Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Environmental Review Document

September 2025

Abbreviations

Acronym	Terminology
AAM	Aboriginal Artefacts Monitor
ABA	Acid-base Accounting
ABS	Australian Bureau of Statistics
ACH	Aboriginal Cultural Heritage
ACHC	Aboriginal Cultural Heritage Committee
ACHIS	Aboriginal Cultural Heritage Inquiry System
AH Act	*Aboriginal Heritage Act 1972*
AHD	Australian Height Datum
AP	Applecross
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian-New Zealand Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid Sulfate Soil
BAM Act	*Biodiversity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
BCH	Benthic Communities and Habitat
BCH - BS	Benthic Communities and Habitat mixed type bare sand and/or shell/rock
BCH - SM	Benthic Communities and Habitat mixed type of seagrass and/or macroalgae
BIA	Biologically Important Areas
BPPH	Benthic Primary Producing Habitat
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CALM Act	*Conservation and Land Management Act 1984*
CBD	Central Business District
CCW	Conservation Category Wetland
CEMP	Construction Environmental Management Plan
CFD	Computational Fluid Dynamics
CPRS	Central Perth Redevelopment Scheme
dB	Decibels
DAWE	Department of Agriculture, Water and the Environment

Acronym	Terminology
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at Breast Height
DCA	Development Control Area
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCLM	Department of Conservation and Land Management
DE	Development Envelope
DMA	Decision Making authorities
DoE	Department of the Environment
DER	Department of Environment Regulation
IDF	Indicative Disturbance Footprint
DoF	Department of Fisheries
DGV	Default Guidance Value
DO	Dissolved Oxygen
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DTMI	Department of Transport and Major Infrastructure
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIL	Ecological Investigation Level
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity and Conservation Act 1999*
EQG	Environmental Quality Guidelines
EQMF	Environmental Quality Management Framework
EQS	Environmental Quality Standards
ES	Executive Summary
ESL	Ecological Screening Level
EQ	Elizabeth Quay
FMP	Foreshore Management Plan
FRM Act	*Fish Resources Management Act 1994*

Acronym	Terminology
FW	Freshwater
GL	Gigalitre
GPS	Global Positioning System
ha	Hectares
HEPA	Heads of EPA
HIL	Health-based Investigation Level
HIS	Heritage Impact Statement
HOC	Hydrophobic Organic Contaminants
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
IDF	Indicative Development Footprint
ILUA	Indigenous Land Use Agreement
IMO	International Maritime Organisation
IMS	Invasive Marine Species
ISQGs	Interim Sediment Quality Guidelines
km	Kilometres
kNm	Kilonewton-metre
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metres
m/s	Metres per second
MARPOL	International Convention for the Prevention of Pollution from Ships
MB	Matilda Bay
MBO	Mono-sulfidic Black-ooze
MEPA	Moderate Ecological Protection Area
MEQ	Marine Environmental Quality
MLA	Member of the Legislative Assembly
MNES	Matters of National Environmental Significance
MRS	Metropolitan Region Scheme
MS	Marine Species
MW	Marine Water
MWQMP	Marine Water Quality Monitoring Program

Acronym	Terminology
NAGD	National Assessment Guidelines for Dredging
NEMP	National Environmental Management Plan
NOAA	National Oceanic and Atmospheric Administration
NSHA	Noongar Standard Heritage Agreement
NSW	New South Wales
NVCP	Native Vegetation Clearing Permit
OC	Organochlorine
OCP	Organochlorine Pesticides
OEMP	Operational Environmental Management Plan
µPa	Micro Pascal
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PCBs	Polychlorinated Biphenyls
PC Stressors	Physical and Chemical Stressors
PCD	Proposal Content Document
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
PFAS	Per- and Polyfluoroalkyl Substances
PFOS	Perfluorooctane Sulfonic Acid
PMST	Protected Matters Search Tool
PSD	Particle Size Distribution
PTA	Public Transport Authority
PTS	Permanent hearing Threshold Shift
RiWI Act	*Rights in Water and Irrigation Act 1914*
SCEF	South Coast Estuarine Managed Fishery
SCP	Swan Coastal Plain
SCRM	*Swan and Canning Rivers Management Act 2006*
SEL	Sound Exposure Level
SRT	Swan River Trust
SSC	Suspended Sediment Concentration
SUP	Standup Paddleboarding
SWALSC	South West Aboriginal Land and Sea Council

Acronym	Terminology
TBT	Tributylin
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
TTS	Temporary hearing Threshold Shift
UFI	Unique Feature Identifier
UWA	University of Western Australia
VSA	Vegetation System Association
WA	Western Australia
WAC	Whadjuk Aboriginal Corporation
WAPC	Western Australian Planning Commission
WIR	Water Information Reporting

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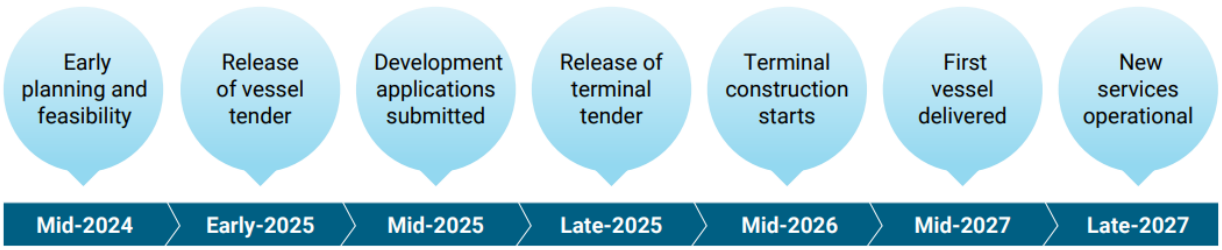
Executive Summary

The WA Government is investing $107 million to expand public transport options along the Swan River. This will improve accessibility across the river for residents and visitors, enhance tourism and support economic growth.

The Public Transport Authority of Western Australia (PTA) (the Proponent) is proposing the expansion of Transperth Ferry Operations, which currently operates between Elizabeth Quay and South Perth, within the Swan River. The METRONET on Swan Ferry Service Expansion: Perth to Applecross (the Proposal) includes the operation of five new electric ferry vessels between Elizabeth Quay, Matilda Bay and Applecross, along with the constructing new ferry terminals located at Applecross and Matilda Bay and upgrading the existing Elizabeth Quay terminal.

The ferry terminals will include piled jetty structures, comprising fixed-deck jetties, gangways, and floating pontoons, with concrete walling for the landward connection. The Matilda Bay site will also include associated electrical high-capacity charging infrastructure, a bus turn-around lane, drop off and service vehicle bays and bus shelters, bike parking, new toilet block and the removal of up to 33 existing moorings. Dredging is not required for implementation of the Proposal. An indicative timeline for the Proposal is provided in Figure 1 below.

ES Figure 1 Proposal Indicative Timeline



A short description of the Proposal, including locations and extent, are presented in Executive Summary (ES) Table 1 and Figure 2. An indicative ferry route is provided in Figure 3.

ES Table 1 Summary of the Proposal

Proposal title	METRONET on Swan Ferry Service Expansion: Perth to Applecross
Proponent name	Public Transport Authority of Western Australia
Short description	The PTA is proposing the expansion of ferry services within the Swan River, from Elizabeth Quay to new terminals at Matilda Bay and Applecross (Figure 1 and Figure 2). The Proposal involves: • Installation of a floating pontoon at the existing Elizabeth Quay ferry terminal. • Construction of a new jetty and ferry terminal at Matilda Bay with onshore electric charging infrastructure, public ablution facilities, bus embayment and roundabout. • Operation of ferry services between Elizabeth Quay, Matilda Bay and Applecross terminals. • Construction of a new jetty and ferry terminal at Applecross with associated pedestrian access. The proposal has an Indicative Disturbance Footprint of 1.65 hectares (ha) and is located within an 8.66 ha Development Envelope across the three (3) proposal sites.

The following key environmental factors have been identified as relevant to the Proposal (ES Table 2):

- Benthic Communities and Habitats;
- Marine Fauna;
- Marine Environmental Quality;
- Social Surroundings;
    - Noise;
    - Aboriginal Heritage;
    - Historic Heritage.

The following other environmental factors have been considered but not deemed to be key environmental factors (ES Table 3):

- Coastal Processes;
- Flora and Vegetation;
- Terrestrial Fauna;
- Terrestrial Environmental Quality;
- Inland Waters;
- Human Health.

The PTA employs a systematic approach to the planning, management and continuous improvement of its environmental performance closely aligned to international Environmental Management System standards (ISO 14001). PTA's commitment to legislative compliance and responsible management of its activities is demonstrated in its' Environment Policy and Sustainability Policy.

PTA followed the mitigation hierarchy and significant effort has been made during the planning of the Proposal to avoid and minimise impacts to the Swan River and the receiving environment.

The environmental impact of the Proposal are not considered to be significant, and are expected to be fully mitigated and managed under other Decision Making Authorities (DMA) legislative processes and the suite of management measures. This includes:

- Planning approvals under the Metropolitan Regional Scheme (MRS): each ferry terminal site will require a Development Approval from the Western Australian Planning Commission (WAPC), on the advice of the Swan River Trust. This process includes a public comment period. These approvals are expected to include conditions requiring preparation and implementation of:
    - A Construction Environmental Management Plan (CEMP; Appendix I) providing a structured framework for managing potential impacts on environmental factors.
    - A Water Quality Monitoring Program as approved by DBCA including daily visual plume monitoring and daily water sampling quality checks
    - A Benthic Community and Habitat Monitoring Plan, including pre and post construction monitoring
    - A Foreshore Management Plan (FMP), detailing coastal erosion management measures and addressing the requirements of *State Planning Policy 2.6 – Coastal Planning* (DPLH, 2013).
- Approvals under the *Swan and Canning Rivers Management Act 2006* (SCRM Act): These will ensure environmental protection during the construction and operation of the ferry terminals and vessels. This process includes a public consultation period. Site specific Construction Environmental Management Plans (CEMPs) and an Operational Environmental Management Plan (OEMP), approved by the Department of Biodiversity, Conservation and Attractions (DBCA) will be required for these approvals. Required approvals include:
    - A River reserve lease under Part 4A, Section 29
    - Development approval under Part 5, Section 70.
- Clearing regulation under the *Environmental Protection Act 1986* (EP Act): The proposed clearing of 0.63 ha of native vegetation (seagrass and macroalgae) will be regulated by the Department of Water and Environmental Regulation (DWER) under Part V Division 2 of the EP Act. This process includes a public consultation period of one week.

The impacts of the Proposal are not likely to have a significant impact to Matters of National Environmental Significance (MNES) and referral to Department of Climate Change, Energy,

the Environment and Water (DCCEEW) under Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) is not required.

This Environmental Review Document has been prepared in support of the section 38 referral under the EP Act following *EPA's Instructions: How to prepare an environmental review document* (EPA, 2024b).

ES Table 2 Key Environmental Factors - summary of potential impacts, proposed mitigation measures and environmental outcomes

Key Factor 1: Benthic Communities and Habitats

Benthic Communities and Habitats (BCH)	
Environmental Protection Authority (EPA) Objective	*To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.*
Policy and guidance	• Environmental Factor Guideline: Benthic Communities and Habitats (EPA, 2016a). • Technical Guidance – Protection of Benthic Communities and Habitats (EPA, 2016b).

Potential impacts	• Impacts to up to 0.63 ha Benthic Communities and Habitat (BCH) type mixed seagrass and/or macroalgae (SM) at Matilda Bay and Applecross sites (BMT, 2025a)
	• This represents the total area of BCH - SM with the DE at Matilda Bay and Applecross and the Proposal's maximum extent of impacts to BCH from construction and implementation of the Proposal. The activities considered include;
	  ○ Mooring of construction barges
	  ○ Piling
	  ○ Shading of jetty / terminal infrastructure
	  ○ Removal of up to 33 existing, used and disused moorings, at Matilda Bay
	• Impacts may include:
	  ○ Sediment mobilisation, increasing Total Suspended Solids (TSS) in the water column, reducing light availability
	  ○ TSS re-settling and smothering and/or limiting suitable conditions for Benthic Primary Producing Habitat (BPPH),
	  ○ TSS re-settling and increased toxicity levels for BPPH
	  ○ Shading from the infrastructure post-construction and reduced light availability for BPPH

	• BCH - SM was not recorded at Elizabeth Quay and piling is not required at this site. The proposed construction and implementation of the Proposal at Elizabeth Quay is not expected to have an impact on BCH. • BCH - SM and BPPH may be impacted post-construction due to shading from the jetty / terminal infrastructure. The maximum extent of impact to BCH – SM from shading is 0.09 ha and includes BCH – SM located directly under the infrastructure (i.e. IDF) (0.03 ha) and the shadow cast from the infrastructure at winter solstice (0.04 ha) and summer solstice (0.02 ha). This 0.09 ha of impact is located within the total 0.63 ha of impact.

Mitigation	**Avoid:**
	• Terminal designs will accommodate berths of sufficient depth to meet safety requirements for vessel draught, reduce sediment accumulation at berths and reduce the potential for sediment plumes. This approach will eliminate the need for dredging both during construction and operations.
	Minimise:
	• The design footprint has been minimised as much as practicable while still ensuring sufficient size for ferry berthing and passenger access. This will minimise any unnecessary disturbance into BPPH and locations suitable for ephemeral seagrass propagation.
	• Features such as elevated, permeable decking and floating structures will be utilised to help maintain light penetration and natural water flow, which are important for the health of seagrasses and other benthic organisms.
	• Sediment quality will be screened at the Matilda Bay and Applecross sites prior to piling. Construction activities will aim to minimise disturbance of contaminated sediments.
	• Implementation of controls in the CEMP (Appendix I) will address potential indirect impacts to BCH during construction. Key management and monitoring measures include:
	  ○ Treatment, management and disposal of Acid Sulfate Soils (ASS) and Mono-sulfidic black-ooze (MBO) in accordance with the *National Acid Sulfate Soils Guidance: Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands* (Sullivan et al. 2018b).
	  ○ Implementation of a water quality monitoring program, requiring visual identification of TSS plumes exiting the DE and daily water quality checks using hand-held TSS probe.
	  ○ Implementation of a BCH monitoring program to be outlined in site-specific CEMP's which will be prepared in consultation with DBCA and will include pre- and post-disturbance surveys.
	  ○ Implementation of sediment control measures (i.e. silt curtains or similar) to contain the potential spread of TSS generated

	during piling activity. Section 7.5 details management of marine water quality within the silt curtain area.
	• Implementation of an OEMP which will outline management controls for the ongoing use and operation for the jetties, berthing and ferries, including:
	  ○ Pollution controls (spill kits, regular ferry inspections and maintenance, reporting of any incidents);
	  ○ Waste disposal (daily inspection of waste receptacles, provision of suitable waste disposal opportunities; passenger signage, use of low or no impact chemicals for cleaning);
	  ○ Protection of wildlife and BCH measures;
	  ○ Ferry route, times and speeds.
	• Construction impacts such as BPPH loss under ferry terminals are considered partly recoverable following completion of construction outside of any areas of permanent fixtures and shading. Baird (2025) predicts that impacts to BCH will be recoverable within a period of five years following removal of temporary construction infrastructure provided other environmental quality criteria are within toxicant Default guidance values (DGVs).

Residual impacts, including assessment of significance	Impacts to up to 0.63 ha of BCH - SM. Temporary impacts to BCH (seagrass, macroalgae, sand) within the Proposal DE due to the removal of existing boat moorings, temporary mooring for construction barges, localised increase in turbidity, which can result in smothering of the BCH and reduced light reaching the seagrass. Construction impacts will be temporary and localised and it is anticipated that impacts to BCH will be recoverable within a five-year period following construction. In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to BCH from the Proposal are not considered significant.
Proposed environmental outcomes	The environmental outcomes that apply to BCH during the construction and operation phases of the Proposal include: • Maintain BCH ecological integrity to ensure that the structure, function, diversity, distribution, and viability of BCH are preserved. • Avoid significant residual impacts such as increases in TSS attributable to construction activities. • Ensure recovery potential by avoiding unnecessary loss of suitable seasonal establishment sites within the DE for seagrass and macroalgae due to design. • Direct disturbance of BCH from construction activities is confined to the maximum approved disturbance footprint within the development envelope

	Following consideration of impacts to BCH the PTA considers the Proposal can be managed to maintain and protect environmental values for BCH and therefore the EPA's objective for this factor can be met.

Key Factor 2: Marine Quality

Marine Environmental Quality (MEQ)	
EPA Objective	*To maintain the quality of water, sediment and biota so that environmental values are protected.*
Policy and Guidance	• Environmental Factor Guideline: Marine Environmental Quality (EPA, 2016c). • Technical Guidance: Protecting the quality of Western Australia's Marine Environment (EPA, 2016d).
Potential impacts	• Mobilisation of sediments from construction activities causing increased TSS, reduced water quality, light reduction and potential increased risk of toxicant harm to marine biota within the DE (Matilda Bay and Applecross sites only). • *Alexandrium* sp. bloom within silt curtains during construction posing a risk to human health and water quality (Matilda Bay and Applecross only). • Increased water toxicity from accidental spills or discharges during construction.

Mitigation hierarchy	**Avoid:**
	• Elutriate and bioavailability testing of sediment quality was assessed, with results indicating that sediments are suitable for minor disturbance (BMT, 2025).
	• Prevention of sediments from being dispersed into waters beyond the DE via a silt curtain to provide a physical barrier that is designed to contain suspended sediments within the construction area, effectively minimising off-site sediment transport.
	• Design of jetties and terminals to avoid dredging.
	Minimise:
	• The implementation of the CEMP (Appendix I) will manage impacts to MEQ including:
	  ○ Collection of pre-construction sediment samples to determine sediment quality.
	  ○ Visual monitoring for sediment plumes, water quality monitoring and deploying sediment control measures (i.e. silt curtains or similar).

	○ Implement trigger levels, tolerance limits and shut down thresholds if sediment plumes are observed outside of silt curtains and/or if severe weather conditions are forecast in consultation with DBCA. ○ Waste and hazardous chemical management measures to prevent release into receiving environment. ○ Provide oil spill response plans, which incorporate the International Convention for the Prevention of Pollution from Ships (MARPOL) requirements and meet conditions from *Pollution of Waters by Oil and Noxious Substances Act 1987*. • Preparation and implementation of an OEMP which will address the following, but not be limited to: ○ Ferry route, times and speeds. ○ Pollution controls (spill kits, regular ferry inspections and maintenance, reporting of any incidents). ○ Waste disposal (daily inspection of waste receptacles, provision of suitable waste disposal opportunities, passenger signage, use of low or no impact chemicals for cleaning). ○ Wastewater and rubbish management, ferry refuelling/charging and servicing requirements (including locations).
Residual impacts, including assessment of significance	Temporary localised increase in turbidity, generally within 5-20 m of the piling locations. Installation of sediment trapping devices (i.e. silt curtains or similar), visual observations and ongoing water quality monitoring (as outlined in the CEMP (Appendix I) will ensure that any localised impacts are adequately managed and do not spread beyond the DE. Sediment sampling results indicate that, other than high nutrient levels which are expected, sediment quality is generally within relevant criteria (Australian & New Zealand Guidelines for Fresh and Marine Water Quality) and therefore is unlikely to introduce any contaminants or toxicants above existing levels. As such, impacts post-management are predicted to be minor and temporary and are unlikely to represent a significant impact to MEQ.
Proposed environmental outcomes	The environmental outcomes that apply to MEQ during the construction and operation phases of the Proposal include: • Maintain post-development water clarity at pre-development levels to preserve ecosystem values. • Maintain water quality. • BCH maintained at acceptable levels to preserve ecosystem values. • Aquatic biodiversity within Swan-Canning Estuary and the Pelican Point Marine Park to be maintained at current condition.

	• MEQ impacts as a result of construction activities are confined to the development envelope. Following consideration of impacts to MEQ the PTA considers the Proposal can be managed to maintain and protect environmental values for MEQ and therefore the EPA's objective for this factor can be met.

Key Factor 3: Marine Fauna

Marine Fauna	
EPA Objective	*To protect marine fauna so that biological diversity and ecological integrity are maintained.*
Policy and Guidance	• Environmental Factor Guideline: Marine Fauna (EPA, 2016e).

Potential impacts	• Impact to marine fauna and foraging opportunities through the loss of up to 0.63 ha of BCH - SM and fauna habitat
	• Vessel strike or entanglement in equipment by individual/s of a vertebrate species.
	• The potential impacts of noise on marine fauna species include audibility, detection and masking of communication and other biologically important sounds, behavioural responses and physiological impacts which generally include discomfort, hearing loss, physical injury and mortality (SLR, 2025) (Appendix J).
	• Noise modelling (SLR, 2025) suggests for Indo-Pacific Dolphins subject to cumulative exposure from up to 3,000 piling pulses within a 24-hour period the following may occur (if the mammals remain in the area continuously):
	  ○ Behavioural disturbance effects within 1.5 km from the piling locations;
	  ○ Permanent hearing loss within 700 m from the piling locations;
	  ○ Temporary hearing loss within 2.0 km from the piling locations.
	• Noise modelling (SLR, 2025) suggests for fish species the following may occur:
	  ○ Immediate impacts:
	  ▪ Physiological effects within 20 m of piling locations.
	  ○ Cumulative exposure from up to 3,000 piling pulses within a 24-hour period (if the animals remain in the area continuously)

	▪ Recoverable injury up to 400 m from the piling locations; ▪ Temporary hearing loss within 2.5 km from the piling locations. • Pollutants from construction vessels (such as sewage, waste or fuel) may lead to chemical toxins leaching into the waterways and being ingested by marine fauna leading to sickness or potential deaths. • Changes to one or more of physico-chemical, toxicological and/or water turbidity parameters in the receiving environment from suspended sediments, creating conditions unsuitable for marine fauna to reside. • There is potential for artificial lighting (associated with construction and operational lighting requirements) to interfere with natural behaviours of marine fauna. • Risk of introduction of invasive marine species (IMS) if vessels used in construction are not locally sourced, which could change the local ecology, impacting marine fauna species.
Mitigation hierarchy	**Avoid:** • Speed restrictions as per current navigational conditions imposed by Department of Transport (8 knots on approach to terminals) already significantly reduce the likelihood of vessel strike on Indo-Pacific bottlenose dolphins to levels appropriate to manage risk. • Piling shutdown during construction if dolphins are observed within an agreed distance of the site, depending on expected daily hammer strike thresholds. Piling works cannot recommence until dolphins move to more than 200 m or if not observed for more than 20 mins in the vicinity of works. • Electric ferries are predicted to reduce noise impacts to marine fauna compared to traditional diesel-powered ferries. • Design of terminals to allow for berths of sufficient depth to meet safety requirements for vessel draught and to reduce sediment accumulation at berths. This reduces potential for interaction of marine fauna with suspended sediments, which can indirectly affect health. **Minimise:** • Measures will be implemented to reduce the mobilisation of sediments outside the Proposal DE. This includes actively minimising TSS plumes during construction activity. The use of silt control measures will serve as a key mitigation measure, acting as a physical barrier to contain and prevent the spread of TSS into surrounding waters. • Alternative piling methods (such as vibration piling) will be explored and implemented where possible to reduce underwater noise impacts on marine fauna.

	• Adapt construction techniques to prevent or minimise mobilisation of sediments from sites with toxicant values exceeding ANZG (2018). This reduces potential for interaction of marine fauna with suspended sediments, which can indirectly affect health.
	• Reduce risk of ingestion, entanglement or toxicant exposure from waste items to marine fauna by implementation of waste and spills management measures as outlined in the CEMP (Appendix I).
	• Manage water quality as outlined in Section 7.5. Bacterial outbreaks within silt curtains may cause poor water quality, subsequently affecting marine fauna if/when released.
	• Incorporate guidance from DBCA CEMP Guidance Note 1 (DBCA, 2024a), Underwater Noise Piling Guidelines (Government of South Australia, 2012) and the Aquatic Noise Management Plan (Section 2.5 of Appendix J) into the CEMP, including:
	  ○ Contract Documentation: Include all piling noise management and mitigation requirements in project contracts.
	  ○ Trained Crew: Ensure a qualified person (e.g., Marine Mammal Observer) is present during piling to implement noise mitigation procedures.
	  ○ Standard Operational Procedures:
	  ○ Pre-start Monitoring: Conduct 30-minute visual monitoring for marine mammals or human divers/swimmers before piling begins.
	  ○ Soft Start: Begin with low-energy strikes (6 strikes/min) and gradually increase over 10 minutes if no animals/divers are detected; also used after breaks longer than 30 minutes.
	  ○ Normal Piling: Proceed with full impact energy if no animals/divers are observed during soft start; continue visual monitoring throughout.
	  ○ Stand-by: If animals/divers are seen in the observation zone (500m), place piling rig on stand-by and continue monitoring.
	  ○ Shut-down: Immediately stop piling if animals/divers enter or approach the shut-down zone (190m); resume only after 30 minutes without sightings or once they leave the zone, starting again with soft start. Stop operations during poor visibility if animals are detected.
	• Engineering design for jetties to include minimum suitable lighting intensity that is fit-for-purpose so that it meets relevant Australian Standards and safety requirements (including the Guide on the Limitation of Effects of Obtrusive Light from Outdoor Lighting Installations (CIE, 2003)).
	• Vessel clearance requires hull inspection for vessels entering the Swan River from regions outside of South-West WA. Vessel(s) to be registered in Vessel-Check. DPIRD manages these inspections through the Vessel-Check portal. Vessel-Check includes:

	○ Assessment of risk of a vessel in relation to biofouling, according to International Maritime Organisation (IMO) in their Biofouling Guidelines; ○ Biofouling inspection by DPIRD certified inspectors. • Preparation and implementation of the OEMP which will address the following, but not be limited to: ○ Protection of wildlife: Measures to mitigate collision risk and potential disturbance to fauna (e.g. birds and dolphins) and sensitive habitat areas; ○ Proposed mitigation and response strategies (e.g. recommended separate distances and/or exclusion zones).
Residual impacts, including assessment of significance	Predicted residual impacts to marine fauna are as follows: • Loss of up to 0.63 ha BCH - SM and fauna habitat. • Underwater noise emissions from construction piling causing temporary disturbance to marine fauna species. In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to marine fauna from the Proposal are not considered significant.
Proposed environmental outcomes	The environmental outcomes that apply to marine fauna during the construction and operation phases of the Proposal include: • No population-level impacts to marine fauna. • No reported behavioural changes, displacement, or injury to marine fauna and habitat, particularly cetaceans such as Tursiops sp. • No reported collisions or physical harm to marine fauna such as Tursiops sp. by construction vessels or operating ferries. No significant or long-term degradation of important marine habitats (e.g., seagrass beds, BCH). In considering potential impacts to Marine Fauna, and the avoidance and mitigation measures proposed, the PTA considers the environmental values for Marine Fauna can be maintained and can thus meet the EPA's objective for this factor.

