applicant acceptance of Permit: **I [INSERT NAME OF COMPANY REPRESENTATIVE AND THEIR POSITION], am authorised to accept this out-of-hours work permit on behalf of [INSERT COMPANY NAME] and my signature below indicates this acceptance.**		
Signature		
Date		

Appendix H

CEMP Change Notice Register and Change Notice Form

CEMP Change Notice Register

Change notice number	Change type	CEMP revision (previous)	CEMP revision (new)	Section(s) affected	Page(s) affected	Trigger	Change description	Constructor(s) issued to	Date issued	Prepared by	Reviewed by	Approved by

Trigger types are as follows:
1. Incident outcome
2. Event outcome
3. Audit outcome
4. Site experience of Construction Contractor
5. Site experience of Site Environment Officer
6. Change in delivery phase
7. Change in legislation
8. Requirement of EPBC Act Approval 2024/10031.

Change types are as follows:
1. Addition
2. Amendment

CEMP Change Notice Form

CEMP Change Notice		
Date Issued		
Change Notice Number		
Change type (addition or amendment)		
CEMP revision (previous)		
CEMP revision (new)		
Relevant Section of CEMP		
Trigger type	**Yes/no**	**Details (e.g. Reference number / change driver)**
Incident outcome		
Event outcome		
Audit outcome		
Site experience of construction contractor		
Site experience of site environment officer		
Change in delivery phase		
Change in legislation		
Requirement of EPBC Act Approval 2024/10031		
Details of Change (include strike through and deleted and added text)		

Change Notice Review:				
	Company	**Name**	**Signature**	**Date**
Prepared by (SEO):				
Reviewed by (Environmental Advisor):				
Approved for Issue (PMCA):				

Issue and receipt:				
	Company	**Name**	**Signature**	**Date**
Issuer:				
Receiver(s):				