Key Factor 4: Social Surroundings

Social Surroundings	
EPA Objective	*To protect social surroundings from significant harm*.
Policy and Guidance	Environmental Factor Guideline: Social Surroundings (EPA, 2023).
Potential impacts	**Direct:**

	• Minor disturbance to the Swan River (ID 3536) Registered Aboriginal Heritage Site.
	• Minor amenity impacts to sensitive receptors and the environment as a result of exposure to noise from general construction and piling activities, dust and particulate matter. Impact piling noise is considered most significant.
	• Noise emissions from the charging infrastructure during operation of the Proposal.
	• Vibration from piling (impact piling with a hydraulic hammer) and civil earthworks (excavation and compaction) for the duration of construction activities have the potential to be noticeable to residents at distances of approximately 100 m.
	• Underwater noise impacts to swimmers and divers up to 4.5 km from piling (based on worst-case piling method).
	• Minor and temporary impacts on visual receptors, including to residents and users of the foreshore area. Resultant development designed to create a positive aesthetic experience and will be in keeping with the surrounding built-up urban area.
	• The construction and operation of the Proposal may result in minor impacts on recreational activities at the Matilda Bay and Applecross foreshores. These impacts include temporary restrictions to access and use of grassed foreshore areas during construction, removal of existing boat moorings at Matilda Bay, and a reduction in marine space previously available for recreational use near the Matilda Bay jetty and terminal.
	Indirect:
	• Vibrations from construction works that may affect the foundations and structural integrity of nearby Registered Historic Heritage Places:
	  ○ Canning Bridge (ID 16178);
	  ○ Raffles Hotel (ID 1544).
	• Visual impacts on Aboriginal and Historic Heritage places.
	• Accumulation of dust and pollution from construction activities on heritage sites.
	• Noise, ground and hydrological vibrations from the operation of ferries.
	• Loss in local property value due to construction and operation noise and vibration.
	• Loss of associated tourism for nearby businesses due to impacts on local landscape character, views and visual amenity.
	• Construction lighting impacts on the amenity of the local area for local residents.

Mitigation hierarchy	**Avoid:** • The Proponent commenced engagement and consultation with the Proposal's DMA's, stakeholders and the wider community in May 2024 to identify key issues of interest to each group. • The Proposal DE (Swan River) has existing operational ferry services and a history of significant disturbance. The Matilda Bay and Applecross site locations have been chosen to avoid impacts to sensitive receptors, including Historic Heritage places. The ferry terminals and supporting infrastructure have been designed to minimise visual intrusion through careful consideration of the terminals' location, size and materials. • Visual impact photomontages have also been prepared to assess visual amenity impacts and to ensure the building heights and locations are in keeping with the existing structures (Element, 2025) (Appendix K). • Initial heritage surveys have been completed to support investigation works (such as geotechnical) to avoid impacts to previously unidentified items of heritage values, including archaeological and ethnographic surveys. Surveys and ongoing consultation with Traditional Owner representatives will be undertaken to inform the implementation of the Proposal and if required separate approvals will be sought under the *Aboriginal Heritage Act 1972* (AH Act). • Technical studies have been used to inform Proposal design evolution and avoidance of sensitive receptors (including a noise assessment). • Construction activities will primarily occur during normal working hours to avoid noise impacts (i.e. 7am to 7pm Monday to Saturday and 9am to 7pm on Sundays and Public Holidays). A Noise and Vibration Management Plan will also need to be prepared for approval by the relevant Local Authority for any out of hours works, which will include the requirement to notify nearby affected stakeholders. **Minimise:** • The Proponent has commenced engagement and consultation to identify key stakeholders and issues of interest for local community members and groups. • The Proponent is undertaking ongoing engagement and consultation with Traditional Owner representatives and will execute and agree to terms of the NSHA. • Additional surveys and consultation will be undertaken prior to construction activities, including the potential requirement for dilapidation surveys to ensure construction activities do not indirectly result in impacts to nearby State Registered Historic Heritage Places. Should dilapidation surveys indicate a risk of impacts to nearby heritage places, specific management measures will be implemented following consultation with local authorities and DPLH.

	• A CEMP, including reference to PTA's Stakeholder Engagement Plan, addressing dust, fire, sediment, noise and vibration impacts and mitigation controls, will be prepared prior to construction. The CEMP will include the following measures to control noise and vibration and dust:
	  ○ Controls of environmental noise practices set out in Section 4 of AS 2436-2010, Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites (Australian Standards 2010).
	  ○ Ensure equipment used on the construction site is the quietest reasonably available.
	  ○ Provide commitments around timing of construction and ensuring no construction works occur outside the hours of 7am to 7pm Monday to Saturday. Should construction works be required outside those times then noise limits will need to be applied and monitored during works in accordance with a Noise Management Plan that will need to be approved by the Local Authority.
	  ○ Implement low or non-vibration construction activities where possible.
	  ○ Monitor vibration levels and should levels exceed a pre-determined threshold then works will cease and alternative construction methodologies will be investigated.
	  ○ Measures to control sediment runoff and dust including regular monitoring, dust suppression (water trucks and spray hoses), avoiding works during high wind periods, erection of silt fences where there is risk of runoff into the river to prevent turbidity.
	  ○ Undertake monitoring of swimming and diving use within the modelled extent of underwater noise impacts based on the final piling method. This will include consultation and observing the area of impact to ensure no one is in the water during piling.
	  ○ Allow for noise screening elements to be applied to manage noise from electrical charging infrastructure to levels consistent with the surrounding environment.
	  ○ Physical vibration monitoring for vibration intensive construction activity within 100 m of residential areas to provide certainty in received ground vibration levels.
	• The FMP will be developed as a condition on the Development Approval to outline any required management of potential coastal erosion impacts to ensure the foreshore integrity is maintained. The FMP will also outline a landscaping approach for the Proposal that will aim to improve visual amenity and incorporate the establishment of native plants and trees. An unexpected finds procedure will be developed prior to the commencement of site works. Operational impacts will be managed via rules around open water operations versus speed restricted areas. The Western Australian *Marine Act*

	1982, Division 2 regulations, Section 114 Powers in relation to regulations, sub section (h) provides for traffic management plans that regulate the movement of vessels, persons and other things in or on specified State waters and for the enforcement of those plans. • Reference groups will be established to inform different aspects of the Proposal such as the Waterways Stakeholder Reference Group (WSRG). The WSRG will provide a dedicated forum for identifying on-water safety concerns, providing advice and collaboratively developing appropriate controls and measures to ensure the river is shared safely and equitably by all users. • The Proponent is in the process of establishing a formal framework for engagement with Whadjuk Noongar Traditional Owners and Custodians throughout the Proposal with the goal of promoting meaningful and collaborative involvement of Whadjuk Elders and cultural representatives in decision-making processes relating to the project where appropriate. **Rehabilitate:** • Temporary construction areas including site offices, equipment storage and laydown areas, site fencing will be rehabilitated to reflect the pre-development land use (primarily planted turf). • Any trees removed during works will be replaced post construction.
Residual impacts, including assessment of significance	• The two identified State Registered Historic Heritage places are located outside of the Proposal's DE and are not expected to be directly impacted. Additional surveys and consultation will be undertaken to inform what additional approvals may be required under the AH Act, which will be sought prior to works. • Some minor loss of usable foreshore and water use areas for passive recreation at Matilda Bay will be experienced once the ferries are operational however the scale of usable area that will be lost is negligible relative to the remaining available areas of Matilda Bay for water-based activities and passive use of the foreshore. • The primary noise and vibration impacts will be associated with construction activities which will be localised and temporary in nature. • Ongoing noise from the substation and ferry operations will be minor and manageable with the implementation of controls. As a result, it is expected that residual impacts from noise and vibration will be low and manageable in accordance with the *Environmental Protection (Noise) Regulations 1997*. • Impacts associated with dust and sediment disturbance from the Proposal's construction works will be managed through on-site controls outlined in the CEMP. • Photomontages (Appendix K) and insights from key stakeholder groups will be used to inform Proposal design evolution with consideration to local stakeholder and community expectations.

	Therefore, it is expected that residual impacts relating to visual amenity will be low.
Proposed environmental outcomes	The residual impacts of the proposed activities are considered to be minor. Any impacts from construction will be short term and highly localised. As an already active ferry service, any operations will be similar to the current operations that exist on the Swan River. Impacts to Registered Aboriginal Cultural Heritage (ACH) sites will be managed under the AH Act and relevant approvals will be sought. Impacts associated with noise and vibration, dust and amenity will be managed via the CEMP. Therefore, the proposed environmental outcomes for Social Surroundings are: • No disturbance of known Aboriginal and Historical Heritage values unless appropriate approvals under relevant legislations have been obtained. • Maintain existing landscape character and scenic quality. • Minimize visual intrusion of new infrastructure on sensitive viewpoints. • Preserve culturally or historically significant views. • Ensure visual integration of structures through design, materials, and landscaping. • Compliance with the Western Australia Environmental Protection (Noise) Regulations 1997. • Minimal disturbance to local residents and the community during construction. In considering potential impacts to Social Surroundings, and the avoidance and mitigation measures proposed, the PTA considers the environmental values for Social Surroundings can be maintained and can thus meet the EPA's objective for this factor.

ES Table 3 Other Environmental Factors - summary of potential impacts, proposed mitigation measures and environmental outcomes

Other Factor 1: Coastal Processes

Coastal Processes	
EPA Objective	*To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.*
Policy and Guidance	• Environmental Factor Guideline: Coastal Processes (EPA, 2016f).

Potential impacts	• Review of the indicative ferry route (Figure 1) indicates that apart from when the ferries approach the terminals, the closest shoreline impacts are likely to be between Matilda Bay and Elizabeth Quay as the ferries pass under the narrows bridge. The foreshore on both sides in this location has been built out with hard edge retaining walls and rock groynes, which will not be impacted by any residual ferry wake.
	• Results from the Preliminary Coastal Processes Impact Assessment (Seashore Engineering, 2025) showed that;
	  ○ Wind waves at Applecross and Matilda Bay typically reach shorelines over 1,000 times per hour while ferry vessels are expected to contribute two waves per passing.
	  ○ Key existing active coastal processes include wind generated wave energy and the wave energy attributed to expected increases in rising sea levels and increased erosion.
	  ○ The high silt and clay content of the riverbeds at Applecross and Matilda Bay makes them susceptible to scour and deepening beneath the berth pocket and the resuspension of sediments. The extent of sediment resuspension depends upon the water depth and vessel thruster energy. At Matilda Bay, the shallowest depth is approximately -4.5 m AHD. At this depth the dispersion of vessel thruster energy may be supported, limiting the extent of bed disturbance. At Applecross, the terminal is located against the terrace margin and there may be localised slumping into the channel. Wake energy may add to overall wave energy at both Matilda Bay and Applecross sites but not Elizabeth Quay due to the highly modified and retained sea wall. While there is a moderate likelihood of vessel scour within the berth pocket, including resuspension of sediments, the consequence is considered low and readily mitigated through operational procedures.
	  ○ Wake energy generated by vessel transit may contribute to overall wave energy however its influence, to overall sediment movements and wave energy reaching the shoreline, is anticipated to be significantly lower than the existing active coastal processes.
	  ○ Overall, the proposed new ferry terminals at Applecross and Matilda Bay are expected to have relatively minor impacts on coastal processes, based on their interaction with existing morphology, foreshore and bed dynamics, and active sediment transport pathways. Key factors contributing to this outcome include:
	  ▪ The shore-based elements (i.e. jetty abutments) being positioned landward of the existing shoreline at Matilda Bay and within an existing revetment footprint at Applecross, limiting potential interruption of sediment transport.

	▪ Facilities consisting of piled structures, with sheltering effects largely associated with berthed vessels and floating jetties, causing only slight reductions in wave and surface current energy on the lee side. ▪ Adherence to the Swan-Canning Estuary speed limits, with maximum speeds of 8 knots as vessels approach the terminals, will ensure boat wakes generate waves smaller than the ambient wind wave climate, with impacts at Applecross primarily confined to the already walled foreshore areas. o The small extensions of the jetty at Elizabeth Quay and continued use of the existing facility at Barrack Street Jetty (No. 1 or 2) will have negligible influence on coastal processes, due to: ▪ Established high vessel usage and ferry operations at these locations; ▪ Extensive prior shoreline modification through dredging, reclamation, and continuous walling. o Overall the impacts of construction and operation of the Proposal are expected to be minimal and fully mitigated and managed through a suite of management measures. • Further, review of the DBCA foreshore type data (DBCA 065) indicates that the wave wake impacts on the shoreline is mostly associated with modified shorelines (Section 7.0) at Matilda Bay and Applecross. As a result, wake wash is anticipated to not cause a significant impact.
Mitigation hierarchy	**Avoid:** • Use of existing infrastructure at Barrack Street Jetty (No. 1 or 2) will have negligible influence on coastal processes. **Minimise:** • Jetty infrastructure at Matilda Bay and Applecross sites will be constructed on piles to allow adequate water flow underneath surface structures. • Jetty abutments will be positioned landward of the existing shoreline at Matilda Bay and within an existing revetment footprint at Applecross, limiting sediment transport, deposition and overall impacts to coastal morphology. • Adherence to Swan-Canning Estuary speed limits and the use of designated passage routes by the ferries will ensure waves generated from ferry wakes are not significantly different from the naturally occurring wave environment, minimising potential impacts to coastal erosion. • During construction of the Applecross and Matilda Bay terminals, silt curtains will be employed to minimise the potential for sediment

	accumulation along the foreshore, reducing the risk of altering wave energy distribution and affecting coastal stability. • Preparation and implementation of the CEMP and FMP prior to any ground disturbing activities to manage and mitigate impacts associated with coastal processes and ensure foreshore integrity is maintained. • Preparation and implementation of the OEMP which will address at a minimum ferry route, times and speeds.
Residual impacts, including assessment of significance	Following the application of avoidance and mitigation measures, the predicted residual impacts to coastal processes from the Proposal are not considered significant. Wave wake from the operation of the ferries is not anticipated to be significantly different from the naturally occurring wave environment. The Proposal will result in minor and manageable deposition of sediments at the Matilda Bay and Applecross sites during periods of low catchment flows.
Proposed environmental outcomes	In considering potential impacts to coastal processes, and the avoidance and mitigation measures proposed, the PTA considers the environmental values for coastal processes can be maintained and can thus meet the EPA's objective for this factor.

Other Factor 2: Terrestrial Quality

Terrestrial Environmental Quality	
EPA Objective	*To maintain the quality of land and soils so that environmental values are protected.*
Policy and Guidance	• Environmental Factor Guideline: Terrestrial Environmental Quality (EPA, 2016j).
Potential impacts	• The Proposal DE is mapped as 'Moderate to Low' risk of encountering ASS at the Matilda Bay and Applecross sites and 'High to Moderate' risk of encountering ASS at the Elizabeth Quay site. Exposure to ASS can result in significant damage to the environment and infrastructure, reduced water quality, impacts to human health and disruptions to ecosystems. • Minor clearing of non-native vegetation may result in some loss of soil nutrients through organic matter oxidisation and removal of surface cover leaving soil vulnerable to erosion. Nutrient stores and cycles will adjust to new land uses, but generally the net loss of nutrients and leakage is greater than under natural conditions. Excavation of soils containing ASS can lead to the release of sulfuric acid and other harmful substances. • Increased risk of waste generation and pollution due to increased human access as a result of operation of the Proposal.
Mitigation hierarchy	**Avoid:** • Delineation and fencing will be undertaken to avoid ground disturbance and impacts to soil outside the Proposal IDF. No excavation of soils greater than 100 cubic metres (m3) will occur at the Elizabeth Quay site mapped as ''High to Moderate' risk of encountering ASS. • Dewatering is not proposed at the three sites. **Minimise:** • Excavation at all three sites will be limited with significant soil disturbance and/or soil removal unlikely to be required. • Soil integrity will be preserved during removal of vegetation and any soil disposal offsite will be tested prior to disposal. • Preparation and implementation of the CEMP prior to any ground disturbing activities to manage and mitigate impacts to maintain the quality of soils and land. • Preparation and implementation of the OEMP which will address the following, but not be limited to: ○ Pollution controls (spill kits, regular ferry inspections and maintenance, reporting of any incidents);

	○ Waste disposal (daily inspection of waste receptacles, provision of suitable waste disposal opportunities; passenger signage, use of low or no impact chemicals for cleaning).
Residual impacts, including assessment of significance	Following the application of avoidance and mitigation measures, the Proposal is not expected to result in a significant residual impact to terrestrial environmental quality. Vegetation clearing and soil disturbance will be limited to the IDF. Given that the Proposal does not involve extensive excavation of soil, nor requires dewatering or drainage activities, and considering the already modified nature of the Proposal DE, residual impacts on terrestrial environmental quality are expected to be negligible.
Proposed environmental outcomes	Following consideration of impacts to terrestrial environmental quality the PTA considers the Proposal can be managed to maintain and protect environmental values for terrestrial environmental quality, and therefore the EPA's objective for this factor can be met.

Other Factor 3: Flora and Vegetation

Flora and Vegetation	
EPA Objective	*To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
Policy and Guidance	• Environmental Factor Guideline: Flora and Vegetation (EPA, 2016g). • Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016h).
Potential impacts	• Loss of up to 1.62 ha of non-native vegetation consisting of: ○ 1.46 ha planted trees, including Eucalypt and non-native species, over hardstand and lawn, and ○ 0.16 ha planted shoreline vegetation ○ The total 1.62 ha includes; ▪ 1.44 ha at Matilda Bay, ▪ 0.18 ha at Applecross and ▪ 0 ha at Elizabeth Quay • No loss of native vegetation. • No impacts to any vegetation representative of TECs or PECs listed under the EPBC Act and/or the BC Act or PECs classified by the DBCA. • Potential introduction and spread of weeds from construction activities; • Potential damage and disturbance to vegetation during construction activities, including generation of dust and waste.

Mitigation hierarchy	**Avoid:** • Delineation and fencing of the Proposal IDF to avoid impacts to flora and vegetation. • Implementation of tree protection measures for any trees that will be retained within close proximity to the works in accordance with *AS4970 – Protection of Trees on Development Sites*. **Minimise:** • Preparation and implementation of the CEMP prior to any ground disturbing activities to manage and mitigate impacts to flora and vegetation.
Residual impacts, including assessment of significance	In consideration of the proposed avoidance and mitigation measures, the residual impacts to flora and vegetation are expected to be negligible.
Proposed environmental outcomes	Following consideration of impacts to flora and vegetation the PTA considers the Proposal can by managed to maintain flora and vegetation so that environmental values are protected and therefore the EPA's objective for this factor can be met.

Other Factor 4: Terrestrial Fauna

Terrestrial Fauna	
EPA Objective	*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained*.
Policy and Guidance	• Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016h).

Potential impacts	• Loss of up to 1.62 ha of non-native vegetation consisting of:
	  ○ 1.46 ha planted trees, including Eucalypt and non-native species, over hardstand and lawn, and
	  ○ 0.16 ha planted shoreline vegetation
	  ○ The total 1.62 ha includes;
	  ▪ 1.44 ha at Matilda Bay,
	  ▪ 0.18 ha at Applecross and
	  ▪ 0 ha at Elizabeth Quay
	• This 1.62 ha is highly modified, fragmented, in small patches and frequently visited by domestic dogs and cats. It is unlikely to provide valuable habitat to mammals, reptiles, amphibians and most avian species.

	• Removal of up to 29 trees with a suitable diameter at breast height (DBH) (i.e. >300mm) and of a species known to be used by black cockatoo's species for nesting. However none of the DBH trees contained hollows. • Permanent removal of up to 1.31 ha 'moderate to low' quality black cockatoo foraging habitat for Forest Red Tail Black Cockatoos. • No conservation significant fauna species were recorded within the Proposal DE. • Evidence of Forest Red Tail Black Cockatoos foraging was recorded in the Proposal DE. • Impacts to fauna habitat through the introduction of weeds from construction activities and equipment. • Injury or death of fauna individuals as a result of construction activities, including vehicle strike and laydown of equipment.
Mitigation hierarchy	**Avoid:** • The Proposal has been designed to avoid impacts to black cockatoo habitat. • Establishment of retention zones around trees to be retained in accordance with *AS4970 – Protection of Trees on Development Sites.* **Minimise:** • The Proposal has been designed to minimise impacts to black cockatoo habitat. • Preparation and implementation of the CEMP (Appendix I) prior to any ground disturbing activities to manage and mitigate impacts to terrestrial fauna and habitat.
Residual impacts, including assessment of significance	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to terrestrial fauna from the Proposal are not considered significant.
Proposed environmental outcomes	Following consideration of impacts to terrestrial fauna the PTA considers the Proposal can be managed to maintain terrestrial fauna so that environmental values are protected and therefore the EPA's objective for this factor can be met.

Other Factor 5: Inland Water

Inland Waters	
EPA Objective	*To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*.

Policy and Guidance	• Environmental Factor Guideline: Inland Waters (EPA, 2018).
Potential impacts	• Changes in water quality as a result of spills and waste release from construction vessels; • Mobilisation of sediments from construction activities causing changes to water toxicant levels. • Stormwater runoff into the river during construction or from the development of additional hardstand areas resulting in increased turbidity and the release of nutrients and other contaminants into the river. • No dewatering or drainage will be required.
Mitigation hierarchy	**Avoid:** • Installation of silt fencing to capture any sediment runoff from the construction site to the river. **Minimise:** • Preparation and implementation of the CEMP prior to any ground disturbing activities to manage and mitigate impacts to hydrological regimes and groundwater and surface water quality. • The provision for a Stormwater Management Plan to be approved by the WAPC and DBCA. • Water abstraction, if required, will be managed under the *Rights in Water and Irrigation Act 1914* (RiWI Act).
Residual impacts, including assessment of significance	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to inland waters from the Proposal are not considered significant.
Proposed environmental outcomes	Following consideration of impacts to inland waters the PTA considers the Proposal can be managed to maintain inland waters so that environmental values are protected and therefore the EPA's objective for this factor can be met.

Other Factor 6: Human Health

Human Health	
EPA Objective	*To protect human health from significant harm.*
Policy and Guidance	• Environmental Factor Guideline: Human Health (EPA, 2016i).

Potential impacts	• Preliminary Site Investigations (PSIs) (Appendix D, Appendix E and Appendix F) for each of the sites have been undertaken to understand the soil properties and potential contamination risk of the Proposal DE. The investigations at Matilda Bay and Applecross included soil sampling (via hand auger) and analysis of the soil against relevant criteria. The investigations found that both Matilda Bay and Applecross contained soils that were a low risk and acceptable for relevant receptors if disturbed during construction activities. • For Elizabeth Quay, the PSI determined that construction disturbance for the proposed ferry landing development is indicated to be of limited scale and therefore minimal disturbance is unlikely to pose an unacceptable risk to relevant receptors.
Mitigation hierarchy	Further soil testing will be undertaken for excavated material if off-site disposal is required to ensure its removal and disposal is in accordance with DWER requirements and guidelines. • Soil excavation and offsite soil disposal will be avoided where possible. • Further soil testing will be undertaken for excavated material if off-site disposal is required to ensure its removal and disposal is in accordance with DWER requirements and guidelines. • The implementation of management measures in the CEMP (Appendix I): o Collection of pre-development sediment samples to determine sediment quality; o Visual monitoring for sediment plumes, water quality monitoring and deploying sediment control measures; o Implement trigger levels, tolerance limits and shut down thresholds if sediment plumes observed outside of control measures and/or if severe weather conditions are forecast; and o Waste and hazardous chemical management measures to prevent release into receiving environment.
Residual impacts, including assessment of significance	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to human health from the Proposal are not considered significant.
Proposed environmental outcomes	Following consideration of impacts to human the PTA considers the Proposal can be managed to maintain human health so that environmental values are protected and therefore the EPA's objective for this factor can be met.

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1.0 Proposal

1.1 Background

The Public Transport Authority of Western Australia (PTA) (the Proponent) is proposing the expansion of Transperth Ferry Operations, which currently operates between Elizabeth Quay and South Pert, within the Swan River. The METRONET on Swan Ferry Service Expansion: Perth to Applecross (the Proposal) is situated within in-river environments, with minimal terrestrial and landside works proposed in already developed areas and will feature new electric ferries.

The Proposal will include the expansion and operation of the existing Elizabeth Quay jetty to connect services to new ferry terminals at Matilda Bay and Applecross. The ferry terminals will include piled jetty structures, comprising fixed-deck jetties, gangways, and floating pontoons, with concrete walling for the landward connection. The Matilda Bay site will also include associated electrical high-capacity charging infrastructure, a bus turn-around lane, drop off and service vehicle bays and bus shelters, bike parking, new toilet block and the removal of up to 33 existing moorings. Dredging is not required for implementation of the Proposal.

Key components of the Proposal includes the operation of five new electric ferry vessels between Elizabeth Quay, Matilda Bay and Applecross, along with constructing new ferry terminals located at Applecross and Matilda Bay, and upgrading the existing boarding facilities at Elizabeth Quay terminal.

The ferry terminals will include:

- Piled jetty structures, comprising fixed-deck jetties, gangways, and floating pontoons, with concrete walling for the landward connection;
- Modified road access at Matilda Bay terminal (Hackett Drive) including a new roundabout, bus embayments and parking bays;
- Removal of existing boat moorings at Matilda Bay;
- Installation of electrical high-capacity charging infrastructure at Matilda Bay.

Subject to obtaining the necessary approvals, the proposed development of the Elizabeth Quay, Matilda Bay and Applecross terminals is scheduled for completion to enable commencement of the new ferry service by late 2027.

For the purposes of this Referral Supporting Document, the Proposal Development Envelope (DE) refers to the 8.66 ha spanning across the three sites: Matilda Bay, Applecross and Elizabeth Quay (Figure 2).

The Indicative Disturbance Footprint (IDF) refers to the maximum disturbance area within the DE based on current designs, where all construction and operational activities of the Proposal will occur. The Proposal's IDF is 1.65 ha, across the three sites (Figure 2).

The proposed development at Elizabeth Quay is subject to the Central Perth Redevelopment Scheme (2022) (CPRS) established under the *Metropolitan Redevelopment Authority Act 2011*.

The proposed developments at Matilda Bay and Applecross are subject to the Metropolitan Region Scheme (MRS) established under the *Planning and Development Act 2005*. These locations also intersect with the Development Control Area (DCA) established under the *Swan and Canning Rivers Management Act 2006* (SCRM Act) and will therefore require separate approvals under this legislation, including:

- River Reserve Lease (Section 29): the ongoing use and operation of the jetties and ferry terminals within the DCA will be subject to a river reserve lease for the land vested in the Swan River Trust. Approval will be contingent on demonstrating that the proposed operations will not adversely affect the conservation, ecological and community values of the river. Lease conditions will ensure appropriate management of the jetties and ferry terminals, and safeguard long-term environmental and social values of the river.
- Part 5 Development Approval (Section 70): A statutory requirement for permanent structures such as jetties within the DCA, Part 5 approval must demonstrate compliance with policies and guidelines issued by the DBCA. Approvals conditions will be applied to ensure the development will not result in unacceptable impacts to ecological health, amenity, and heritage, and that appropriate controls are in place to manage potential environmental impacts.

1.2 Infrastructure Elements

The Proposal will include the following key infrastructure elements (Table 1), with the Proposal DE presented in Figure 2.

Table 1 Proposal Content Elements

Proposal Element	Location / Description	Maximum extent, capacity or range
Physical Elements		
Matilda Bay – Terminal (Please refer to Figure 2 in the ERD)	Matilda Bay Terminal including the jetty and berthing facilities will include: • Walkway: - attached to a limestone head wall and steel piles. - will connect to the fixed jetty with a ticketing/waiting area. • Fixed jetty - attached to steel piles. - will sit 2.44 m above mean sea level. • Access Gangway	Matilda Bay • Development Envelope (maximum extent) of 7.17 ha. • Indicative Disturbance Footprint of 1.30 ha

Proposal Element	Location / Description	Maximum extent, capacity or range
	- dual access gangway will connect the fixed jetty to the floating pontoon/boarding area. • Floating pontoon (berthing) - floating pontoon attached to piles - ferry berthing and electrical charging for up to four ferries	
Applecross – Terminal (Please refer to Figure 2 in the ERD)	Applecross Terminal including the jetty and berthing facilities will include: • Walkway: - attached to a concrete head wall and steel piles. - will attach to the fixed jetty and waiting area. • Fixed jetty - attached to steel piles. - will sit 2.44 m above mean sea level. • Access Gangway - will connect the fixed jetty and the floating pontoon/boarding area. • Floating pontoon (berthing) - floating pontoon attached to piles berthing only for up to one ferry.	Applecross • Development Envelope (maximum extent) of 1.23 ha • Disturbance Footprint (indicative) of 0.29 ha
Elizabeth Quay – Terminal (Please refer to Figure 2 in the ERD)	Elizabeth Quay Terminal including the jetty and berthing facilities will include: • Addition of new floating access platform via connection to existing retaining wall and existing terminal structure.	Elizabeth Quay • Development Envelope (maximum extent) of 0.26 ha • Disturbance Footprint (indicative) of 0.05 ha
Matilda Bay – Landside infrastructure and access	• Installation of electrical infrastructure (substation) landside. • Construction of bike parking facilities.	Matilda Bay • Development Envelope (maximum extent) of 7.17 ha. • Indicative Disturbance Footprint of 1.30 ha

Proposal Element	Location / Description	Maximum extent, capacity or range
(Please refer to Figure 2 in the ERD)	• Demolition of the existing public toilets and construction of new public toilets. • Development of a bus-embayment at Matilda Bay, bus slip-lane, drop off and service vehicle bays and bus shelters, including modification of sections of existing road and car-parking. • New roundabout on Hackett Drive to facilitate bus movements.	
Applecross – Landside infrastructure and access (Please refer to Figure 2 in the ERD)	• Installation of electrical infrastructure (wall mounted electrical box) landside • Construction of bike parking facilities. • Development of short-term on-street drop off car bays at Applecross.	Applecross • Development Envelope (maximum extent) of 1.23 ha • Disturbance Footprint (indicative) of 0.29 ha
Construction Elements		
Matilda Bay – Removal of non-native vegetation/trees (Please refer to Figure 2 in the ERD)	Removal of non-native vegetation, primarily mature planted trees, associated with landside infrastructure at Matilda Bay (i.e. pedestrian access, bus turnaround area, jetty access and sub-station, bike parking and toilets).	Matilda Bay Removal of up to 1.62 ha of non-native, vegetation, consisting of 1.46 ha mature planted trees of non-native and native species in a parkland cleared landscape, and 0.16 ha planted wetland shoreline vegetation.
Matilda Bay and Applecross – Impacts to Benthic Community and Habitat – Seagrass and/or macroalgae type	Impact to 0.63 ha of Benthic Community and Habitat seagrass and/or macroalgae type (BCH SM) from Matilda Bay and Applecross from construction and operational activities including piling, removal of up to 33 moorings, new mooring point for the construction vessel, sedimentation and increased Total Suspended Solids (TSS) in the water column, subsequent settlement of sediments that may be toxic, and decreased light availability from TSS or shading of structures, including jetties and terminals.	Matilda Bay and Applecross Loss of up 0.63 ha of BCH - SM at Matilda Bay (0.37 ha) and Applecross (0.26 ha).

Proposal Element	Location / Description	Maximum extent, capacity or range
(Please refer to Figure 10 in the ERD)	0.63 ha includes all of the BCH SM located within the DE at Matilda Bay and Applecross. (NOTE: No BCH - SM was recorded at Elizabeth Quay and no BCH will be disturbed during works at that location)	
Matilda Bay, Applecross and Elizabeth Quay – Temporary Construction (Please refer to Figure 2 in the ERD)	Erection of site offices, ablutions, laydown areas, equipment storage area, and mooring point for construction vessel.	Matilda Bay • Development Envelope (maximum extent) of 7.17 ha • Disturbance Footprint (indicative) of 1.30 ha Applecross • Development Envelope (maximum extent) of 1.23 ha • Disturbance Footprint (indicative) of 0.29 ha Elizabeth Quay • Development Envelope (maximum extent) of 0.26 ha • Disturbance Footprint (indicative) of 0.05 ha
Matilda Bay – Removal of Moorings (Please refer to Figure 2 in the ERD)	Moorings at Matilda Bay will be decommissioned during construction.	Matilda Bay • Removal of up to 33 used and disused moorings within a Development Envelope (maximum extent) of 7.17 ha
Matilda Bay and Applecross – Piling (Please refer to Figure 2 in the ERD)	Piling of support posts and landings for fixed walkways, jetty and waiting area for Matilda Bay and Applecross sites only. Installation of jetty and berthing components via marine vessels and/or terrestrial based equipment. See Figure 2.	Matilda Bay • Development Envelope (maximum extent) of 7.17 ha. • Disturbance Footprint (indicative) of 1.30 ha • Up to 45 piles Applecross • Development Envelope (maximum extent) of 1.23 ha

Proposal Element	Location / Description	Maximum extent, capacity or range
		• Disturbance Footprint (indicative) of 0.29 ha • Up to 25 piles
Operational Elements		
Matilda Bay, Applecross and Elizabeth Quay – Terminal Operations (Please refer to Figure 2 and Figure 3 in the ERD)	Pedestrian access path, jetty, ferry terminals and supporting infrastructure.	Matilda Bay • Development Envelope (maximum extent) of 7.17 ha. • Disturbance Footprint (indicative) of 1.30 ha Applecross • Development Envelope (maximum extent) of 1.23 ha • Disturbance Footprint (indicative) of 0.29 ha Elizabeth Quay • Development Envelope (maximum extent) of 0.26 ha • Disturbance Footprint (indicative) of 0.05 ha
Matilda Bay, Applecross and Elizabeth Quay – Ferry Operations (Please refer to Figure 2 and Figure 3 in the ERD)	Operation of ferries between Elizabeth Quay, Matilda Bay and Applecross. Ferry timetables are expected to mirror current timetables in terms of operating times. Timetables may be amended after a trial period based on demand. Ferries will travel at a maximum 8 knots as they approach terminals and otherwise travel at a variety of speeds, depending upon conditions and location, and in compliance with a traffic management plan under the *Western Australian Marine Act 1982*.	Matilda Bay, Applecross and Elizabeth Quay Ferries will travel along a route to be determined by the Department of Transport and Major Infrastructure. An Indicative Ferry Route is provided in Figure 3 of the ERD.

The Proposal construction method is summarised below:

Piling Method (all):

- Vibration piling is proposed as the default construction method, with hammer piling utilised by exception where required.

Matilda Bay:

- All construction elements will be delivered via a floating barge method.
- Up to 45 piles required.

Applecross:

- Construction will be via overhand construction method for the fixed terminal, working from the shore out as the structure is developed.
- Construction will be via floating barge for the gangway/floating jetty.
- Up to 25 piles required.

Elizabeth Quay:

- The fixed platform is expected to be attached to the existing diaphragm wall.
- No marine piling is required.

1.3 Maintenance

The PTA will be responsible for the ongoing maintenance of the jetties, berthing terminals and ferries which will be undertaken in accordance with an OEMP. Maintenance inspections will be regularly undertaken to ensure the facilities and ferries are in good working order and are operating safely and in an environmentally responsible manner. Maintenance of ferry vessels will not be undertaken within the Proposal DE and does not form part of the Proposal activities.

1.4 Operations

The new ferry service is currently aimed to commence at the end of 2027 and ferry timetables are expected to mirror current timetables in terms of operating times. Timetables may be amended after a trial period based on demand. Ferries will travel at a maximum 8 knots as they approach terminals. and otherwise travel at a variety of speeds, depending upon conditions and location, and in compliance with a traffic management plan under the *Western Australian Marine Act* 1982.An indicative ferry route is provided in 1 with route definition to be determined by the Department of Transport and Major Infrastructure. The ferries will travel at a maximum 8 knots as they approach terminals.

The Matilda Bay site will also include high-capacity ferry charging infrastructure, a roundabout, bus embayments, pick up points and bus shelters, new toilets and bike storage.

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 1 - Proposal Locations and Proposed Ferry Route

LEGEND

- Development Envelopes
- Indicative Ferry Routes

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 2a - Development Envelopes and Indicative Disturbance Footprint: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Indicative Ferry Routes

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 2b - Development Envelopes and Indicative Disturbance Footprint: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Indicative Ferry Routes
- Mooring Points (DoT, 2025)

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Base Data: Nearmap 2022, Landgate 2022, Main Roads: , Others: , Minor Roads: , Light Gray Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 2c - Development Envelopes and Indicative Disturbance Footprint: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

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1.5 Proposal Considerations

1.5.1 Proposal Need

While Perth's existing transport networks provide essential links, there are limited crossings over the Swan River with critical bridges such as the Narrows and the Causeway regularly experiencing capacity constraints. This situation highlights vulnerabilities arising from heavy reliance on a few critical crossing points. Constructing additional road bridges would not only incur substantial costs but also present significant environmental challenges and constraints, while offering limited long-term effectiveness due to ongoing congestion and future proofing opportunities.

Expanding the ferry network presents a strategic, long-term, and sustainable transport solution. Establishing new ferry terminals at key waterfront locations would significantly enhance cross-river connectivity, improve public transport options, support urban growth, revitalise riverside areas and stimulate vibrant commercial and residential development.

Unlike road-based transport, ferry services are not constrained by road capacity and can be scaled to meet future demand. Ferry services provide reliable cross-river connections that are relatively cost-effective and environmentally friendly compared to new road or rail infrastructure. Further, ferries offer a distinctive and enjoyable travel experience, appealing to both commuters and visitors (over 55% of current ferry patronage consists of tourists/ non-commuters).

Strategic Rationale: Expanding the Swan River ferry network aligns with several strategic objectives and policies at national, state, and local levels including Strategic Asset Plan of Public Transport Authority (GoWA, 2024). Some of the key alignment includes:

- *National Net Zero Plan and State Climate Policy:*
    - Electric ferries support emissions reduction and sustainability targets.
- *Australian Infrastructure Plan; State Infrastructure Strategy; Perth and Peel @ 3.5 Million Framework; Perth Water Buneeboro Locality Plan:*
    - Ferry expansion will facilitate economic growth through introduction sustainable infrastructure, higher-density urban infill, reducing reliance on road transport and fostering vibrant urban precincts.
- *Thrive 2030; City of Perth Transport Strategy; City of Melville Strategic Community Plan; City of Perth Riverfront Masterplan; Perth Metropolitan Regional Tourism Development Strategy:*
    - Enhancing riverfront access supports Perth’s vision as a sustainable and dynamic tourist destination, significantly boosting local economies and unlocking land developing (homes and jobs).

1.5.2 Alternative Options Considered

Throughout the design process, the Proponent has considered a number of alternative site locations, with over five sites considered for the Matilda Bay location and two sites considered

for the Applecross location. The criteria used to determine the Matilda Bay site included consideration of:

- Waterways safety;
- Compatibility with surrounding land and water uses;
- Suitability for transport function;
- Environmental and heritage values;
- Capital cost;
- Delivery;
- Maintenance cost.

The Applecross location was selected over other alternatives, including Canning Bridge, primarily due to its existing waterway depths, which eliminate the need for dredging and reduce environmental impacts.

In addition to careful site selection, the Proposal's design has evolved to avoid adverse and minimise environmental, heritage, and social impacts, ensuring they are reduced to the lowest practicable levels. Key design elements include:

- Applecross Terminal:
    - The length and orientation of the berthing structure were adjusted to ensure sufficient water depth for ferry operations, thereby avoiding the need for dredging.
    - The construction design was modified to temporarily close the shared pathway for use as a laydown area, eliminating the need for a separate concourse structure. The shared pathway will link to the jetty terminal once construction is complete.
- Matilda Bay Terminal:
    - The terminal length was increased to avoid dredging and to minimise interaction with foreshore users and recreational activities.
    - Electrical infrastructure was integrated into the replacement toilet block to minimise visual impacts.
- Elizabeth Quay Terminal:
    - The design avoids any disturbance to the riverbed.
    - Due to the presence of existing infrastructure, alternative locations were not considered, therefore, avoiding additional development in the area.
- Other key design measures:
    - Maximising the use of previously disturbed areas and avoiding sensitive receptors, including places of Historic Heritage significance.
    - Designing terminal berths to ensure adequate water depth for vessel safety and to reduce sediment accumulation.

1.6 Local and Regional Context

1.6.1 Bioregion

The Proposal is located within the Perth subregion of the Swan Coastal Plain bioregion, which includes Perth metropolitan area and surrounding suburbs, excluding those in the Hills. The Swan Coastal Plain is a narrow strip, less than 30 km wide, composed of Aeolian, alluvial and colluvial deposits dating from the Holocene and Pleistocene age (Gibson et al., 1994). It is described (DAWE, 2012) as a low lying coastal plain, mainly covered with woodlands dominated by Banksia or Tuart in sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. Warm Mediterranean. Three distinct phases of marine sand dune formation contribute to the region's topographical variation. Historically, the outwash plains, once dominated by *C*. *obesa*-Marri woodlands and *Melaleuca* shrublands, were more extensive in the southern portion of the bioregion.

1.6.2 Location

The Proposal is located within the Swan-Canning Estuary and adjacent foreshore, situated within the Swan coastal plain region of Western Australia. The Swan-Canning Estuary is approximately 50 km long and covers an area of approximately 55 km^2. It is a microtidal system supplied with freshwater from the Swan and Canning rivers, while marine water is supplied from a narrow entrance channel at Fremantle that opens into two basins (Melville Water and Perth Water). During summer months, a salt wedge extends upstream into the Swan and Canning rivers, up to approximately 29 and 13 km upstream from their entry points into Melville Water, respectively. Although the majority of the estuary is shallow (less than 2 m in depth), it reaches a maximum depth of approximately 20 m in the entrance channel (Valesini et al., 2014).

1.6.3 Climate

The climate in the South-West region of Western Australia is temperate-Mediterranean with mild wet winters and hot dry summers. The south-west is influenced by winter frontal systems, troughs and cut-off lows associated with westerly winds resulting in high winter rainfall and low summer rainfall (DWER, 2024). Precipitation occurs predominantly during the winter months, with the possibility of some summer storms, with ~80% of rainfall occurring between June and September (Hodgkin et al., 2017). Average temperatures in Perth range from 17.7°C to 31°C in summer and 8.4°C to 19.1°C in winter. (BoM, 2025).

1.6.4 Geology and Soils

The terrestrial components of the proposed development are situated on the Spearwood System in the Perth Coastal Zone, which occurs within the Swan Province. The Spearwood System is described as sand dunes and plains, with yellow deep sands, pale deep sands and yellow/brown shallow sands.

One soil system occurs within the Proposal DE, namely the EnvGeol S14 Phase (211Sp). The soil system is described as pale grey to white sand, medium-grained sub-angular, quartz and feldspar, well sorted, abundant whole and broken bivalves and gastropod shells of alluvial origin (DPIRD, 2022).

1.6.5 Acid Sulfate Soils

Acid Sulfate Soil (ASS) risk mapping indicates that all three sites contain areas with High to Moderate risk of ASS in shallow soils. For the Matilda Bay and Applecross sites, the High to Moderate risk areas are located within the river, with the terrestrial components mapped as Moderate to Low risk (DWER, 2017). Elizabeth Quay is classified as High to Moderate risk across the entire Proposal DE in this location.

The Proposal will require disturbance of river sediments during piling and any recontouring works, removal, and land excavation to construct the ferry terminals and associated infrastructure. Therefore, there is a potential risk of exposing ASS during the works, particularly during piling. If any existing wooden piles are discovered during works, these will be cut down and left embedded in the riverbed.

Preliminary assessment of landing site sediments to determine the presence of potential ASS and MBO's and establish the general magnitude and extent of their distribution has been undertaken by BMT with results and findings presented in the SAPIR (BMT, 2025a) (Appendix A). These initial preliminary sediment assessment works have established that modification of riverbed stratigraphy through construction activities (including, but not limited to, shoring (driven piles etc) have the potential to disturb in-situ ASS and MBO's at the Applecross and Matilda bay sites.

Active management controls will be undertaken to assist in limiting the rate and spatial extent of acid generation resulting from the oxidation of inorganic sulfur compounds (predominantly iron disulfide and iron monosulfide minerals) associated with ASS and MBO's which have been identified in shallow nearshore sediments.

Mapping for ASS risk is shown on Figure 3.

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 3a - Acid Sulfate Soil Risk Mapping: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Acid Sulfate Soil Risk Map, Swan Coastal Plain (DWER-055)

- 1 - High to moderate risk of ASS occurring within 3m of natural soil surface
- 2 – Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 3b - Acid Sulfate Soil Risk Mapping: Matilda Bay Site

LEGEND

- Indicative Disturbance Footprint
- Development Envelope

Acid Sulfate Soil Risk Map, Swan Coastal Plain (DWER-055)

- 1 - High to moderate risk of ASS occurring within 3m of natural soil surface
- 2 – Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface

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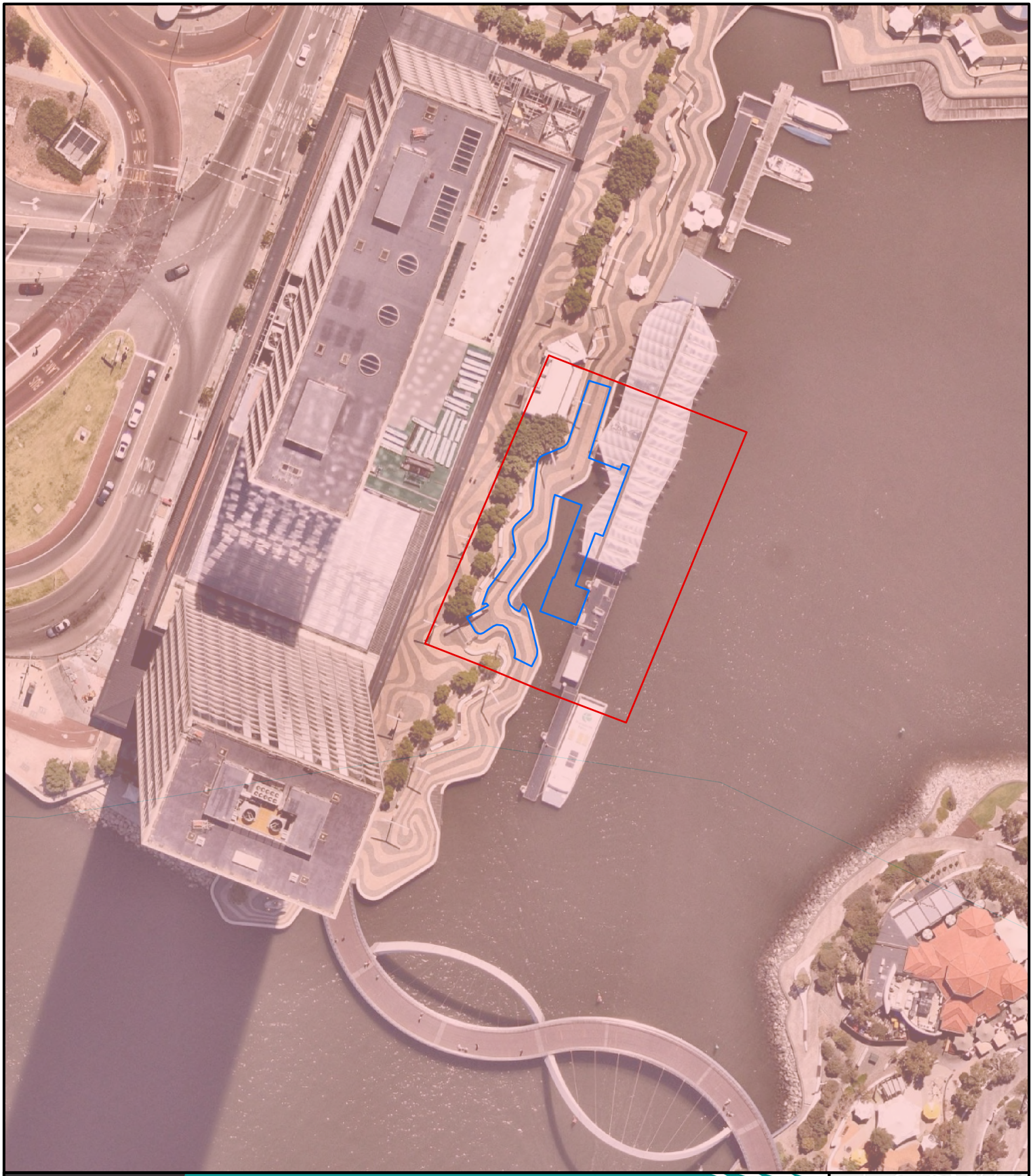

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 3c - Acid Sulfate Soil Risk Mapping: Elizabeth Quay Site

LEGEND

Indicative Disturbance Footprint

Development Envelope

Acid Sulfate Soil Risk Map, Swan Coastal Plain (DWER-055)

1 - High to moderate risk of ASS occurring within 3m of natural soil surface

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1.6.6 Terrestrial Vegetation and Flora

1.6.6.1 Regional Vegetation

Mapping by Beard et al. (2013) is used to assess the current extent of remnant vegetation in comparison to pre-European distribution. One vegetation association is mapped within the Proposal DE. Table 2 summarises the percentage remaining of vegetation association across relevant regional boundaries.

Further details on terrestrial flora and vegetation and fauna habitats in the Proposal DE, based on surveys completed for the Proposal, are provided in Section 10.0.

Table 2 Regional Vegetation Associations and Percent Remaining (Beard et al, 2013 & Govt. of WA, 2019)

Vegetation System Association (VSA)	Description	Percentage Remaining (%)			
		Western Australia	Swan Coastal Plain IBRA region (SWA)	Perth IBRA Sub-region (SWA-02)	City of Perth
6	Medium woodland; Tuart & Jarrah	23.72	23.72	23.72	24.14

Further vegetation mapping of the Swan Coastal Plain by Heddle et al. (1980) has mapped the sites as:

- Vasse Complex (Matilda Bay and Elizabeth Quay) – described as: Mixture of the closed scrub of *Melaleuca* species fringing woodland of *Eucalyptus rudi*s (Flooded Gum) - *Melaleuca* species and open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri). Will include areas dominated by *Tecticornia* and *Sarcocornia* species (Samphire) near Mandurah and south of the Capel River (Heddle et al., 1980).
- Bassendean Complex Central and South (Applecross) – described as: Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* (Jarrah) to *Eucalyptus todtiana* (Pricklybark) in the vicinity of Perth (Heddle et al., 1980).

1.6.7 Vegetation

A biological survey of the Proposal DE, including a desktop assessment and a basic reconnaissance flora and vegetation survey was completed by GHD on 7 and 27 of March 2025 (GHD, 2025a) (Appendix B). Remnant native vegetation was not identified in the Proposal DE with the exception of one flooded gum (*Eucalyptus rudis*) that was found on the edge of the shoreline at Matilda Bay during the Black Cockatoo habitat survey (refer to Section 1.6.9.3).

The Applecross site contains three vegetation types: Replanting, Wetland/Shoreline, and Parkland with Planted Trees. The remaining areas were recorded as Cleared.

The Matilda Bay site contains three vegetation types: Revegetation and Re-planting, Parkland, and Wetland/Waterline Shore-bank. The remaining areas were recorded as Cleared.

The Elizabeth Quay site contains one vegetation type: Replanting. The remaining areas were recorded as Cleared. None of the vegetation types were assigned a condition, as they did not represent native vegetation. (GHD, 2025a).

Portions of the Matilda Bay and Applecross sites were not surveyed by GHD (2025a), however vegetation types in these relatively minor portions of the DE's were able to be inferred based on site visits and aerial photography (Figure 4).

No EPBC or BC Act listed TECs, or DBCA listed Priority Ecological Communities (PECs) were recorded in the Proposal DE (GHD, 2025a).

Terrestrial vegetation mapping is shown in Figure 4.

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 4a - Terrestrial Vegetation: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Biological Survey (GHD and AECOM, 2025)

Vegetation Type

- Cleared
- Open water
- Parkland
- Revegetation and Replanting
- Wetland Shoreline

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 4b - Terrestrial Vegetation: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Biological Survey (GHD and AECOM, 2025)
Vegetation Type

- Cleared
- Open water
- Parkland
- Revegetation and Replanting
- Wetland Shoreline

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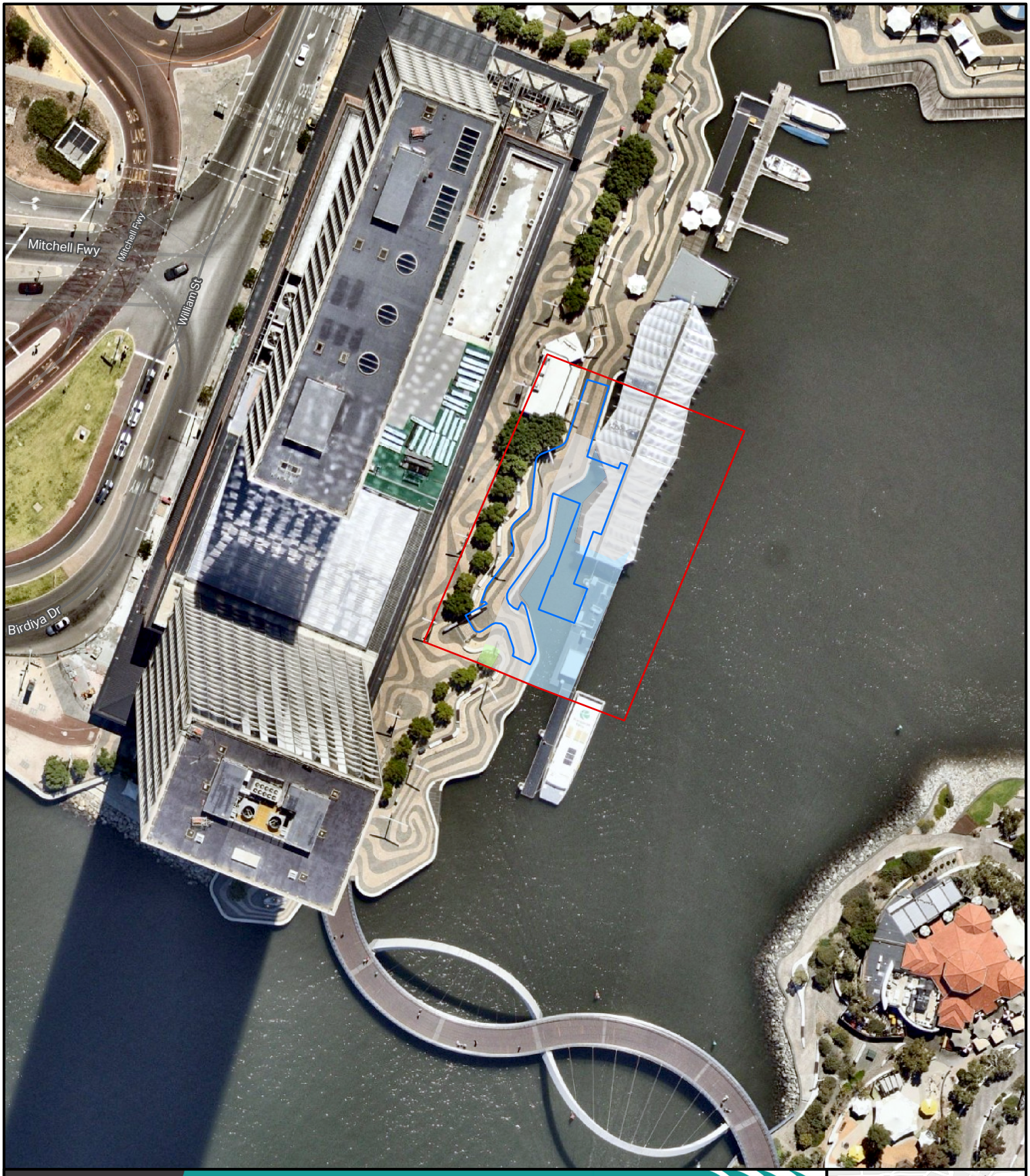

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 4c - Terrestrial Vegetation: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Biological Survey (GHD and AECOM, 2025)
Vegetation Type

- Cleared
- Open water
- Revegetation and Replanting

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1.6.8 Flora

A desktop assessment identified 18 threatened flora species known to occur within 5 km of the Proposal DE (DBCA-036; DBCA, 2023). However, none of these species were considered likely to occur within the Proposal DE due to the absence of suitable habitats (GHD, 2025a) (Appendix B).

At the Applecross site, the biological survey conducted by GHD (2025a) identified six flora species, including two native taxa, and four introduced species. No priority or threatened flora species were identified and none of the recorded species are listed as declared pests (plants) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (GHD, 2025a).

At the Matilda Bay site, a total of 17 flora species were recorded, comprising 12 native taxa, and five introduced species. No priority or threatened flora or declared pest (plants) were identified in the surveyed area.

A portion of the Matilda Bay site was not included in the biological survey undertaken by GHD (2025a). This area consists of cleared roads and grassed foreshore with planted trees, predominantly non-endemic Eucalypt species. Due to the lack of suitable habitat, it is highly unlikely that any flora species listed under the EPBC Act or BC Act occur in this area.

At the Elizabeth Quay site, five flora species were recorded, including three native taxa, and two introduced species. No priority or threatened flora or declared pest (plants) were identified (GHD, 2025a).

1.6.9 Terrestrial Fauna

1.6.9.1 Fauna Species

A biological survey of the Proposal DE, including a desktop assessment, basic reconnaissance flora and vegetation survey and basic reconnaissance-level fauna survey, was completed by GHD on 7 and 27 March 2025 (GHD, 2025a) (Appendix B). The desktop assessment identified 44 threatened fauna species with potential to occur within 5 km of the Proposal DE. The GHD (2025a) survey did not record the presence of any conservation significant fauna species in the Proposal DE. Eight conservation significant fauna species were assessed as likely or possibly occurring in the Proposal DE based on known local occurrences and habitat availability . None of these conservation significant fauna species are dependent solely on habitat in the DE for their survival or continued presence.

Additional conservation significant fauna species relevant to the Proposal include migratory birds, due to the DE's proximity to the Swan River estuarine habitat. However, these species are unlikely to regularly visit the DE and are expected to only pass overhead (GHD 2025a).

1.6.9.2 Fauna Habitat

Four basic fauna habitat types were identified within the Proposal DE (GHD 2025a) (Table 3):

- Scattered trees (native and exotic);
- Parkland over revegetation and re-planted flora;
- Riparian rivers and shoreline wetlands;
- Completely cleared.

The fauna habitats are simple in structure with limited vegetation diversity. Fauna habitat type 'Scattered trees (native and exotic)' is derived from relatively recent revegetation of trees and plants comprising *Eucalyptus, Melaleuca, Casuarina*, palms, deciduous and evergreen trees, and is consequently largely artificial.

Due to the highly modified condition of the terrestrial part of the Proposal DE, as well as the fragmented and limited extent of vegetation patches, the area is unlikely to support suitable habitat for conservation significant fauna species. Only certain avian taxa (terrestrial species inhabiting wetlands in urbanised environments), as well as small reptiles and amphibians, were considered to have potential to occur locally. However, the Proposal DE does not represent important habitat for migratory bird species and is likely to receive only transient individuals enroute to more suitable environments. In addition, the frequent presence of domestic dogs (*Canis familiaris*) within the Proposal DE is expected to further deter the persistence of sensitive fauna species (GHD, 2025a).

Table 3 Fauna Habitats

Site	Habitat Types	Survey Findings
Applecross	Parkland cover over revegetation and replanted	The field survey recorded a total of eight birds and one mammal species, with no reptiles, fish or frog species sighted. One introduced species was recorded, that being the Rainbow Lorikeet (*Trichoglossus moluccanus*). (GHD, 2025a).
	Scattered Trees	
	Shoreline wetlands riparian river	
	Cleared	
Matilda Bay	Parkland cover over revegetation and replanted	A total of 11 bird species were recorded during the survey, with no mammal, reptile, fish or frog species sighted. Two introduced species were identified, including the Rainbow Lorikeet (*Trichoglossus moluccanus*) and the Long-billed Corella (*Cacatua tenuirostris*) (GHD, 2025a).
	Scattered Trees	
	Shoreline wetlands riparian river	
	Cleared areas and Open water	

Site	Habitat Types	Survey Findings
Elizabeth Quay	Native exotic replanting	A total of four bird species were recorded during the survey, with no mammal, reptile or fish species identified. One introduced species was recorded, the domestic pigeon (*Columba livia*). No significant fauna species were recorded within the Proposal DE (GHD, 2025a).
	Cleared areas and Open water	

Terrestrial fauna habitat within the Proposal DE is shown in Figure 5.

1.6.9.3 Black Cockatoo Habitat

AECOM conducted a targeted habitat assessment of the Matilda Bay ferry terminal site on 17 July 2025 (AECOM, 2025a) (Appendix C), focusing on three threatened Western Australian black cockatoo species which are Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*), and the Forest-Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*).

The assessment followed methodologies outlined in the *Referral Guidelines for Three Threatened Black Cockatoo Species and the Survey guidelines for Australia's threatened birds* (DAWE, 2022; DCCEEW, 2010).

A refined foraging assessment was then completed using the Bamford Consulting Ecologists (2020) scoring system to identify habitat quality and inform impact avoidance strategies. The results are summarised below:

Breeding Habitat

Twenty-nine potential nesting trees were identified; however, none contained hollows suitable for breeding. The survey area supports scattered native species including a Flooded Gum and a Wandoo tree amongst planted Eucalyptus and Lemon-scented Gums. While some trees exceeded the 300 mm DBH threshold outlined in DAWE (2022) guidelines, the absence of hollows and the urbanised setting suggest limited breeding value. Although breeding cannot be entirely ruled out, isolated trees in landscaped corridors in a heavily urban environment are unlikely to support nesting compared to those in proximity to remnant woodlands.

Foraging Habitat

The Bamford Consulting Ecologists (2020) scoring tool determined that the "Revegetation, Replanting and Parkland" fauna habitat provides low or negligible foraging quality for Baudin's and Carnaby's Cockatoo respectively, and Low to Moderate quality foraging for Forest Red-tailed Black Cockatoos. This was influenced by the lack of suitable foraging species for the former two Cockatoo species, while evidence of use was recorded for Forest Red-tailed Black Cockatoo.

In total, 1.31 ha of low to moderate quality foraging habitat for the Forest Red-tailed Black Cockatoo was recorded across the ferry terminal site. Despite evidence of use by Red-tailed Black Cockatoos, the narrow corridor of planted native and introduced mature trees is not considered significant foraging habitat, especially given the availability of preferred species in nearby Kings Park.

Night Roosting Habitat

Roosting potential within the survey area and surrounding area is supported by the presence of suitable tree species (e.g. *Corymbia citriodora*) and confirmed roosting sites within 1.5 km of the survey area. However, at a landscape scale, the removal of these trees within the survey area is unlikely to significantly impact black cockatoo populations, given the presence of 36 known roosting sites within a 20 km radius (DBCA, 2019a). This broader context suggests that while the survey area may offer some roosting value, its contribution to regional habitat availability is relatively minor.

The full Black Cockatoo Habitat Assessment Report is available as Appendix C, with mapped habitat at Matilda Bay shown in Figure 6.

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Figure 5a - Terrestrial Fauna Habitat: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Fauna Habitats (GHD and AECOM, 2025)

- Exotic
- Open water
- Parkland cover over revegetation and replanted
- Scattered trees
- Shoreline wetlands riparian river
- Cleared

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 5b - Terrestrial Fauna Habitat: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Fauna Habitats (GHD and AECOM, 2025)

- Open water
- Parkland cover over revegetation and replanted
- Scattered trees
- Shoreline wetlands riparian river
- Cleared

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 5c - Terrestrial Fauna Habitat: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Fauna Habitats (GHD and AECOM, 2025)

- Native exotic replantings
- Open water
- Cleared

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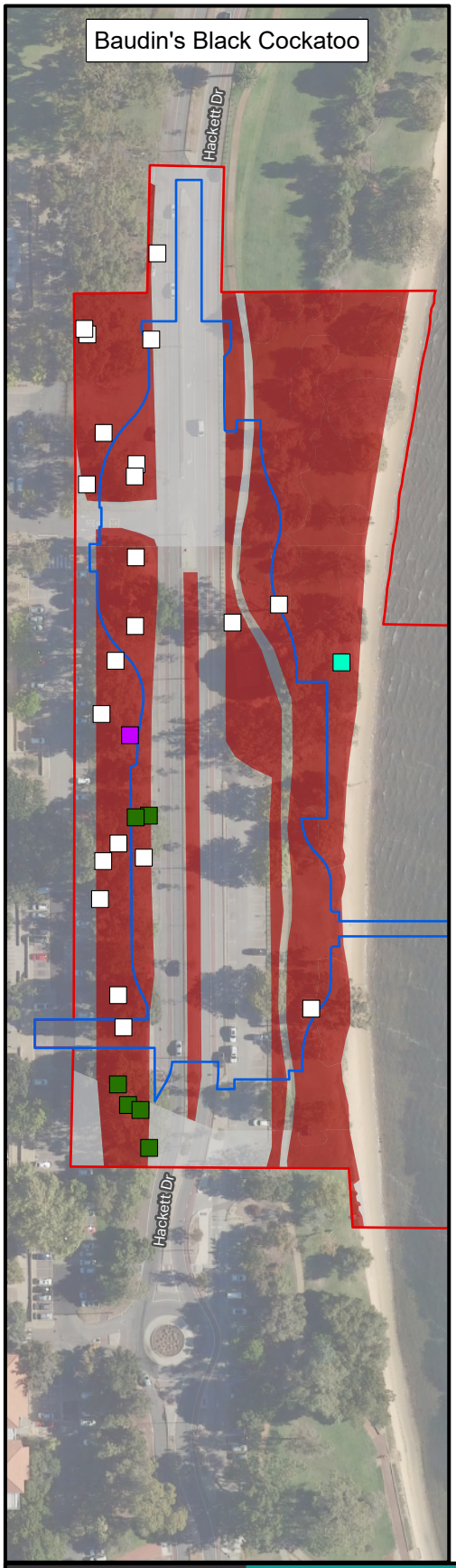

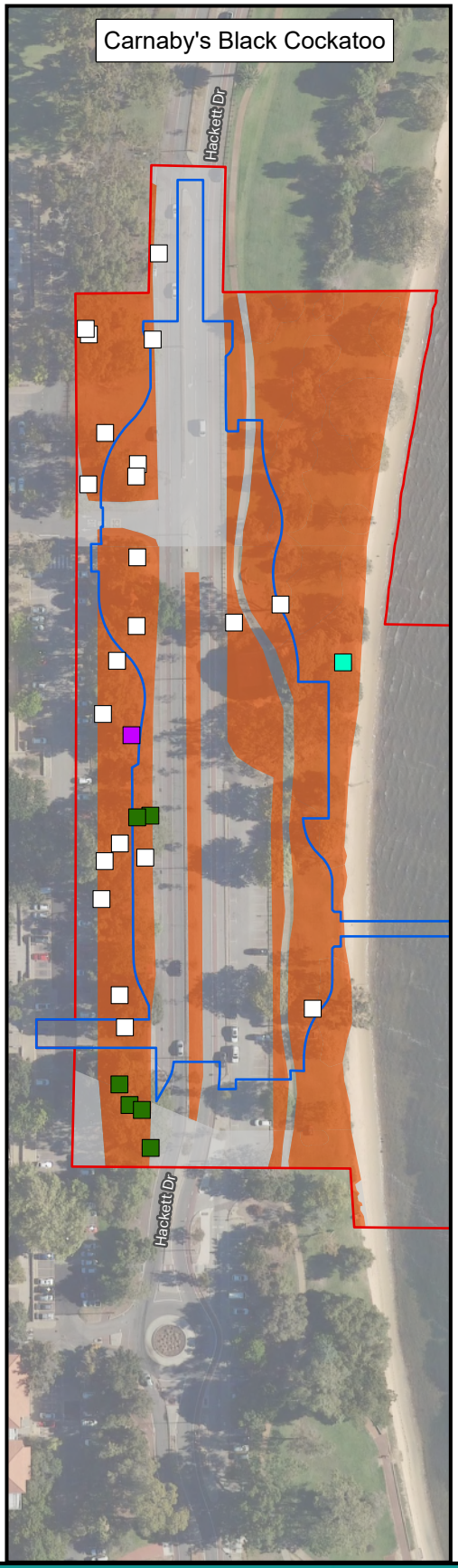

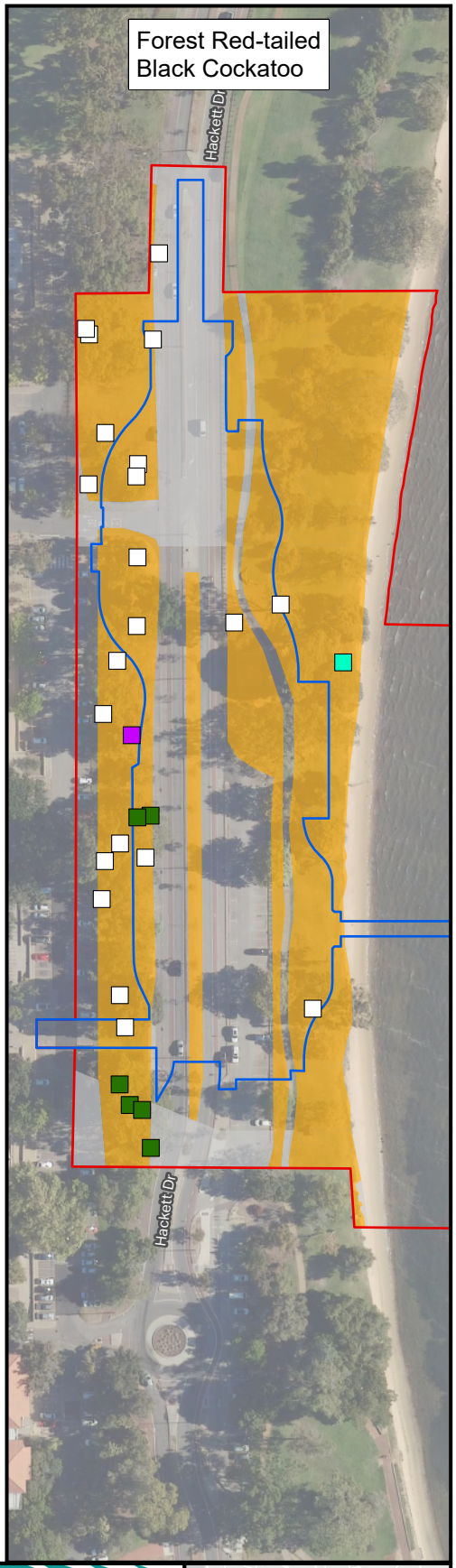

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 6 - Black Cockatoo Habitat: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Black Cockatoo Foraging Quality (AECOM, 2025)

- None
- Negligible
- Low
- Low to Moderate
- Moderate
- Moderate to High
- High

Black Cockatoo Breeding Trees (AECOM, 2025)

Species

- Powderbark Wandoo (Eucalyptus accedens)
- Lemon-scented gum (Corymbia citriodora)
- Flooded Gum (Eucalyptus rudis)
- Other

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1.6.10 Social Context

The Swan River is a defining feature of Perth's landscape, offering unique visual and recreational amenity. The river supports a wide range of recreational activities, including kayaking, sailing, cycling, walking, and picnicking, making it an important space for community wellbeing and outdoor enjoyment. Its accessibility and integration with urban and natural environments enhance Perth's liveability, while also contributing to cultural identity and tourism appeal.

The foreshore areas at Matilda Bay and Applecross are well established recreational spaces for residents, visitors and tourists. These areas are supported by public infrastructures such as parking, pathways, viewing points, picnic facilities and toilets, with landscaped lawns encouraging use of these areas. Nearby restaurants and cafes also take advantage of the natural viewsheds.

Key stakeholders in the area include the Raffles Hotel, The University of Western Australia Boat Club, Royal Perth Yacht Club and surrounding residents and businesses.

The Proposal DE spans the City of Perth and City of Melville Local Government Areas (LGAs).

The City of Perth covers an area of 20 km² with a population of 110,530 (ABS, 2021a) and is a highly urbanised area including Perth's Central Business District (CBD). The City of Melville covers an area of 53 km² with a population of 103,523 (ABS, 2021b) and is a similarly urbanised area.

According to the Metropolitan Region Scheme (MRS), land parcels across the Proposal's DE are predominately zoned as 'Waterways' and 'Parks and Recreation'. A summary of land uses is provided in Table 4.

Table 4 Proposal Land Use and Zoning

Proposal Site	LGA	Details
Applecross site	City of Melville	The site intersects the Canning River, attributing to the 'Waterways' MRS zoning. The southern portion of the site is attributed to 'Primary regional roads' due to the intersecting Canning Highway, while the remainder of the site is zoned 'Parks and Recreation'.
Elizabeth Quay site	City of Perth	The site is located within the Perth CBD and is zoned as 'Central city area'. It is adjacent to the Swan River, attributing to 'Waterways' land use.
Matilda Bay site	City of Perth	The site intersects the Swan River, attributing to the 'Waterways' MRS zoning. A large portion of the site is located in the Matilda Bay Reserve, which is zoned as 'Parks and Recreation'. To the west, the University of Western Australia is zoned as 'Public purposes – university'.

1.6.11 Conservation Reserves

1.6.11.1 Swan-Canning River Reserve

Both the Matilda Bay and Applecross sites will require development within the Swan-Canning River system which is identified as a DBCA legislated reserve (R 48325) for the purpose of Landscape Protection protected under the SCRM Act. The Elizabeth Quay site does not affect the River Reserve under the SCRM Act.

1.6.11.2 Matilda Bay Foreshore

The Matilda Bay site will also require some development within the Matilda Bay Reserve (R 17375), listed as an 'A Class' reserve for the purpose of recreation and vested with the Conservation and Parks Commission.

The Matilda Bay Management Plan (1992 – 2002) is still in effect and guides the objectives of the reserve and management by DBCA. The Plan was prepared under the authority of the National Parks and Nature Conservation Authority and the Department of Conservation and Land Management (CALM), which operated under the *Conservation and Land Management Act 1984*. The management plan lists a number of management objectives for the reserve including:

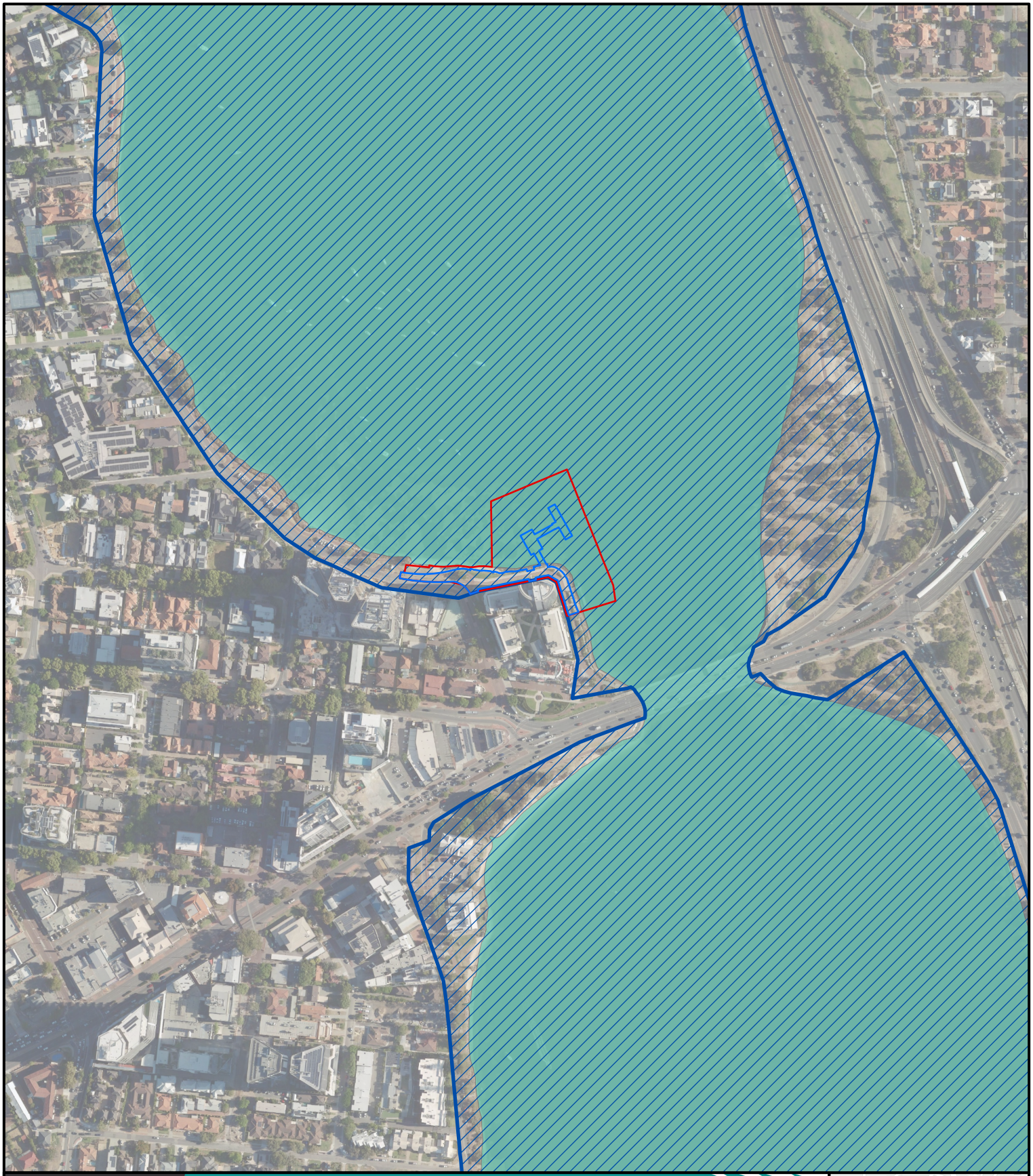
- Recreation – provide the public with recreational opportunities and facilities that are consistent with management objectives and conflict between users.
- Conservation – Protect and conserve the Reserve's physical, cultural and scenic resources.
- Information, Interpretation and Education – promote an understanding of the Reserve's history and natural environment and awareness and appreciation of its values.
- Research and Monitoring – promote and undertake studies on the Reserve's social values and natural processes and monitor the impacts of visitor use and management.

The project is considered to be consistent with the stated purpose of the reserve.

1.6.11.3 Swan Estuary Marine Park

The Swan Estuary Marine Park is a shallow water, A-Class Marine Park that encompasses three Biologically Important Areas (BIA) within the Swan-Canning Estuary near the DE: Alfred Cove, Pelican Point and Milyu (DCLM, 1999). These locations are considered BIA due to their ecological diversity, cultural significance and recreational values. These sites hold significant cultural, mythological, and historical significance for the Whadjuk people and support recreational activities, including swimming, fishing and boating. To protect these sensitive environments, restrictions are in place on certain recreational uses.

The three proposed terminal locations are zoned for general use under the *Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan* (DCLM, 1999). Pelican Point lies near the Matilda Bay terminal site and the proposed operational route of the Proposal passes close to both Pelican Point Marine Park (5.5 ha) and Milyu Marine Park (4.4 ha). Indo-Pacific bottlenose dolphins (*Tursiops truncatus*) have been observed in waters near Pelican Point Marine Park (SLR, 2025). Conservation reserves relative to the Proposal DE are shown in Figure 7.



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METRONET on Swan Ferry Service Expansion: Perth to Applecross

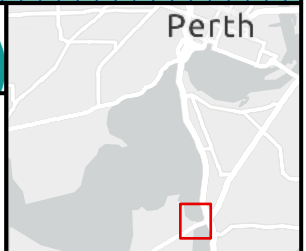
Figure 7a - Conservation Reserves and Development Control Areas: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Swan and Canning River - Development Control Area (DBCA-028)

DBCA - Legislated Lands and Waters (DBCA-011)

- SCRM Act - River Reserve



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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 7b - Conservation Reserves and Development Control Areas: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Swan and Canning River - Development Control Area (DBCA-028)

DBCA - Legislated Lands and Waters (DBCA-011)

- Section 5(1)(g) Reserve
- Marine Park
- SCRM Act - River Reserve
- Botanic Gardens and Parks Auth. Reserve

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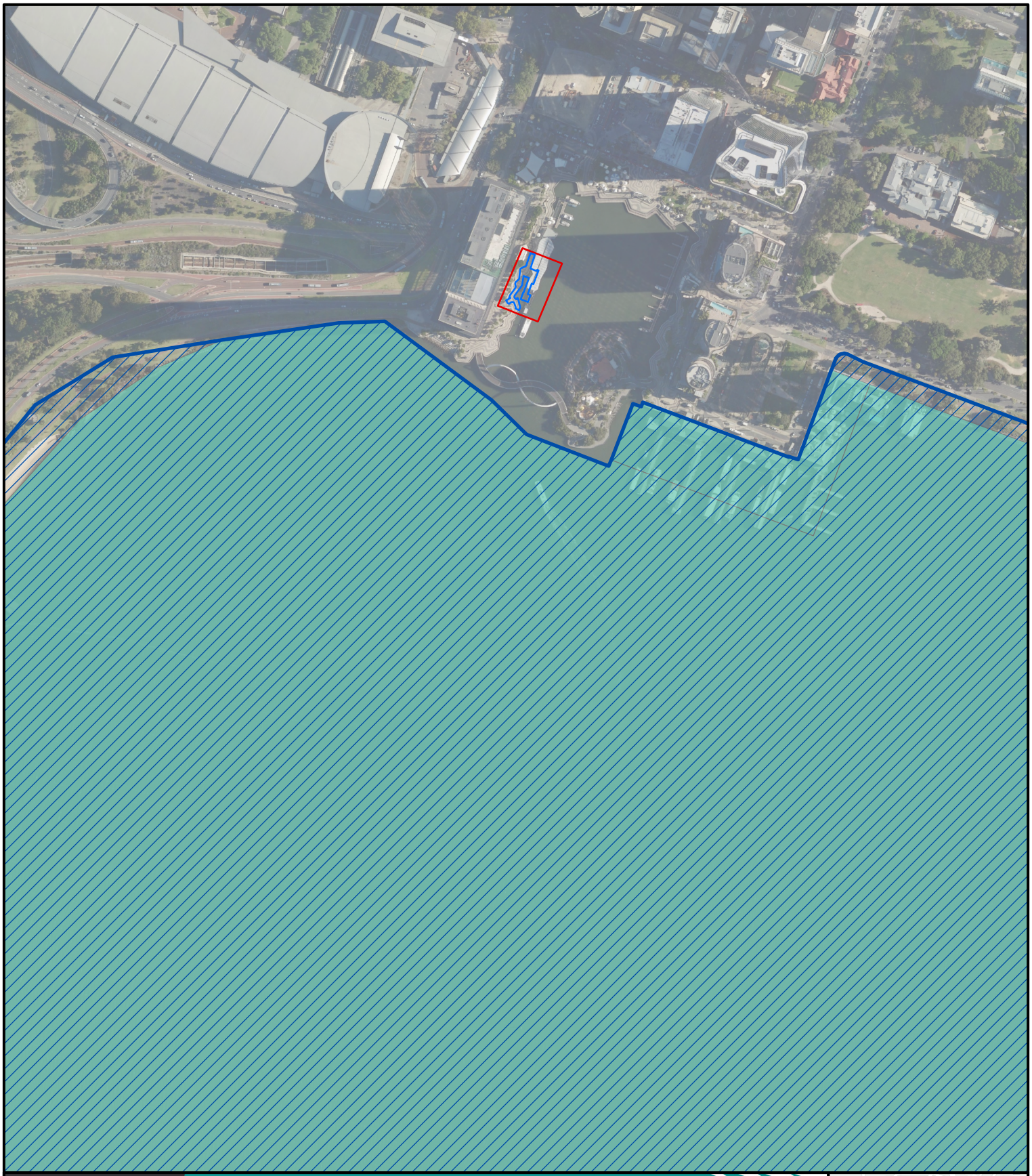

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

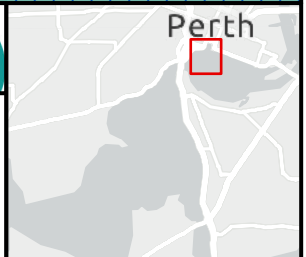
Figure 7c - Conservation Reserves and Development Control Areas: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Swan and Canning River - Development Control Area (DBCA-028)

DBCA - Legislated Lands and Waters (DBCA-011)

- SCRM Act - River Reserve



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1.6.12 Wetlands and Water

1.6.12.1 Wetlands

The Geomorphic Wetlands of the Swan Coastal Plain mapping (DBCA, 2025) identifies the Proposal DE within the Swan River Estuary (UFI 13316), which is categorised as a Conservation Category Wetland (CCW) and listed as a basin landform and estuary waterbody (Figure 8). CCWs are wetlands which support a high level of ecological attributes and functions, where development or clearing is generally considered inappropriate.

The Swan-Canning River system is also listed in the Directory of Important Wetlands in Australia (Site WA091) (Landgate, 2025) which is a large database that encompasses a number of important elements and aims to identify important wetlands across Australia to provide a substantial knowledge base on what defines wetlands and their variety and dependence on them of many flora and fauna species.

1.6.12.2 Groundwater

The Perth Groundwater Map indicates that groundwater is present in the Proposal DE at depths of less than 5 metres below ground level (DWER, 2022a). Additionally, the Proposal DE is located within the Perth Groundwater Proclamation Area (DWER, 2022b).

No Public Drinking Water Source Areas (PDWSA) are present in the Proposal DE.

1.6.12.3 Catchment Flows

Historical catchment flow data indicates that South-west Western Australia, including the Swan-Canning catchment, has experienced a drying trend, marked by reductions in overall rainfall, particularly during winter, and an increase in storm intensity. Concurrently, ambient temperatures and evaporation rates have risen. These climatic changes have led to a decline in average annual runoff since the 1970s, with rainfall and catchment flows decreasing by approximately 20% over this period (DWER, 2024) (DPIRD, 2023).

Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 8a - Wetlands and Water: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Directory of Important Wetlands in Australia - Western Australia (DBCA-045)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation Wetland

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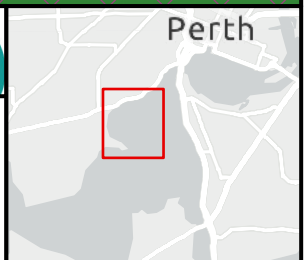
METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 8b - Wetlands and Water: Matilda Bay Site



LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Directory of Important Wetlands in Australia - Western Australia (DBCA-045)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation Wetland

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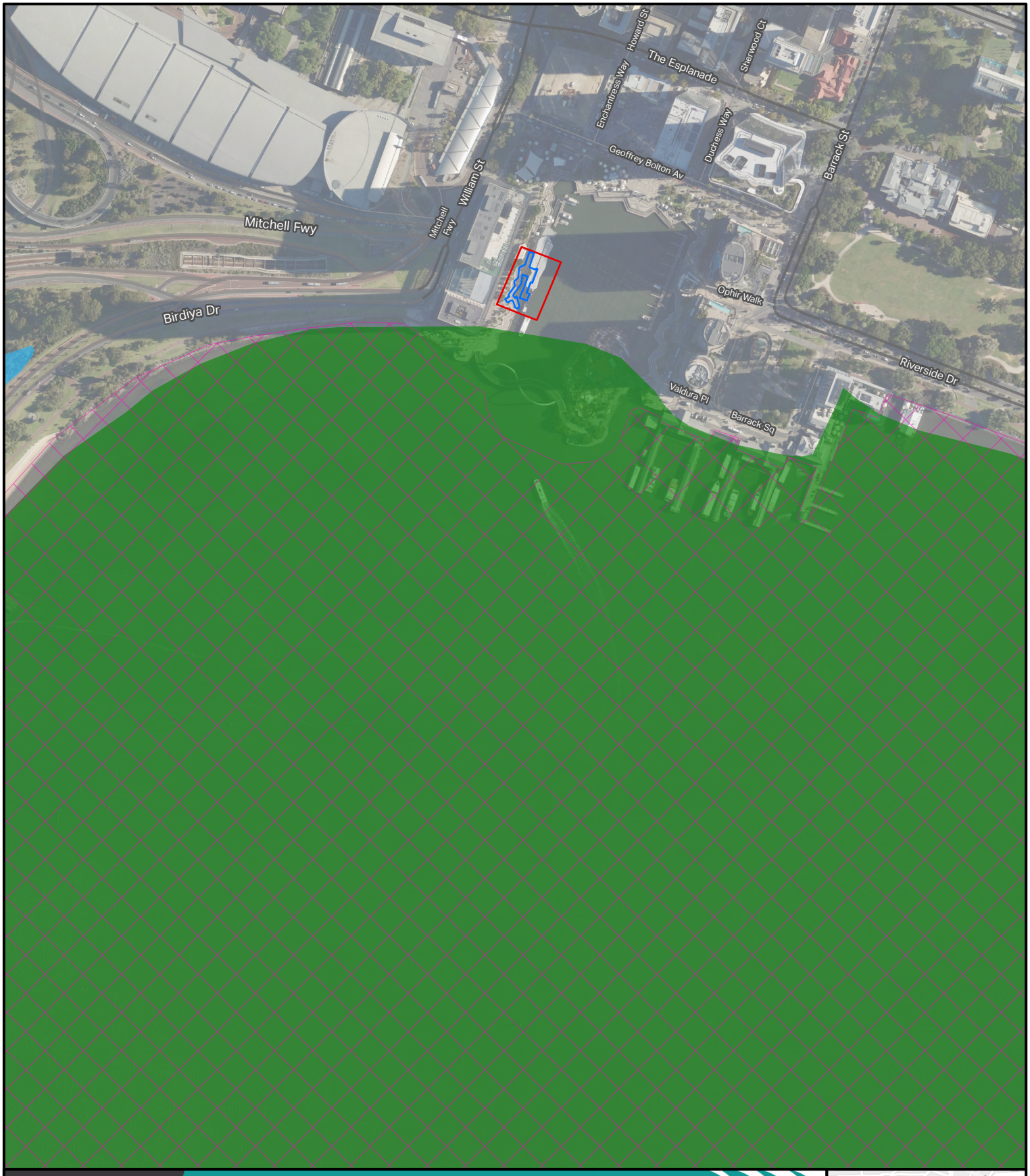

Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 8c - Wetlands and Water: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Directory of Important Wetlands in Australia - Western Australia (DBCA-045)

Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)

- Conservation Wetland
- Multiple Use Wetland

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1.6.13 Land Contamination

A search of DWER's contaminated sites database identified a site classified as 'remediated for restricted use' approximately 590 m north of the Matilda Bay site. This contaminated site is separated from the proposed activities by Hackett Drive and Mounts Bay Road and is therefore not relevant to the Proposal.

The Applecross site is located near two contaminated sites, both classified as 'remediated for restricted use'. One site is located approximately 170 m from the Proposal DE and is separated by Kintail Road. The second site is about 260 m from the Proposal DE and is separated by Kintail Road and Canning Highway.

Preliminary Site Investigations (PSIs) were completed at the Applecross (Appendix D), Elizabeth Quay (Appendix E) and Matilda Bay (Appendix F) sites to assess soil conditions in the Proposal DE. The Matilda Bay and Applecross investigations included hand auger soil sampling and analysis against relevant ecological and human health criteria. GHD (2025b, 2025c and 2025d) identified the following potential sources of land-based contamination in the Proposal DE:

- Historical land reclamation or landfilling has occurred at all three sites. Construction and demolition materials were observed at the Matilda Bay foreshore and may also be encountered in sub-surface soils at the Applecross and Elizabeth Quay sites.
- Elevated zinc concentrations were recorded in four samples at the Matilda Bay site, associated with suspected fill material. GHD (Appendix F) noted that the default ecological assessment criteria applied are conservative, and do not account for ambient background concentrations.
- An asbestos-cement irrigation pipe is known to underlie the Matilda Bay site.

Overall, the risks associated with construction related soil disturbance is currently considered low and acceptable for relevant receptors, including human health, due to the limited extent of soil disturbance and the quality of surface water. However, additional soil sampling is recommended to inform appropriate soil management and disposal practices, where required.

1.6.14 Water Quality

A review of the freshwater catchment inputs into the Swan-Canning Estuary for the period 2013-2016 showed that the Swan River received significantly more freshwater inflow than the Canning River, contributing approximately 84% of the total flow. The highest monthly discharge during this period occurred in September 2013, reaching 111 gigalitres (GL), although the timing of peak flows varied annually depending on storm events. Freshwater inflows were consistently low (<5 GL per month) between November and April each year, highlighting the substantial reduction in catchment flows during the summer periods (Crisp et al., 2018).

Nutrient inputs into the system are typically sourced from catchment flows, stormwater drainage outfalls and marine tidal exchange, with stormwater contributing a larger proportion of nutrient during the summer months (Twomey and John, 2001).

Water quality sampling surveys are currently being undertaken within the Proposal DE. These surveys will provide baseline data to support comparative monitoring during construction and post development phases.

1.6.15 Benthic Habitat

Benthic composition of the Swan-Canning Estuary varies across its length, influenced by river inflows and tides. The upper part of the estuary generally contains more silts, clays, and organic matter, while the lower reaches tend to have sandier sediments colonised by ephemeral seagrasses and macroalgae estuary (DoW, 2010; Hilman et al., 1995; Novak and Hoeksema, 2022). The DE for this proposal is located within the lower reaches of the Swan-Caning Estuary, in areas designated as Melville Water (Pelican Point and Matilda Bay), Heathcote (Applecross) and South Perth sites.

Currently, seagrass health in the Swan-Canning Estuary is managed under the River Protection Strategy for Derbal Yirragan Djarlgarro (DPaW, 2015), which is a requirement of the SCRM Act. Annual surveys are conducted by DBCA at monitoring locations in the Swan-Canning Basin area including Pelican Point and Heathcote, to infer annual changes in abundance and distribution of seagrass and macroalgal species. These sites also include locations near the Swan Estuary Marine Park zones of Pelican Point and Milyu. Historically, seagrass meadows within the estuary covered 598 ha in 1982, an increase from 568 ha in 1976. However, in 2011, the Department of Water reported the area had declined to 403 ha within the estuary (Kilminster and Forbes, 2014). Seagrass is considered to be native vegetation as defined in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Along with seagrass, the Swan-Canning Estuary also supports ecosystems such as rocky reef, oyster beds, algal mats, and large extents of sand (Kilminster and Forbes, 2014; RPS, 2021 as cited in BMT, 2025b).

Further details on benthic habitat including results from a survey undertaken by BMT is outlined in Section 6.0.

1.6.16 Sediments

Nice (2009) conducted a study on 20 sites throughout the Swan-Canning Estuary to assess sediments surface for metals, organochlorine (OC) pesticides and polycyclic aromatic hydrocarbons (PAHs). Data were compared to the Interim Sediment Quality Guideline Trigger Values (ISQGs) set by the Australian and New Zealand Environment and Conservation Council (ANZECC, 2000) (ANZG, 2023). Overall, contaminants from all three groups were recorded in the sediments across the 20 sites. Of the 20 sites, one (Melville Waters – Site 14), is the closest in proximity to the Matilda Bay and Applecross sites. No contaminants at this site were found to exceed the ISQGs. Sediment particle size analysis indicated that fine sands (2-63 µm) made up an average of 52.1% of the sediment composition.

The most recent baseline surveys to characterise general chemical concentrations and particle size trends for sediments in the Swan-Canning Estuary were conducted by Novak & Hoeksema (2022), building upon previous surveys. This 2022 survey sampled for additional analytes including polychlorinated biphenyls (PCBs) and glyphosate. Comparison of the contaminants sampled in both studies showed that chemical concentrations have not changed significantly. Five contaminants exceeded the ISQGs which were zinc, copper and lead metals, the organochlorine pesticide DDE and PCBs. At the Melville Waters site (no. 14), no contaminants were found to exceed the ISQGs, and silt constituted nearly half of the sediment particle size analysis.

Marine sediment sampling has been undertaken within the DE, with results presented in Section 6.3.2.

1.6.17 Marine Fauna

The Swan-Canning Estuary is home to a variety of species, many of which are of social, cultural, conservation, recreational and commercial importance.

The Open Water habitats present across the DE are characterised as being marine microtidal estuary locations that are subject to seasonal increases in catchment flows. Habitats at the three sites are not considered to be part of BIAs under State legislation (such as the Swan Estuary Marine Park); however, they are known to provide brief foraging and refuge habitats for a range of endemic fish and crustacea. These regions are also utilised by marine mammal species such as Indo-Pacific bottlenose dolphins, who are known to periodically hunt in these areas.

The DE is not likely to support large residential populations of marine fauna species or contribute substantially to the overall seagrass habitat in the estuary.

A desktop assessment of MNES was conducted using the Protected Matters Search Tool (PMST) interactive map, by selecting a polygon capturing the three sites within the DE. A 10 km buffer zone was applied to capture significant areas and species that may also be impacted within a broader likelihood of occurrence.

The PMST search identified seventeen (17) threatened species including, two species of sharks, four species of turtles and eleven species of birds. Additionally, the PMST identified twenty-two (22) migratory species of which three species were sharks and nineteen species were migratory birds.

The five shark species identified in the PMST were:

- Freshwater Sawfish (*Pristis pristis*), listed as Vulnerable and Migratory under the EPBC Act;
- Scalloped Hammerhead (*Sphyrna lewini*), listed as Conservation Dependent under the EPBC Act;
- Giant Manta Ray (*Mobula birostris*), listed as Migratory under the EPBC Act;
- Reef Manta Ray (*Mobula alfredi*), listed as Migratory under the EPBC Act;
- Porbeagle (*Lamna nasus*), listed as Migratory under the EPBC Act.

The four species of turtles identified in the PMST are:

- Green Turtle (*Chelonia mydas*), listed as Vulnerable, Migratory and Marine under the EPBC Act;
- Flatback Turtle (*Natator depressus*), listed as Vulnerable, Migratory and Marine under the EPBC Act;
- Loggerhead Turtle (*Caretta caretta*), listed as Endangered, Migratory and Marine under the EPBC Act;
- Leatherback Turtle, (*Dermochelys coriacea*), listed as Endangered, Migratory and Marine under the EPBC Act.

The threatened sharks and turtles are not expected to be present in the DE as the sites do not offer suitable habitats for these species.

Migratory shore birds may pass through the DE temporarily while travelling to more suitable habitat. The Matilda Bay and Applecross sites are not expected to support permanent or continuous breeding populations of migratory birds, or significant foraging areas, due to frequent recreational activities, dense infrastructure and existing noise and artificial light. However, seagrass beds, particularly the Swan Estuary Marine Park, may offer occasional foraging locations for migratory birds.

In consideration for the above, the species specifically considered in this assessment include:

- Indo-Pacific bottlenose dolphins:

  The Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) utilises the estuary for foraging and breeding (Holyoake et al., 2011). Indo-Pacific bottlenose dolphins are protected under the BC Act; the EPA provides specific guidance through its Marine Fauna Environmental Factor Guidance, which outlines best practices for managing potential impacts from vessel movements and jetty construction activities on marine fauna (EPA, 2016e). Monitoring for Indo-Pacific bottlenose dolphins in the Swan Canning Riverpark (Salgado Kent and Chabanne, 2021) indicated that both the Matilda Bay and Applecross areas had relatively high numbers of dolphin sightings, although sightings from scientific vessels were in deeper water set back from the shoreline.

  Research on noise impacts on Indo-Pacific bottlenose dolphins is limited, but studies suggest they may be sensitive to pile-driving and vessel noise (SLR, 2025). Assessment criteria for these dolphins follow those for high-frequency (HF) cetaceans. While the Swan-Canning Estuary is not known to host other cetacean hearing groups,

noise modelling has conservatively considered all auditory thresholds to ensure protection of any future species identified, allowing for proactive management of underwater noise impacts.

- Estuarine Cobbler:

  The Estuarine cobbler (*Cnidoglanis macrocephalus*), endemic to Australia, also inhabits the Swan-Canning Estuary. Commercial fishing of this species began in the 1940s and is restricted to estuaries in South West WA. A 10-year ban of fishing cobbler in the Swan-Canning Estuary was enacted in 2007, in response to a significant decline in population. The species is known to utilise the BIA in the Swan Estuary Marine Park and is under continued management by the South Coast Estuarine Managed Fishery (SCEF) (DoF, 2012).

- Other fish and turtles – Noise Effects:

  Scientific data on the effects of sound on fishes and turtles is limited, making regulatory and mitigation measures often less effective. To address this, the National Oceanic and Atmospheric Administration (NOAA) convened an expert panel in 2004 to establish sound exposure guidelines based on peer-reviewed research, resulting in criteria that account for species diversity and sound detection methods (Popper et al., 2014). Although sea turtles are rarely found in the Swan River and the DEs do not contain suitable habitat for sea turtles, these guidelines may be conservatively applied to other turtle species, such as freshwater turtles, in the absence of species-specific auditory data (SLR, 2025).

  There is currently no direct evidence that non-impulsive noise, such as from dynamic positioning systems (DPS), causes mortality in fish, but it can interfere with their behaviour by masking important sounds, including those related to foraging and predator avoidance (SLR, 2025). The U.S. National Marine Fisheries Service (NMFS) uses a general behavioural disturbance threshold of 150 dB re 1 µPa for fish, though its origin is less defined than other thresholds (NMFS, 2021). For sea turtles, behavioural disturbance is generally observed around 175 dB re 1 µPa, though data is limited and thresholds are not species-specific (NMFS, 2021).

Potential impacts to marine fauna species are further discussed in Section 8.4.

1.6.18 Aboriginal Heritage

The Proposal DE lies entirely within Whadjuk Country, one of six defined regions in Noongar Country. Whadjuk spans approximately 5,580 km², covering metropolitan Perth from Two Rocks in the north to Jervoise Bay in the south, extending west to Rottnest Island and east to the Darling Scarp. Two major waterways—Derbal Yerrigan (Swan River) and Dyarlgarro Beeliar (Canning River)—are central to this region.

Aboriginal spirituality is deeply connected to the land, which is believed to have been shaped during the Dreamtime by ancestral beings. In Noongar mythology, the Waugal, a snake or rainbow serpent, is a key spiritual figure. It is considered the giver of life and guardian of all freshwater sources, and it is through the Waugal that Noongar people are seen as custodians of the land.

The Waugal is believed to inhabit all natural water sources such as rivers, springs, and rock holes. When approaching these places, Noongar people perform customary rituals, often led by Elders, to ensure safety and show respect. These practices reflect the enduring spiritual and cultural significance of water in Noongar traditions.

Historical accounts highlight the importance of the Swan River and surrounding wetlands for Noongar people, not only for sustenance but also for cultural and seasonal movement. Aboriginal groups travelled between the coast and the Darling Scarp to access resources, fulfill cultural duties, and engage in social and spiritual activities. The river served as a vital corridor for camping, hunting, fishing, and gathering for communal events.

One registered ACH site intersects with the development areas at Matilda Bay and Applecross, identified as the Swan River (ID 3536) and registered as a Mythological site (Figure 9).

To date, two Aboriginal ethnographic and archaeological surveys have been undertaken to support two separate applications for Regulation 7 and Regulation 10 of the *Aboriginal Heritage Regulations 1974*, specifically for sediment sampling and geotechnical testing activities only (AHA, 2025a; AHA, 2025b). These surveys included the involvement and participation of two representative groups, from Whadjuk and the Swan River Noongar Community.

In addition, an Aboriginal Ethnographic and Archaeological Survey was undertaken by AHA Logic (2025c) to support the Proposal. This survey included consultation with representatives from the Whadjuk and Noongar families.

The survey report highlights that the Swan River has been subject to extensive use, infrastructure development, land reclamation and regular dredging for over a century. While these activities have not diminished the Aboriginal heritage values, spiritual associations, or cultural significance of the Swan River (ID 3536), they have likely compromised the ability of riverbed sediments—particularly those located away from the shoreline—to preserve intact archaeological material.

On the basis of this history of disturbance, the archaeological potential of the Swan River Ferry Expansion (SRFE) area is assessed as very low. Whadjuk and Noongar representatives agreed that monitoring of any ground-disturbing activity within the boundaries of Aboriginal site ID 3536 would be an appropriate measure to ensure that any cultural or archaeological material, if present, is identified and protected.

Ongoing consultation will continue prior to development of the proposed ferry terminals. This process will inform the necessary approvals under the Aboriginal Heritage Act and guide the management of potential impacts to Aboriginal Cultural Heritage (ACH).

1.6.19 Historic Heritage

The State Heritage Register (inHerit database) and the City of Perth Municipal Inventory do not identify any State-registered sites of heritage significance within the Proposal DE. The Raffles Hotel (Site ID 1544) is adjacent to the Applecross site, and is classified as a registered heritage site under the *Heritage Act 2018* (Figure 9).

Mounts Bay Road Foreshore (Place No. 27029) and an associated Archaeological site (Place No. 9209) within the Matilda Bay site are on the assessment program for consideration by the Heritage Council of Western Australia (Heritage Council of WA, 2022a; Heritage Council of WA, 2022b).

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 9a - Aboriginal and Historic Cultural Heritage Sites: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Heritage Council WA - State Register (DPLH-006): Individual Place
- Aboriginal Cultural Heritage - Register (DPLH-099)
- Heritage Council WA - Local Heritage Survey (DPLH-008)

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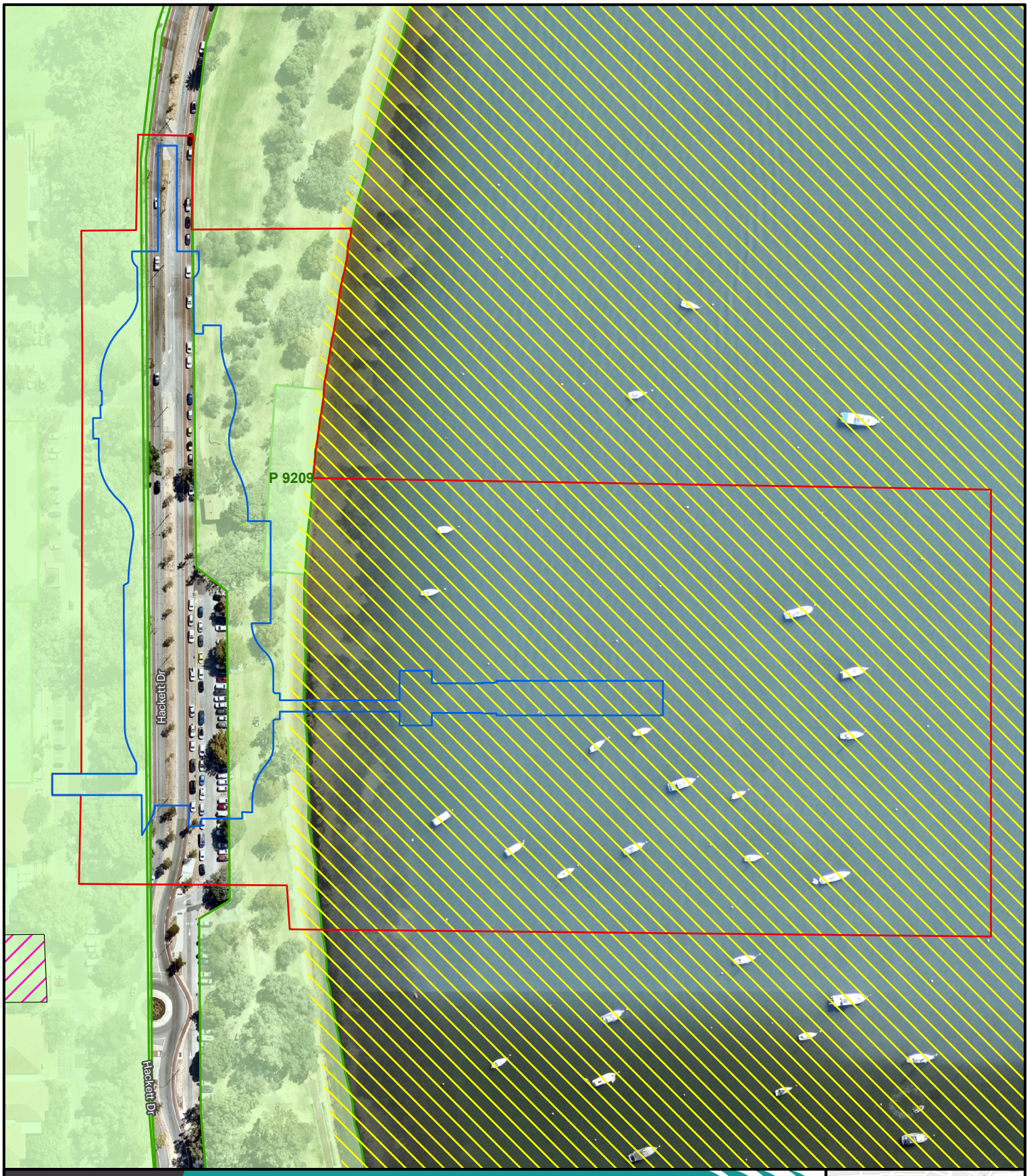

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METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 9b - Aboriginal and Historic Cultural Heritage Sites: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Heritage Council WA - State Register (DPLH-006): Individual Place
- Aboriginal Cultural Heritage - Register (DPLH-099)
- Heritage Council WA - Local Heritage Survey (DPLH-008)

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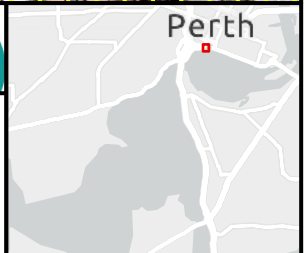
Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 9c - Aboriginal and Historic Cultural Heritage Sites: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint
- Heritage Council WA - State Register (DPLH-006): Individual Place
- Aboriginal Cultural Heritage - Register (DPLH-099)
- Heritage Council WA - Local Heritage Survey (DPLH-008)



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2.0 Legislative Context

2.1 Environmental Impact Assessment Process

2.1.1 Environmental Protection Act

In Western Australia, the *Environmental Protection Act 1986* (EP Act) is the primary legislation for preventing, controlling and reducing pollution and environmental harm and providing for the conservation, preservation, protection, enhancement and management of the environment. The EPA is responsible for Environmental Impact Assessment (EIA) of development proposals and planning schemes under Part IV of the EP Act. Proposals with the potential to cause significant effects on environmental factors are referred to the EPA under section 38 of the EP Act. If a proposal is deemed significant, the EPA will undertake a formal assessment to determine the extent of the proposal's direct and indirect impacts, and whether the EPA environmental factor objectives can be met.

In some cases, the EPA may determine that the likely environmental effects of the proposal are not so significant to warrant a formal assessment, and that the proposal can be managed through other statutory processes. Regardless of the outcome of EPA's consideration, the EPA Chair will issue a public notice pursuant to s.39 of the EP Act to inform the public of its decision.

This document is the Referral Supporting Document which forms part of the Proposal referral under s. 38 of the EP Act, and has been prepared in accordance with *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA, 2024a) and *Instructions: How to prepare an environmental review document* (EPA, 2024b).

2.1.2 Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). Under the EPBC Act, the Minister for the Environment and Water determines whether an action is a '*controlled action*', which would have, or is likely to have, a significant impact on Matters of National Environmental Significance (MNES) or Commonwealth land. If this is the case, the action may not be undertaken without prior approval from the Minister for the Environment and Water.

If a self-assessment determines that an action is likely to have a significant impact on any MNES, or if the level of impact is undetermined, the action should be referred to the Minister for Environment and Water. Should the Minister determine that the action is likely to have a significant impact, it will be determined as a controlled action and will require formal approval under the EPBC Act.

An assessment of MNES relevant to this Proposal, in accordance with the *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (DoE, 2013), is provided in

Section 12.0. Based on this assessment, the Proposal is unlikely to have a significant impact on any MNES.

2.2 Other Approvals and Regulations

Other statutory decision-making processes capable of addressing and mitigating the potential impacts of the Proposal are listed in Table 5. These processes are considered sufficient to manage all environmental impacts associated with implementing the Proposal. In particular, the Swan River Trust plays a central role in both the construction and operational elements of the Proposal, under the *Swan and Canning Rivers Management Act 2006* (SCRM Act) and its associated policies. The Trust acts as a key advisory body in the assessment of Development Applications under Part 5 of the SCRM Act, and also holds decision making authority (on delegation from the Minister for the Environment) through the granting of River Reserve leases under section 29 of the SCRM Act.

Given the robustness of these existing statutory mechanisms, assessment under Part IV of the *Environmental Protection Act 1986* is not considered necessary.

Table 5 Additional Regulations and Approvals

Authority	Legislation	Approval Required	Ability to mitigate environmental impact
Western Australian Planning Commission (WAPC)	Planning and Development Act 2005 – clause 30A(2)(b) of the Metropolitan Region Scheme	Development Application	**Yes** Applications for development approval at Matilda Bay and Applecross will be determined by the Western Australian Planning Commission (WAPC), on the advice of the Swan River Trust (SRT). The Development Applications, if approved, will likely include statutory conditions that will ensure that the development is carried out in a way that meets the expectations of both the DPLH and the Swan River Trust. The Development Applications will be lodged with the WAPC concurrently with this EPA referral.
Department of Planning, Lands and Heritage (DPLH)	*Aboriginal Heritage Act 1972* (AH Act) *Aboriginal Heritage Regulations 1974*	Section 18 Application Regulation 7 and 10 consent	**Yes** The Section 18 provides a legal mechanism for land use proposals that may affect registered or unregistered Aboriginal Heritage sites. The Regulation 7 and 10 consent provide a legal mechanism for managing minor works that disturb the surface of the ground.

Authority	Legislation	Approval Required	Ability to mitigate environmental impact
Swan River Trust, supported by Department of Biodiversity, Conservation and Attractions (DBCA)	*Swan Canning Rivers Management Act 2006* (SCRM Act)	River Reserve Lease	**Yes** The river reserve leasing process will enable assessment of potential environmental impacts associated with the operation of the ferry terminals in accordance with DBCA Policy and SCRM Act.
		Part 5 Development Approval	**Yes** A Part 5 development approval will be considered for approval by the SRT on advice of DBCA and must demonstrate compliance with DBCA policies and guidelines, focussing on minimising impacts to the environment, heritage and amenity. The Part 5 applications, if approved, will include statutory conditions that will ensure that the development is carried out in a way that meets the expectations of the Swan River Trust.
Department of Water and Environmental Regulation (DWER)	*Rights in Water and Irrigation Act 1914* (RiWI Act)	5C Licence to take groundwater Beds and Banks Permit	**Yes** The RiWI Act licensing process assesses and manages the abstraction of ground and surface water. If new bores, or the modification of existing bores, are required, the appropriate licenses will be applied for.
	Part V Division 2 of the *Environmental Protection Act 1986* (EP Act)	Native Vegetation Clearing Permit (NVCP)	**Yes** The clearing of native vegetation can be regulated under Part V Division 2 of the EP Act. DWER undertakes the assessment of significant flora and vegetation, areas of high biological diversity, important fauna habitats, and conservation areas through the NVCP process. This assessment aligns with the EPA's Environmental Factor Objectives for Benthic Communities and Habitat, Flora and Vegetation and Terrestrial Fauna. Any native vegetation clearing (including seagrass) that is not exempt under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* will require an NVCP application before construction begins.

Authority	Legislation	Approval Required	Ability to mitigate environmental impact
Department of Transport and Major Infrastructure (DTMI)	*Jetties Act 1926*	Jetty licence application	**Yes** Regulates the construction, maintenance and preservation of jetties and other works, and to make better provision for securing and regulating the use and management.

2.2.1 Decision-making in Parallel to an Environmental Assessment Process

All secondary approvals listed in Table 5 can be obtained in parallel to the Part IV assessment, unless they are prescribed as a restricted decision under section 41(1A) of the EP Act.

In response to the *Independent Review of WA Environmental Approvals Processes and Procedures* (Vogel and McFerran, 2023), the WA Government has undertaken legislative reforms to the EP Act to remove the previous restrictions under s.41(3) of the EP Act and enable Decision Making Authorities (DMAs) to make decisions in parallel to an environmental assessment process under Part IV of the EP Act.

The Proponent acknowledges that to ensure the environmental protection is maintained, no decision made in parallel to a Part IV assessment will authorise a proposal to be implemented.

This amendment is applicable to all DMAs from the time that they are served a notice from the EPA under s38G(1)(b)(iii) or (5) of the EP Act of its decision to assess a proposal and only in relation to decisions that relate to that proposal.

3.0 Stakeholder Engagement

3.1 Stakeholder Identification and Engagement Process

The Proponent commenced stakeholder engagement in May 2024, to identify key stakeholders and their areas of interest. These were then categorised into tiers based on the potential level of impact from ferry operations. Additional stakeholders have been identified throughout the consultation process, as recommended by participating stakeholders.

Stakeholder engagement has focused on the following key objectives:

- Inform stakeholders about the Proposal and its environmental and community impacts.
- Gathering insights from local community members and stakeholder groups to ensure their perspectives shape the evolving proposal design.
- Initiating early discussion with stakeholders to build trust and identify their interests and any potential concerns that would influence the Proposal's development.

Engagement activities were paused to allow for the Caretaker period in the lead up to and during the 2025 WA State Election. Engagement has since recommenced.

3.2 Stakeholder Consultation

Stakeholder consultation and engagement has been undertaken via engagement methods presented in Table 6.

Table 6 Stakeholder Engagement Mechanisms

Mechanism	Objective	Targeted Stakeholder	Description
Proposal briefing / meetings	To engage stakeholders to understand their concerns and address any issues raised.	State and Local Government bodies	Briefing meetings to identify potential impacts and opportunities
Letters / correspondence / email / phone calls	To inform stakeholders of the Proposal and offer opportunity to engage and share interest or concern.	Broader community / All	Introductory information letter to all stakeholders, followed by the opportunity for additional engagement through correspondence channels.
Community information sessions	To inform and involve the wider community on the Proposal, providing proposal updates, timelines and gathering community feedback to shape design evolution.	Broader community / All	The Proponent has delivered a series of community information sessions. The first was held in October 2024 and the second in July 2025. Include May
Regular progress meetings	To maintain active communication channels for progress updates.	DBCA and DTMI	Fortnightly update meetings to discuss proposal progress.

3.3 Stakeholder Consultation Outcomes

A summary of outcomes from consultation undertaken to date is presented below in Table 7.

Table 7 Stakeholder Consultation Outcomes

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
State Government Stakeholders			
Department of Transport and Major Infrastructure (DTMI)	March 2025 – ongoing	• Ongoing proposal updates; • Traffic, safety and risk management plans; • Storage facilities for bikes and e-scooters; • Delivery of joint engagement activities.	The Proponent has engaged in regular ongoing meetings between subject matter experts and broader teams The Proponent will engage with DTMI on a fortnightly basis to provide proposal updates.
Department of Biodiversity, Conservation and Attractions (DBCA)	May 2024 – ongoing	• Maximum of 8-knots coming into the Matilda Bay and Applecross terminals; • Sediment sampling methods; • Surface monitoring to take place pre-construction; • Request to take a cautious approach; • Matilda Bay infrastructure design.	The Proponent has engaged with DBCA on a fortnightly basis to provide proposal updates. DBCA has provided regular feedback to the PTA on the Proposal, including recommended management considerations.
Department of Water and Environmental Regulation (DWER)	October 2024 ongoing	• Ongoing proposal updates; • Scoping meeting with Native Vegetation Regulation regarding Seagrass disturbance clearing requirements.	The Proponent has considered secondary impacts from disturbance (removal) of seagrass. The Proponent and DWER will have a scoping meeting prior to submission of any Native Vegetation Clearing Permit.
Environmental Protection Authority (EPA)	September 2024 – ongoing	• Ongoing proposal updates.	EPA Services has provided feedback to the Proponent on the Proposal, including referral recommendations and options.
Department of Planning, Land and Heritage (DPLH)	September 2024 – ongoing	• Ongoing proposal updates.	The Proponent has engaged with DPLH on a regular basis to provide planning and heritage updates.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
Main Roads/ Office of Major Infrastructure Delivery	May 2024 - ongoing	• Interfacing with Canning Bridge Bus Interchange Project.	The Proponent is part of the project team for this project, so engages regularly.
Member for Bateman – Kim Giddens MLA	April 2025	• Concerns about location of the ferry terminal and the impact of the South of Perth Yacht Club.	The Proponent held a briefing with Ms Giddens MLA in April 2025. Ms Giddens MLA reported on engagement with constituents and is supportive of the project. Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application assessment process.

Tourism WA	March 2025	• A meeting was held with the following Tourism WA representatives:
		  ○ Executive Director Destination Development;
		  ○ Executive Director Strategy & Engagement;
		  ○ Acting Director Insights and Strategy Senior Policy Officer).
		• Proposal outline.
			Tourism WA were supportive of the project and wider activation of the Swan River in general.

Local Government Stakeholders			
City of Melville	January 2025	• Project proposal and briefing; • Ongoing engagement at project management level around traffic and parking.	City of Melville requests the Proponent to consult with the Applecross community. The Proponent will continue to engage with the City of Melville.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
City of Perth	January and May 2025	• Project proposal and briefing; • Associated bus route requirements; • Design feedback.	City of Perth has provided feedback on architect designs and bus route. Consultation is ongoing.
Landowner and Local Community Stakeholders			
South of Perth Yacht Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions where the following was shared: • Expressed support for the Proposal and use of ferries on the Swan River to add to the level of public transport available across the Perth Public Transit system. • Raised concerns around increased water traffic in areas used by the club and the impact on passive and active pursuits, protection of the club's physical infrastructure and erosion and environmental impacts on the riverbanks. • Shared detail of the club's weekly training and development schedule for consideration.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
Royal Perth Yacht Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Noted support of making the Swan River more accessible for public transport, but raised the following concerns: • Increased risk of collision; • Disruption to sailing races and boating activities; • Interference with the Start and Finish line; • Disruption to sailing coaching and recreation; • Damage to marina infrastructure from ferry wakes;	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
		• A 20-knot vessel in an 8-knot zone; • No provision of data, understanding or research of sailing and boating numbers, times and courses on the Swan River.	
Yachting Western Australia	October 2024, May and July 2025 -	Attended stakeholder briefing information session. Shared the following: • Proximity of the Matilda Bay site to the UWA Boat Club and the risk of negative interactions between ferries and rowers/sailors. • Location of the Applecross site and associated walking route and distance for users. Suggestion to delay service to and from Applecross until the Canning Bridge location becomes a viable option. • Parking pressures associated with the Matilda Bay and Applecross sites. • The high volume of recreational river users in the area. • Request for patronage modelling to take place to assess the capacity and frequency of services. • Safety concerns relating to recreational users and a request for a Safety Analysis report to be completed. • 20-knot ferries operating in 8-knot zones. • Request for further detail on proposed routes. A current sailing activity schedule for the Canning River and Matilda Bay was shared.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
Rowing WA	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Shared the following concerns: Terminal locations – proximity of the Matilda Bay site to existing recreational users and clubs and associated safety risks. Environmental and heritage impacts. Ferry journey paths – impacts to the safety and enjoyment of existing recreational users from ferry operation and associated wake. Made reference to the Safe on Water – Code of Conduct on the Brisbane River.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
Perth Dinghy Sailing Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Shared the following concerns: • Water space – restricted space for recreational users with high intensity, high speed ferries in operation; • Dangerous interactions – safety risks associated with increased traffic; • Land side concerns – damage to foreshore amenity; • Passenger demand – lack of research on passenger volume; • Scheduling – concern with scheduling and delays.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
Mounts Bay Sailing Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Expressed support for the concept of expanding the river transport system and raised the following topics: • Equitable access to the Swan River;	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
		• Proposal planning to include risk assessments for the activities of all river users; • An engineering study to evaluate the effect of vessel wakes and erosion; • Environmental concerns and protection of habitat.	
Hale School Rowing Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Raised following concerns: • Safey – increased risk to student rowers and risk associated with wake wash created by ferries; • Usability – impact to student rowers, access and usability for inexperienced users; • Environmental – negative impacts to the environment, notably from wake wash from the ferries.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
University of Western Australia Boat Club	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Raised key concern with the high probability of events risking safety to Matilda Bay users from interaction with ferries and the removal of a significant portion of the waterfront of Matilda Bay from public use.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
University of Western Australia Outdoor Club	October 2024, May and July 2025	Attended stakeholder briefing information session The club shared opposition to the Proposal and outlined the following concerns: • River access – safe access for inexperienced recreational users; • Safety risks – risks posed to recreational users associated with increased traffic on the Swan River; • Operational constraints – restricted access for equipment storage and transportation; • Irreversible impact – negative impacts to the Swan River and limiting access to members and the wider community during the construction and operation phases.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
Western Australian Water Ski Association	December 2024	Attended stakeholder briefing information session. Raised the following concerns: • Heavy use of the area by recreational water skiers and concern around ferry timings posing a safety risk; • The risks associated with a fixed point object within water ski areas. Increasing concentration of water ski users and the growing number of incidents each year.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
UWA representatives for: • **Estate, planning and development**	October 2024, May and July 2025	Attended stakeholder briefing information sessions. Raised following concerns:	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process. UWA is

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
• **Campus operations** • **Sport** • **Placemaking and activation**		• Location to UWA Stand up Paddle Board and Kayak; • Safety getting in and out of the water; • Reduction of land-based access to the Bay (grassed area used for preparation). The infrastructure is too close to areas of preparation for events etc – it will impact the way the area is currently used; • Route that ferries will take coming in and out of the location – would prefer it to be further out from the bay.	conducting a survey on Transport demand by UWA students. UWA requested the Proponent to maintain lines of communication.
Australian Sailing	October 2024, May and July 2025	Attended stakeholder briefing information session and raised the following concerns: • Request that proposal planning considers and takes into account the importance of sailing in the Western Australian community and the focal point which the Matilda Bay and Melville water areas represent; • Request that the Proposal consider the number of organised sailing events which take place in the area every day of the week, throughout the year; • Raised the relevance of the Social Return on Investment of Structured Sports Participation in Western Australia Study undertaken by SportWest and the economic and social benefits associated with sailing.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
Shenton College	October 2024, May and July 2025	Attended stakeholder briefing information session and raised the following: Noted the existing long-term partnership between Shenton College and the UWA Boat Club and the positive impact this has on students; Raised concerns around the safety of student rowers and the risks posed from the Proposal's ferry terminal and operations.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
WA Windsurfing	April and May 2025	Attended stakeholder briefing information sessions. Raised concern around alternative Matilda Bay locations (Jojos and Pelican Point).	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.
• **Other Community Groups** • **Bayside Kitchen** • **Boating Industry Association of WA** • **Boating WA** • **Canning Bridge Rowing Club** • **City of Melville Community Reference Group** • **City of Perth Western Residents Group**	November 2024 / April 2025 / May 2025	Attended briefing meetings and/or community information session. No specific concerns were raised. General meeting discussions included: • Human safety risks, including risk posed by high number of new and novice users in the area; • Vessel design and operations, including speed restrictions; • Increased local traffic disruptions; • Impacts to visual amenity and recreational access; • Impacts associated with noise and lighting; • Environmental impacts.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process.

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
• Claremont Masters Swimming Club • Efoil Australia • Fishability WA • Kiteboarding WA • John XXIII College Rowing • Nature Play WA • Nedlands Yacht Club • Paddle WA • Pelican Point Sea Scout Group • Perth Rowing Club • The Raffles Waterfront Apartments Council of Owners • Sailability WA • Scout Water Activity Centre Como • Sea Scouts WA • SUP Central • Swan Estuary Reserves Action Group • Sevens Group			

Stakeholder	Date	Issue / Topics Raised	Proponent Response / Outcome
• **UWA Student Guild** • **WA Powerboat** • **WA Rowing Club** • **Westcycle** • **Wonil Hotel**			
• **Jet Sport West** • **Matilda Bay Restaurant** • **Nedlands Rugby Club** • **Outdoors WA** • **Personal Watercraft WA Inc** • **Perth Flying Squadron Sailing Club** • **Xquizit Creations Yoga Studio**	April /May 2025	Invited to attend briefing meetings and/or community information session. Did not attend and no comments shared.	Further opportunity to provide feedback on the design of the terminal during the public comment period that forms part of the Development Application and EPA Referral process
Traditional Owner Stakeholders			
South West Aboriginal Land and Sea Council (SWALSC), Whadjuk Aboriginal Corporation (WAC), Whadjuk and Noongar representatives	September 2024 – ongoing	Shared an overview of the Proposal, including details of geotechnical works, with visual aids, maps and technical data. Discussion around potential impacts to the State Registered Aboriginal Heritage site that intersects the Proposal (The Swan River (ID 3536)).	Archaeological and ethnographic surveys have been undertaken to inform the avoidance strategy of the Proposal. The Proponent will undertake ongoing engagement and surveys to support a s18 approval required under the AH Act.

3.4 Stakeholder Reference Group

3.4.1 Cultural Advisory Working Group

The PTA is in the process of establishing a formal framework for engagement with Whadjuk Noongar Traditional Owners and Custodians throughout the Proposal with the goal of promoting meaningful and collaborative involvement of Whadjuk Elders and cultural representatives in decision-making processes relating to the project where appropriate.

This will ensure that engagement with the Whadjuk community is respectful, culturally safe, and informed by Noongar knowledge and protocols, ensuring that cultural voices remain central throughout the project lifecycle.

The objective of this Cultural Advisory Working Group is to provide a forum for nominated Whadjuk Noongar Traditional Owners and Custodians to share cultural knowledge, provide advice, and contribute to enhancing the cultural outcomes of the PTA Ferry Expansion Project.

Specifically, the group will:

- Provide cultural input into the design and delivery of new ferry infrastructure, including terminals, access points, and surrounding landscapes;
- Offer cultural advice on the integration of Noongar stories, language, and knowledge into artistic, interpretive, and educational elements of the project;
- Guide the observance of cultural protocols during construction and project activities to ensure respect for Whadjuk Noongar heritage and Country;
- Support Aboriginal participation initiatives and strategies, ensuring opportunities are created for meaningful involvement of Noongar people in the project;
- Strengthen cultural governance by ensuring Noongar voices inform decisions and shape project outcomes in a way that honours community aspirations.

3.4.2 Waterways Stakeholder Reference Group

The Waterways Stakeholder Reference Group (WSRG) will assist DTMI Maritime and the PTA in ensuring the safe and effective operation of the ferry service connecting terminals at Elizabeth Quay, Matilda Bay, and Applecross.

The WSRG will provide a dedicated forum for identifying on-water safety concerns, providing advice and collaboratively developing appropriate controls and measures to ensure the river is shared safely and equitably by all users.

The role and responsibilities of WSRG members will be to:

- Represent the interests and views of their organisation, and provide on-water stakeholder expertise to support the Project Team;

- Share the views of their organisation but also remain committed to open dialogue • inform the organisation they represent about the project, and convey feedback at meetings.

4.0 Objectives and Principles of the EP Act

The objective of the EP Act is to protect the Western Australian environment with regard to five principles outlined in Section 4A. Table 8 summarises how the Proposal has considered each of these five principles.

Table 8 Object and Principles of the EP Act

Principle	Consideration
1. The precautionary principle ***Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*** ***In this application of the precautionary principle, decisions should be guided by:*** ***1. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and*** ***2. an assessment of the risk-weighted consequences of various options.***	A range of baseline studies and investigations have been undertaken to determine the environmental, heritage and social impacts associated with the Proposal. These studies, conducted by qualified consultants in accordance with relevant EPA guidelines where available, have enabled a robust evaluation of potentially significant environmental factors. The findings have directly informed the Proposal's design, ensuring that potential impacts are avoided or minimised to the greatest extent practicable. In alignment with the precautionary principle, which advocates for proactive measures in the face of potential environmental harm and scientific uncertainty, the Proposal incorporates a range of avoidance strategies based on a high degree of confidence in the supporting data. These measures include: • Strategic site selection to maximise use of previously disturbed areas; • Completion of specialist surveys to identify additional risks and develop mitigation strategies; • Ongoing engagement with key stakeholders, including Traditional Owners; • Limiting terrestrial vegetation clearing (non-native vegetation) to a maximum of 1.62 ha; • Limiting impacts to BCH - SM to a maximum of 0.63 ha.

Principle	Consideration
2. The principle of intergenerational equality ***The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.***	Electric ferries produce zero emissions during operation, significantly reducing greenhouse gases such as CO_2, methane, and nitrous oxide. This reduction plays a crucial role in combating global warming and improves air quality. By minimising emissions and noise pollution, electric ferries safeguard marine ecosystems and the wellbeing of coastal communities, ensuring the preservation of ecological functions for future generations. In addition, ferry services offer a sustainable transport alternative which supports long-term urban mobility. Unlike road-based transport, ferry services are unaffected by limited road capacity and can be scaled to meet future demand. Ferry services provide reliable cross-river connections that are relatively cost-effective and environmentally friendly compared to new road or rail infrastructure, aligning with the principle of intergenerational equity by promoting infrastructure that meets present needs without compromising the ability of future generations to meet theirs.
3. Principles in relation to improved valuation, pricing and incentive mechanisms ***The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.*** ***The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.*** ***Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits***	Funding for the construction of the jetty will be provided by the Proponent reflecting a direct investment in infrastructure that supports sustainable transport and minimises environmental harm. I design and location of the Proposal have been carefully selected to avoid and reduce environmental impacts, as detailed in this referral. In alignment with the EPA's principle of improved valuation, pricing, and incentive mechanisms, the Proposal incorporates measures that recognise and respond to the environmental value of the surrounding area. Where practicable, the Proposal will: • Employ appropriately trained local personnel and source local goods and services to support regional economic sustainability; • Apply best practice standards during construction to minimise emissions and discharges, reducing environmental costs;

Principle	Consideration
and/or minimise costs to develop their own solutions and responses to environmental problems.	• Source goods and services that have the least environmental impact, incentivising sustainable supply chain. These actions demonstrate a commitment to integrating environmental considerations into economic and operational decision-making, ensuring that environmental values are appropriately recognised and protected.
4. The principle of conservation of biological diversity and ecological integrity ***Conservation of biological diversity and ecological integrity should be a fundamental consideration.***	Environmental studies have considered the presence of Threatened and Priority flora, fauna and vegetation communities and vegetation condition, in accordance with EPA guidelines. These assessments have informed the Proposal's design and operation to ensure biological diversity and ecological integrity of the DE and surrounding areas are not compromised. Mitigation measures have been developed with the explicit aim of avoiding or minimising impacts to biodiversity and ecosystem function. This includes protecting habitat values, reducing disturbance to native species, and preserving ecological processes essential to long-term environmental health. The Proposal reflects a commitment to conserving the diversity of life and the integrity of ecological systems for current and future generations.
5. The principle of waste minimisation ***All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.***	The Proposal is not expected to generate significant pollution or waste during construction. By reducing emissions and noise pollution, electric ferries help protect marine ecosystems and the health of coastal communities. In accordance with this principle, the Proposal will implement the waste hierarchy to ensure efficient resource use and reduce environmental impacts. All reasonable and practicable measures will be implemented to minimise waste generation, including: • Avoiding waste at the source and reusing where possible; • Adopting reuse and recycling practices where practicable; • Ensuring all waste is appropriately collected and removed from site.

Principle	Consideration
	These measures reflect a proactive approach to managing waste and conserving resources throughout the construction and operational phases of the Proposal.

5.0 Environmental Impact Assessment

To determine whether the Proposal is likely to have significant residual impacts on the environment, the scope and activities of the Proposal were considered against the EPA's *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a). This assessment included consideration of all 14 environmental factors across the five environmental themes to ensure a comprehensive evaluation of potential environmental impacts and alignment with the EPA's environmental objectives (EPA, 2021a).

The Proponent has considered the Proposal's activities and environmental context to identify the key environmental factors and other environmental factors relevant to the Proposal. Section 5.2 lists the environmental factors and classification relevant to the Proposal and indicates the section number for each factor. Where relevant, MNES are identified under each factor and summarised in Section 12.0.

Based on this assessment, the following key environmental factors have been identified as relevant to the construction and operation of the Proposal:

- Benthic Communities and Habitats (Section 6.0);
- Marine Environmental Quality (Section 7.0);
- Marine Fauna (Section 8.0);
- Social Surroundings (Section 9.0).
    - Amenity (noise, dust, light and visual impacts);
    - Aboriginal Heritage;
    - Historic Heritage.

The following other environmental factors have been considered but were not deemed significant in the context of this Proposal. These are further discussed in Section 10.0.

- Coastal Processes;
- Flora and Vegetation;
- Terrestrial Fauna;
- Terrestrial Environmental Quality;
- Inland Waters;
- Human Health.

The remaining environmental factors (Landforms, Subterranean Fauna, Air Quality and Greenhouse Gas Emissions) are not deemed relevant to the Proposal and are not discussed further.

5.1 Mitigation Hierarchy Approach

The mitigation hierarchy has been applied in accordance with the EPA's *Statement of Environmental Principles, Factors and Objectives* (EPA, 2021a). Avoiding impacts has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on flora and vegetation.

These principles, and the order in which they have been applied, are:

- **Avoid:** reducing the Impact Area and locating activities to avoid direct and indirect impacts on significant flora and vegetation;
- **Minimise:** minimising direct and indirect impacts where they cannot be completely avoided;
- **Rehabilitate:** actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery;
- **Offset:** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

Mitigation measures are separately discussed for each environmental factor throughout this document.

5.2 Environmental Factors and Objectives

Table 9 lists the environmental factors and classification relevant to this Proposal following the significance test and indicates the Section number for each factor.

Table 9 Consideration of EPA Factors and Objectives and relevance to the Proposal

Environmental Factor	Objective	Classification	Basis of Classification	Section
Sea				
Benthic Communities and Habitats (BCH)	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	**Key Environmental Factor**	The Proposal has the potential to disturb BCH - SM within the DE from construction and operational activities at Matilda Bay and Applecross. Activities include: • Mooring of construction barges • Piling • Shading of jetty / terminal infrastructure • Removal of up to 33 existing, used and disused moorings, at Matilda Bay The effects may include: • Sediment mobilisation, increasing Total Suspended Solids (TSS) the water column, reducing light availability; • TSS re-settling and smothering and/or limiting suitable conditions for Benthic Primary Producing Habitat (BPPH); • TSS re-settling and increased toxicity levels for BPPH; • Shading from the infrastructure post-construction and reduced light availability for BPPH.	Section 6.0

Environmental Factor	Objective	Classification	Basis of Classification	Section
Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	Not a significant environmental factor	The Proposal is unlikely to impact Coastal Processes from construction or operational activities The proposed expansion and construction of the jetties and associated infrastructure is unlikely to impact coastal processes as the jetty will be on piles which will still allow water to flow underneath it. Wave wake is not anticipated to cause erosion due to controlled vessel speeds and modified shoreline environments. Therefore, coastal processes is not considered a key environmental factor.	Section 10.1
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	**Key Environmental Factor**	The Proposal has the potential to impact Marine Fauna during construction activities. Indo-Pacific bottlenose dolphins may be affected by underwater noise as a result of piling during construction, which may lead to avoidance behaviours, interfering with communication between individuals, displacement from area or in severe circumstances even death. Localised and temporary changes to underwater soundscape affecting foraging activity of marine fauna. Local and temporary changes to ambient noise effecting marine fauna natural behaviours. IMS risk from mobilisation of vessels to site from other regions.	Section 8.0

Environmental Factor	Objective	Classification	Basis of Classification	Section
Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	**Key Environmental Factor**	The Proposal has the potential to impact Marine Environmental Quality within the DE from construction activities. Risk from changes in water quality as a result of spills and waste release from construction vessels. Risk from mobilisation of sediments causing decreased light availability for primary producers. Risk from mobilisation of sediments from construction activity causing changes to water and nearby sediment toxicant values. Potential release of microbes due to use of silt curtains.	Section 7.0
Land				
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Not a significant environmental factor	No native vegetation was recorded within the Proposal DE. No significant flora was identified within the DE. The Proposal DE is dominated by planted trees, including Eucalypt and non-native species, over hardstand and lawn.	Section 10.2
Landforms	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	Not a relevant environmental factor	There are no known significant physical landforms that will be impacted by the Proposal. The proposed facilities will mostly be in keeping with the surrounding buildings and modified landscape.	N/A
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	Not a relevant environmental factor	There is no known subterranean fauna in the Proposal DE. In addition the proposal will not impact on groundwater or affect subterranean habitats.	N/A

Environmental Factor	Objective	Classification	Basis of Classification	Section
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Not a significant environmental factor	The Proposal is not expected to significantly impact terrestrial environmental quality due to the developed nature of the sites and limited development footprint, combined with the avoidance of excavation over 100 cubic metres and dewatering or drainage.	Section 10.4
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Not a significant environmental factor	Terrestrial fauna is not expected to be significantly impacted due to the developed nature of the site, limited extent of fauna habitat and lack of conservation significant fauna records. The Proposal DE is dominated by planted trees, including Eucalypt and non-native species, over hardstand and lawn. No native vegetation is located within the Proposal DE.	Section 10.3
Water				
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	Not a significant environmental factor	Potential impacts to inland waters are minor and can be controlled through the implementation of on-site management.	Section 10.5
Air				

Environmental Factor	Objective	Classification	Basis of Classification	Section
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	Not a relevant environmental factor	The ferries associated with the Proposal will be powered by electric battery. As a result, air quality impacts associated with the Proposal's operation will be minimal.	N/A
Greenhouse Gas Emissions	To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.	Not a relevant environmental factor	The ferries associated with the Proposal will be powered by electric battery. As a result, greenhouse gas emissions impacts associated with the Proposal's operation and construction will be minimal.	N/A
People				
Social Surroundings	To protect social surroundings from significant harm.	**Key Environmental Factor**	The Proposal has the potential to Social Surroundings from construction and implementation activities. Potential impacts include visual impact, light, noise, dust, Aboriginal Cultural Heritage and non-Aboriginal Heritage.	Section 9.0
Human Health	To protect human health from significant harm.	Not a relevant environmental factor	Impacts to human health are not expected to be significant and are limited to potential disturbance of contaminants within sediment.	Section 10.6

6.0 Benthic Communities and Habitats

The EPA Environmental Factor Guideline for BCH (EPA, 2016a) defines BCH as "*biological communities that live in or on the seabed. These communities typically contain light-dependent taxa such as algae, seagrass, mangroves and corals, which obtain energy primarily from photosynthesis, and/ or animals such as molluscs, sponges and worms, that obtain their energy by consuming other organisms or organic matter.*"

Benthic habitats are defined as "*the seabed substrates that benthic communities grow on or in. They can range from unconsolidated sand to hard substrates such as limestone or igneous rock and occur either singly or in combination.*" (EPA, 2016a).

6.1 EPA Objective

The EPA's objective for BCH is "*to protect benthic communities and habitat so that biological diversity and ecological integrity are maintained*" (EPA, 2016a).

6.2 Relevant Policy and Guidance

Table 10 summarises the relevant policy and guidance considered for the factor BCH.

Table 10 Policy and Guidance – Benthic Communities and Habitats

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Benthic Communities and Habitats (EPA, 2016a).	This guidance was used to inform the impact assessment undertaken for BCH and the significance of the potential environmental impacts.
Technical Guidance: Protection of Benthic Communities and Habitats (EPA, 2016b).	This document guides the appropriate obtainment and collation of BCH data to be used in EIA. All studies conducted for the Proposal are in accordance with this guidance document.
Other State or Commonwealth Policy or Guidance	
***Biodiversity Conservation Act 2016* (BC Act) (WA)**	The Proposal has avoided disturbance of native vegetation as far as reasonably practicable.
***Conservation and Land Management Act 1984* (CALM Act) (WA)**	Management and legislative requirements for the protection of BIAs such as the Swan Estuary Marine Park (including benthic habitat), near the Proposal DE.
***Swan and Canning Rivers Management Act 2006* (SCRM Act) (WA).**	Management of seagrass health and impact risk assessment in areas outside of the Swan Estuary Marine Park.

Policy and Guidance	Consideration
Pollution of Waters by Oil and Noxious Substances Act 1987 **(WA)**	Management of construction waste and hydrocarbon spills.

6.3 Receiving Environment

6.3.1 Surveys and Studies

Benthic community and habitat surveys and assessments have been undertaken within the DE to determine the baseline environment, used to inform Proposal avoidance and design. Details of these surveys are presented in Table 11.

Table 11 Benthic Communities and Habitats Surveys

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
Benthic Communities and Habitat Mapping Report **(BMT, 2025b)** **(Appendix G)**	Surveys completed by BMT on 10-12 March 2025.	Survey guidance is limited and varies depending on the scale and cumulative risk of Proposals. However, EPA Technical Guidance recommends proponents obtain adequate aerial imagery or remote sensing data. Where such imagery is not supported by ground-truthing surveys of the DE, historical data should be used Historical data may include information about local biophysical conditions required to support various types of benthic communities. The use of surrogates such as geomorphic features, sediment type, degree of exposure to waves/currents and water depth may be considered to infer the locations and estimate the original extent of benthic communities and their habitats	The survey was completed by BMT, according to the approved Sampling and Analysis Plan (BMT 2025). BCH was mapped in three survey locations at Applecross, Matilda Bay and Elizabeth Quay. Mapping was verified through ground truth video transects and drop camera footage at four locations: • Elizabeth Quay (three transects); • Matilda Bay South (two transects), covering the location of the Matilda Bay DF;

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
			• Matilda Bay North (two transects), approximately 200 m north of the Matilda Bay DF; • Applecross (two drop camera locations).
Sediment Sampling Report (BMT, 2025a) (Appendix A)	Survey was completed by BMT on 10 April 2025. Laboratory results were provided to BMT for analysis on 7 May 2025.	The survey was completed by BMT, according to the approved Sampling and Analysis Plan (BMT, 2025). The Sampling and Analysis Plan was guided by: • *National Assessment Guidelines for Dredging* (Australian Government 2009) which provides a reasonable and logical framework for the sampling of sediments to adequately characterise the physical and contamination status of the dredged material for offshore disposal; • *Assessment and management of contaminated sites* (DWER, 2023) for high level screening assessment of dredge sediment for onshore disposal; • *Landfill Waste Classification and Waste Definitions 1996* (DWER, 2019) which provides a framework for the characterisation of	Sampling occurred within the DE including: • Elizabeth Quay (three sites); • Matilda Bay (six sites, three sites within the DE and three at an alternate area); • Applecross (three sites). This survey included assessment of results from sampled sites previously selected for potential dredging activity, though those sites and activities have since been excluded from this Proposal.

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
		sediment for acceptance to landfill; • *National Environment Protection (Assessment of Site Contamination) Measure* (NEPC, 1999 as amended 2013); • *PFAS National Environmental Management Plan 3.0* (HEPA, 2025); • *National Acid Sulfate Soils Guidance* (Sullivan et al., 2018a). Assessment of sediment toxicant Default Guidance Value (DGV's) was conducted using the following guidelines: • *PFAS National Environmental Management Plan 3.0* (HEPA, 2025); • *Acid Sulfate Soils Guidelines* (DER, 2015); • *National Acid Sulfate Soils Guidance* (Sulivan et. al., 2018); • *National Assessment Guidelines for Dredging* (NAGD) (Australian Government, 2009); • Australian and New Zealand Guidelines for fresh and marine water quality (ANZG, 2018); • Elutriate waters were assessed against the NAGD Screening Levels (CA, 2009), ANZG DGVs (Australian Government,	

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
		2018) and ASS Guidelines (DER, 2015).	

6.3.1.1 BCH Survey Methodology

A BCH survey to classify estuarine habitats in the Swan River within the Proposal DE was completed between 10-12 March 2025 by BMT (Appendix G). The survey targeted a total area of 4.94 ha across the DE (hereafter; referred to as the survey area) at Elizabeth Quay, Matilda Bay and Applecross. The Matilda Bay survey area is comprised of two discrete areas of interest; however, the proposed ferry passenger terminal development is positioned within the southern area. The methods and results described herein for the Matilda Bay survey area are referring to the two areas of interest collectively.

The survey was scheduled for late summer during peak growth periods for seasonal and ephemeral benthic flora. Spatial extent and BCH assemblages were quantitatively characterised within the survey areas.

High–definition towed video data was collected using Spot X Real–Time Underwater Video System approximately 0.5 m above the seabed to record seabed features. For the Matilda Bay and Applecross sites, video transects were conducted; however, for Elizabeth Quay, a drop camera was deployed instead due to access restrictions. Transects were conducted at a speed of 1–5 knots to ensure the best quality footage was captured, with a handheld Global Positioning System (GPS), and a tracklog used to record transect paths. Side scan sonar was run and recorded for each transect to confirm benthic profile.

The video footage was analysed and classified by a trained marine ecologist using Transect Measure software, which allows a single benthic habitat type to be assigned to each frame of video footage. The BCH scoring system included two components, firstly, habitat was classified by identifying the dominant habitat category and minor categories, where possible, according to Table 12.

Table 12 Benthic communities and habitat classes and percent cover classifications, as per BMT (2025b).

Major class	Minor class	Cover	Type
Seagrass	*Halophila decipiens*	Very sparse (<5%) Sparse (5-35%) Moderate (35-70%) Dense (70-100%)	Benthic Community Habitat type mixed seagrass and/or macroalgae (BCH – SM)
	Halophila ovalis		
	Mixed *Halophila* spp.		
	Other spp.		
Mixed	Mixed seagrass and macroalgae		
Macroalgae	Macroalgae		
Filter feeders	Sponges/hydroids/other		
Wrack	Seagrass/Macroalgae wrack		
Sand	Bare sand Shell debris, rocky rubble	None	Benthic Community Habitat type bare sand (BCH – BS)
Rock substrate	Bare rock reef/rubble	None	NA

6.3.1.2 Sediment Sampling Methodology

Sediment sampling at each survey area was conducted by BMT on 10 April 2025 (Appendix A). Samples were collected using a Van Veen grab, which collected sediments at the proposed sampling locations from surface to approximately 0.2 m depth. Three samples were collected from within each survey area.

Sample results were assessed against relevant guideline values to determine potential environmental risks:

- Default Guideline Values (DGVs) for species protection were adopted from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018). Marine guideline values were applied across all sites, as they are located downstream of the halocline and are consistently exposed to salinities above 2 parts per trillion (ppt) (ANZG 2018).
- For PFAS, assessment followed the *Per- and Polyfluoroalkyl Substances National Environmental Management Plan* (PFAS NEMP) guidelines (HEPA 2025).
- For metals, DGVs based on 95% species protection level were applied. For bioaccumulating toxicants, elutriate testing was conducted and assessed against

interim marine guideline values for 99% species protection, appropriate for high conservation value systems (ANZG 2018).

- For hydrophobic organic contaminants (HOCs), DGVs were normalised to 1.0% OC following the approach outlined by Simpson et.al (2018) and adopted by ANZG (2018).
- No guidelines exist for total nutrients in sediments; as a precaution, elutriate nutrient testing was initiated in the first phase analysis. Results were assessed against the ANZECC & ARMCANZ (2000) DGVs for physical-chemical stressors in slightly disturbed estuarine ecosystems of south-west Australia.
- For Acid Sulfate Soils (ASS), reduced inorganic sulfur content (SCr [%S]) was assessed against texture-based Action Criteria (DER, 2015). Where thresholds were exceeded, total net acidity was calculated using acid-base accounting (ABA). Further details on these calculations are provided in the BMT sediment report (BMT 2025), which estimates actual and potential acidity of sediment samples.

6.3.2 Survey Findings

6.3.2.1 BCH Survey Results

Results showed that within all three survey areas, bare sand was the dominant BCH category, especially further offshore in Matilda Bay and Applecross, and entirely at Elizabeth Quay. For the Matilda Bay and Applecross survey areas, BCH displayed similar spatial distribution; bare sand with patches of seagrass, macroalgae or mixed seagrass and macroalgae in the nearshore of the survey areas transitioning to bare sand further offshore as the banks deepen.

For Matilda Bay, benthic habitat beyond the intertidal zone was dominated by a band of moderate to dense seagrass which extends between approximately 20–40 m offshore. Analysis of classified ground truth video data identified a seagrass assemblage comprising mixed species of *Halophila decipiens* and *H. ovalis.* However, due to the morphological similarities between these species, and the absence of previous records of *H. decipiens* within the Swan Canning River system, its presence should be regarded as low confidence.

In the intertidal zone and areas further offshore, bare sand was the dominant BCH category (Figure 10). Small-scale temporal variation in the seagrass extent was evident between ground truth data and Nearmap imagery capture. This could be attributed to seasonal timing between the BCH field survey and the collection date of the Nearmap imagery, combined with highly seasonal productively and biomass of ephemeral seagrasses.

At Matilda Bay, BMT recorded 0.46 ha seagrass across a 3.17 ha survey area (i.e. only 14.5% comprised seagrass). Remaining areas constituted sand substrate.

BCH within the Applecross survey area was partitioned into three main categories:

- Predominantly bare sand habitat with isolated patches of mixed seagrass and macroalgae in the nearshore;
- Connected patches of predominantly moderate to dense seagrass (*Halophila spp.*) in the transition zone;

- Predominantly bare sand was observed further offshore.

In a total survey area of 1.70 ha, BMT recorded 1.19 ha sand, 0.26 ha seagrass, 0.01 ha sparse seagrass and 0.23 ha mixed seagrass with macroalgae. Combined, the seagrass and mixed seagrass with macroalgae cover 0.5 ha, representing approximately 29.4% of the Applecross survey area.

The Elizabeth Quay survey area covers 0.07 ha and consists entirely of bare sand.

In summary, bare sand dominated the benthic habitat in all surveyed areas, covering 3.97 ha (80.4%), while seagrass and mixed seagrass with macroalgae occupy 0.96 ha (19.4%) in smaller, disconnected patches.

The results of the BCH survey showing the extent of BCH within the DEs is outlined in Figure 10 and Table 13 below.

Table 13 Benthic Community and Habitat Survey Findings

Benthic Habitat Type	Area of Impact within the DE at each site (in hectares)			
	Matilda Bay Site	Applecross Site	Elizabeth Quay Site	Total
BCH – SM	0.37	0.26	0.00	0.63
BCH – BS	4.55	0.66	0.17	5.38

Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 10a - Benthic Habitat: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Benthic Habitat (BMT, 2025)

- Sand
- Seagrass
- Seagrass and Macroalgae
- Sparse Seagrass
- Sparse Seagrass and Macroalgae

Benthic Habitat (DBCA, 2023)

- Seagrass Sparse
- Seagrass Medium
- Seagrass Dense
- Sand

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Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 10b - Benthic Habitat: Matilda Bay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Benthic Habitat (BMT, 2025)

- Sand
- Seagrass
- Sparse Seagrass

Benthic Habitat (DBCA, 2023)

- Sand

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Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 10c - Benthic Habitat: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Benthic Habitat (BMT, 2025)

- Sand

Benthic Habitat (DBCA, 2023)

- Seagrass Medium
- Sand

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6.3.2.2 Sediment Sampling Results

Results of the sediment sampling (BMT, 2025a) (Appendix A) are summarised below:

- Particle Size Distribution (PSD) of the samples showed significant variation between samples within each survey area, with Elizabeth Quay Sample #1 (EQ1) (65.35%), Matilda Bay Sample #5 (MB5) (58.70%) and Applecross Sample #2 (AP2) (53.77%) all consisting of predominantly high silt-fraction (4-63 µm fraction range) sediments. All remaining sediment samples were between 47.01 – 90.42% sand (63 – 2000 µm fraction range).
- Organic carbon concentrations appear to be correlated with PSD, with recorded values of 3.60%, 3.0% and 2.4% recorded at MB5, AP2 and EQ1 respectively, whereas the remaining samples had an organic content range of between 0.19% – 0.61%.
- Metal concentrations in sediment samples showed DGV exceedances at Matilda Bay (sample MB5) for copper, lead, mercury, nickel and zinc. Bioavailable metal concentrations exceeded DGVs for elutriate lead and zinc at the Matilda Bay site (sample MB5) and for elutriate copper at the Applecross site (sample AP1).
- There was an apparent correlation between sites with silt-fractions higher than 50%, and elevated levels of barium, boron, chromium, manganese, vanadium, iron and aluminium.
- For PFAS, samples collected from the Matilda Bay and Applecross sites had elevated perfluorooctane sulfonic acid (PFOS) concentrations in exceedance of NEMP human health guidelines. Further elutriate testing showed that all samples at all sites had PFOS concentrations in exceedance of NEMP guidelines.
- Nutrient concentrations exceeded DGVs across all sites, with total phosphorus, total nitrogen and ammonium levels all exceeding DGVs for physical chemical stressors. Two sample concentrations of ammonia (NH3) exceeded the ANZG (2018) DGV for 95% species protection level for toxicants (Elizabeth Quay Sample #3 (EQ3) and Matilda Bay Sample #4 (MB4); ANZG 2018).
- Samples recorded pH values of between 8.4–9.5, indicating slightly basic sediments with no evidence of actual acidity. Sulfur values were detected above the DER (2015) Action Criteria of 0.06% in all sediment samples except for MB4, Matilda Bay Sample #6 (MB6), Applecross Sample #1 (AP1) and Applecross Sample #3 (AP3), suggesting the presence of potential ASS (PASS), however this acidity is likely to be buffered by the acid neutralising capacity of the sediments and the alkalinity of surrounding seawater. The presence of multiple mono-sulfidic black oozes (MBOs) indicators across all survey areas indicate sediments potentially contain MBOs.

6.4 Potential Environmental Impacts

The Proposal has the potential to directly impact BCH – SM within the Matilda Bay and Applecross sites from construction and operation activities. No direct impacts to BCH will

occur at the Elizabeth Quay site as BCH – SM was not recorded, and the activities proposed would not impact BCH.

In order to consider impacts to BCH, seagrass mapping undertaken by DBCA in 2023 (Phelps et al, 2025) was reviewed to assess the extent of impacts relative to the BCH across the Swan Canning system. The DBCA mapping involved combining satellite imagery and ground truth data with computer modelling to assign seagrass distribution and density across the Swan Canning Estuary. Approximately 590 ha of seagrass communities were found in the shallow areas of the Swan Canning Estuary (Phelps et al, 2025). The mapping data was also used to infill a portion of the Applecross DE that wasn't originally surveyed by BMT due to an amendment to the DE post survey which is included in the areas above.

The total area of seagrass and/or macroalgae within the DE is 0.63 ha, reflecting the maximum extent of potential impacts. This equates to 0.1% of the total area of mapped seagrass based on the 2023 mapping estimate undertaken by DBCA.

6.4.1 Potential Direct Impacts

Table 14 outlines potential direct impacts of the Proposal to BCH.

Table 14 Potential Direct Impacts to Benthic Communities and Habitats

Proposal Activity	Potential Direct Impact

Construction and operation	• Loss of up to 0.63 ha BCH - SM at Matilda Bay and Applecross sites (BMT, 2025a)
	• This represents the total area of BCH SM with the DE at Matilda Bay and Applecross and the Proposal's maximum extent of impacts to BCH from construction and implementation of the Proposal. The activities considered include;
	  ○ Mooring of construction barges;
	  ○ Piling;
	  ○ Shading of jetty / terminal infrastructure;
	  ○ Removal of up to 33 existing, used and disused moorings, at Matilda Bay;
	• The effects of construction and operation activities may include;
	  ○ Sediment mobilisation, increasing Total Suspended Solids (TSS) the water column, reducing light availability;
	  ○ TSS re-settling and smothering and/or limiting suitable conditions for Benthic Primary Producing Habitat (BPPH);

Proposal Activity	Potential Direct Impact
	○ TSS re-settling and increased toxicity levels for BPPH; ○ Shading from the infrastructure post-construction and reduced light availability for BPPH. • BCH SM was not recorded at Eliabeth Quay and piling is not required at this site. The proposed construction and implementation of the Proposal at Elizabeth Quay is not expected to have an impact on BCH. • BCH - SM and BPPH may be impacted post-construction due to shading from the jetty / terminal infrastructure. The maximum extent of impact to BCH – SM from shading is 0.09 ha and includes BCH – SM located directly under the infrastructure (i.e. IDF) (0.03 ha) and the shadow cast from the infrastructure at winter solstice (0.04 ha) and summer solstice (0.02 ha). This 0.09 ha of impact is located within the total 0.63 ha of impact.

6.4.2 Potential Indirect Impacts

Table 15 outlines potential indirect impacts of the Proposal to BCH.

Table 15 Potential Indirect Impacts to Benthic Communities and Habitats from construction activities

Proposal Activity	Potential Indirect Impact
Construction and operation	• The loss of BCH - SM is expected to be contained within the DE through implementation of controls in the CEMP (Appendix I), including implementation of sediment control measures (i.e. silt curtains or similar) to contain the potential spread of TSS generated during piling activity within the DE. • No further indirect impacts, including impacts outside the DE, are anticipated.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 6.6 for both direct and indirect impacts.

6.5 Mitigation and Avoidance

Table 16 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to BCH during the scoping phase of the Proposal.

Table 16 Mitigation and Avoidance Actions Considered for Benthic Communities and Habitats

Design or management measure	Description
Avoid	
Avoid dredging of terminal berths required for safe and efficient operation of vessels	Design of terminals to allow for berths of sufficient depth to meet safety requirements for vessel draught, reduce sediment accumulation at berths and reduce sediment plumes from occurring. An assessment of dredging within the IDF found that no dredging would be required (Appendix H).
Minimise	
Detailed design to integrate spatial maps of seagrass at Terminal locations and reduce disturbance footprint of sites being considered to minimise impacts on habitats suitable for ephemeral seagrass establishment.	The design footprint has been minimised as much as practicable while still ensuring sufficient size for ferry berthing and passenger access. This will minimise any unnecessary disturbance into BPPH and locations suitable for ephemeral seagrass propagation.
Design and materials for jetty and berthing facilities	Features such as elevated, permeable decking and floating structures will be utilised to help maintain light penetration and natural water flow, which are important for the health of seagrasses and other benthic organisms.
Sediment quality screening	Sediment quality will be visually monitored and tested during works at the Matilda Bay and Applecross sites with criteria thresholds to be established in consultation with DBCA prior to works commencing. Construction activities will aim to minimise disturbance of sediments.
CEMP to include controls for management of disturbed sediment	Implement controls in the CEMP for management and disposal of ASS and MBOs in accordance with *Treatment and management of soil and water in acid sulfate soil landscapes* (DER 2015) and *National Acid Sulfate Soils Guidance: Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands* (Sullivan et al. 2018b).

Design or management measure	Description
CEMP to include controls for management, monitoring and reporting of TSS plumes during piling and vessel use.	Mobilisation of sediments into receiving environment outside of Proposal DE to be minimised by managing the spread of TSS plumes during construction activity with a control and reporting system in place. Implementation of controls listed in the CEMP (Appendix I) provides the monitoring and management framework to address potential indirect impacts to BCH from impacts to marine environmental quality during construction. Key management and monitoring measures include: Implementation of a water quality monitoring regime, requiring visual identification of TSS plumes exiting the DE and daily water quality checks using hand-held TSS probe; Implementation of a BCH monitoring program to be outlined in site specific CEMP's which will be prepared in consultation with DBCA and will include pre- and post-disturbance surveys Sediment control measures (i.e. silt curtains or similar) to be implemented to contain potential spread of TSS from piling activity. Section 7.5 details management of marine water quality within the silt curtain area. The development of the proposal will also be subject to a Part 5 development approval under the SCRM Act. This approval will be required to enable the development of the jetty and ferry terminals at Applecross and Matilda Bay within the Swan Canning DCA and will need to demonstrate adequate controls and management of potential environmental impacts to enable approval by the SRT. Detailed site-specific CEMPs will be developed in consultation with DBCA to ensure the SRT's expectations for management of impacts within the DCA are met.
Prepare and implement an Operational Environmental Management Plan (OEMP) to include controls for management, monitoring and reporting of any potential impacts associated with the operation of the Proposal.	The implementation of an OEMP will outline management controls for the ongoing use and operation for the jetties, berthing and ferries, including: • Pollution controls (spill kits, regular ferry inspections and maintenance, reporting of any incidents); • Waste disposal (daily inspection of waste receptacles, provision of suitable waste disposal opportunities, passenger signage, use of low or no impact chemicals for cleaning). The ongoing use and operation of the jetties and ferry terminals within the DCA will also be subject to the river reserve lease – required under Section 29 of the SCRM Act. This approval will be required for the leasing of land within the Swan Canning DCA that is vested in the Swan River Trust. The river reserve lease will be contingent on demonstrating that the operation will not impact on the conservation,

Design or management measure	Description
	ecological and community values of the river. Conditions requiring ongoing management of the jetties and ferry terminals will also be applied to the lease to ensure adequate controls are in place to protect the values of the river long term.
Rehabilitate	
Post construction	Construction impacts such as BPPH loss under ferry terminals are considered partly recoverable following completion of construction outside of any areas of permanent fixtures and shading. Baird (2025) predicts that impacts to BCH will be recoverable within a period of five years following removal of temporary construction infrastructure provided other environmental quality criteria are within toxicant DGVs.

6.6 Assessment and Significance of Residual Impact

The impact assessment has focused on identifying any potential residual effects of the Proposal on BCH, following the implementation of the mitigation measures outlined above.

The identified impacts are up to 0.63 ha loss of BCH - SM within the Proposal DE at Matilda Bay and Applecross. The loss of up to 0.63 ha of BCH - SM represents less than 0.1% of the 590 ha mapped extent of seagrass (Phelps et al, 2025) in the estuary which is not considered a significant impact.

This conclusion aligns with the EPA's objective for benthic communities and habitats, which is '*to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.*' The assessment confirms that this objective is likely to be met, with no lasting or significant adverse effects anticipated.

Implementation of management controls such as silt curtains and monitoring as outlined in the CEMP (AECOM, 2025) (Appendix I) will ensure that any disturbance occurring outside of the silt curtain during piling activities is promptly detected and effectively managed. In addition, research summarised in Baird (2025) indicates that these impacts are generally limited in scale and that benthic communities often recover relatively quickly. Recovery tends to be confined to areas immediately surrounding the infrastructure. As such, these sites are also likely recoverable for BPPH upon completion of construction provided sediment quality is maintained through all phases of the Proposal life cycle.

Indirect impacts to BPPH as a result of the implementation of the Proposal are unlikely, provided the mitigation and avoidance measures outlined in Table 16 are implemented.

6.7 Environmental Outcomes

Environmental outcomes and conditions to protect BCH values are proposed in Table 17 below.

Table 17 Environmental Outcomes for BCH

Proposed environmental outcomes	How environmental outcomes can be measured and assured
Maintain BCH ecological integrity to ensure that the structure, function, diversity, distribution, and viability of BCH are preserved	• Conduct baseline surveys and post-development monitoring of BCH extent and impacts.
Avoid significant residual impacts such as vessel scour and resuspension of sediments	• Application of mitigation hierarchy; • Implementation of CEMP; • Use silt curtains where sediment disturbance is expected within the Proposal DE; • Monitor during and after construction to detect and respond to impacts such as TSS levels.
Ensure recovery potential by avoiding unnecessary loss of suitable seasonal establishment sites within the DE for seagrass and macroalgae due to design	• Implement the proposal in accordance with the PCD that limits the spatial extent and duration of disturbance to allow natural recovery; • Undertake post development monitoring to ensure no detectable impacts to BCH outside the DE.
Direct disturbance of BCH from construction activities is confined to the maximum approved disturbance footprint within the development envelope	• No detectable impacts to BCH outside the development envelope based on visual monitoring and installation of physical barrier (silt curtain).

Following consideration of impacts to BCH, the PTA considers the Proposal can by managed to maintain and protect environmental values for BCH and therefore the EPA's objective for this factor can be met.

7.0 Marine Environmental Quality

Although many of the EPA's marine guidance documents provide clear objectives for environmental factors they describe, marine environmental quality (MEQ) is treated slightly different. This is due to the range of key Environmental Values that this guidance addresses, including:

- Ecosystem health;
- Fishing and aquaculture;
- Recreation and aesthetics;
- Industrial water supply;
- Cultural and spiritual.

To address these values, the EPA developed environmental quality management framework (EQMF) for protecting and maintaining the quality of the State's marine environment. Environmental values "*form the basis of the framework from which broad environmental quality objectives, including levels of ecological protection, are established and spatially defined. Environmental quality criteria that represent environmental quality thresholds of 'acceptability' are then established based on scientific, social and political imperatives*" (EPA, 2016c).

7.1 EPA Objective

The EPA's objective for MEQ is "*to maintain the quality of water, sediment and biota so that environmental values are protected*" (EPA, 2016c). However, this objective is not comprehensive in that the EPA objectives for MEQ are individual and determined on a case-by-case basis. MEQ objectives can be described by a combination of the infrastructure type/purpose, environmental vectors and receiving environment effects.

In terms of the DE and potential receiving environment effects from the expected construction and operating activities for this proposal, Table 3 of the MEQ technical guidance (EPA, 2016d) designates ports berths, turning basins, marinas and harbours are considered Moderate Ecological Protection Area (MEPA). Furthermore, BIAs such as the Swan Estuary Marine Park (located approximately 900m from Matilda Bay, 2,300m from Applecross and 1,800m from Elizabeth Quay) are afforded maximum level of ecological protection (MaxEPA).

In terms of monitoring and management for this proposal, MEQ guidelines (EQG's) are defined as:

- Sediment toxicant changes (EQG for Toxicants in sediments);
- Water toxicant changes (EQG for Toxicants in water);
- Light reduction, via TSS increase (EQG for physico-chemical stressors; TSS concentrations);
- Smothering of benthos (Biological indicators EQS).

Preferred methods for deriving EQC for the different indicator types and EQOs for the EV 'Ecosystem Health' (Based on the recommended approaches and trigger values in ANZECC & ARMCANZ (2000) with some adaptation for the Western Australian marine environment) (EPA, 2016c) is provided in Table 18 below.

Table 18 Proposed Environmental Quality Guidelines and Objectives

Indicator Type	Max LEP	High LEP	Mod. LEP	Low LEP
EQG for physico-chemical stressors	No detectable change from natural background	20th and/or 80th percentile of natural background, whichever is relevant	5th and/or 95th percentile of natural background, whichever is relevant	No EQG apply
EQG for Toxicants in water	Naturally occurring: No detectable change from natural background Xenobiotic: No detection using lowest available analytical limits of detection.	99% species protection trigger values, except for cobalt where the 95% species protection trigger is recommended.	90% species protection trigger values	80% species protection trigger values for potentially bioaccumulating/ bioconcentrating chemicals
EQG for Toxicants in sediment	Naturally occurring: No detectable change from natural background Xenobiotic: No detection using lowest available analytical limits of detection	ISQG-low* trigger values	ISQG-low* trigger values	ISQG-low* trigger values but only for potentially bioaccumulating/ bioconcentrating chemicals
Bioaccumulation/ Bioconcentration of toxicants (EQS)	No detectable change from natural background	80th percentile of tissue concentrations in filter or deposit feeder at suitable reference site.	No EQS apply	No EQS apply
Biological indicators (EQS)	No detectable change beyond natural variation	No detectable change beyond natural variation	No detectable change in biodiversity,	No EQS apply

Indicator Type	Max LEP	High LEP	Mod. LEP	Low LEP
			small changes in abundance and biomass and rates of ecosystem processes (e.g. 95th percentile of background)	

* Interim sediment quality guideline – low range.

As such, to align with the EPA's objectives for the protection of BCH, this proposal seeks to achieve the following environmental quality outcomes:

- EQG for physico-chemical stressors are to be maintained within 5th and/or 95th percentile of natural background levels, whichever is applicable, within the DE and at natural background levels within BIAs.
- EQG for toxicants in water are to be maintained at or below 90% species protection trigger values within the DE and at natural background levels within BIAs.
- EQG for toxicants in sediment are to be maintained at or below ISQG-low* trigger values.
- Biological indicators (EQS) to be maintained as no detectable change in biodiversity, minor changes in abundance and biomass, ecosystem process rates maintained within the 95th percentile of background levels within DE and no detectable change beyond natural variation within BIAs.

7.2 Relevant Policy and Guidance

Table 19 summarises the relevant policy and guidance considered for the factor MEQ.

Table 19 Policy and Guidance – Marine Environmental Quality

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Marine Environmental Quality (EPA, 2016c)	This guidance was used to inform the impact assessment undertaken for MEQ and the significance of the potential environmental impacts.
Technical Guidance: Protecting the Quality of Western Australia's Marine Environment (EPA, 2016d)	This document guides the appropriate obtainment and collation of MEQ data to be used in EIA. All studies conducted for the Proposal are in accordance with this guidance document.
Other State or Commonwealth Policy or Guidance	

Policy and Guidance	Consideration
***Conservation and Land Management Act 1984* (CALM Act) (WA)**	Management and legislative requirements for the protection of BIAs such as the Swan Estuary Marine Park (including benthic habitat), near the DE.
***Swan and Canning Rivers Management Act 2006* (SCRM Act) (WA)**	Management of seagrass health and impact risk assessment in areas outside of the Swan Estuary Marine Park.
International Convention for the Prevention of Pollution from Ships (MARPOL), by extension through: ***Pollution of Waters by Oil and Noxious Substances Act (1987)* (WA)**	Management of shipborne waste and hydrocarbon spills
DBCA Guidance Note 1 (2024a): Construction Environmental Management Plan	A CEMP identifies all the potential environmental risks or impacts that can arise during construction and the measures put in place to manage and minimise these impacts.
DBCA Guidance Note 2 (2024b): Algal sampling when using a silt curtain	Aims to prevent the spread of algal blooms into the river system. Guidance is provided on monitoring and sampling when conducting works within a silt curtain and/or works that disturb riverbed sediment.

7.3 Receiving Environment

7.3.1 Surveys and Studies

Marine environmental quality surveys and assessment have been undertaken within the DE to determine the baseline environment, used to inform Proposal avoidance and design. Details of these surveys are presented in Table 20.

Table 20 Marine Environmental Quality Surveys

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
Coastal Processes Impact Assessment Report **(Seashore Engineering, 2025)** **(Attachment L)**	Assessment Completed in September 2025	Survey guidance is limited and varies depending on the scale and cumulative risk of Proposals. This assessment relied upon review of existing and	The desktop assessment included a review of existing studies and data, records of historical modifications, and an analysis of shoreline and bed changes in the context of metocean drivers. The assessment reviewed

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
		historical information (refer to Section 7.3.1.1).	existing and potential changes to foreshore, metocean, active processes (i.e. sediment transfer and erosion) and conditions (wind water levels, and currents). The impact of vessel movements, including wave wake and scour, and the installation of new jetty infrastructure in the context of current and future coastal processes was evaluated for all three sites with a focus on Matilda Bay and Applecross due to foreshore types.
Assessment of Dredging Requirements **(BMT, 2025c)** **(Appendix H)**	Report provided June 2025	An assessment of whether dredging was required was guided by: • *AS 3962 Marina Design* (Australian Standards 2020); • *AS 4997-2005 Guidelines for the design of maritime structures* (Australian Standards 2005).	Desktop assessment using bathymetry, vessel design and weather and metocean conditions.
Benthic Habitat Surveys **(BMT, 2025b)** **(Appendix G)**	Surveys completed March 2025	Refer to Section 6.3.1.	
Baseline water quality monitoring **(Report pending)**	GHD Have been commissioned to undertake monthly water quality monitoring.	Water quality monitoring is being undertaken with reference to the following guidance: • *Water quality – Sampling: Guidance on the design of sampling*	Water quality sampling is being undertaken at the surface and approximately 0.5 m above the benthos to understand baseline water quality in the Proposal DE, including:

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
	Monitoring commenced in April 2025 and will be undertaken for a 12 month period (April 2025 to March 2026)	*programs, sampling techniques and the preservation and handling of samples* (Standards Australia, 1998a); • *Water quality – Sampling: Guidance on the sampling of rivers and streams* (Standards Australia, 1998b); • *Water quality – Sampling: Guidance on the sampling of marine waters* (Standards Australia, 1998c); • *Assessment and management of contaminated sites* (DWER 2023); • *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013); • *PFAS National Environmental Management Plan 3.0* (HEPA, 2025). Water quality samples are being analysed using the following guidelines: • Australian and New Zealand Guidelines for fresh and marine	• Elizabeth Quay (one location); • Matilda Bay (two locations); • Applecross (one location). Surface water sampling is also being undertaken at three reference sites outside of the Proposal DE: • Narrows Bridge; • Matilda Bay (waters east of the Matilda Bay site); • Heathcote (waters between Matilda Bay Reserve peninsula and the Applecross site).

Survey	Survey Timing	Survey Guidance	Survey Methods and Effort
		water quality (ANZG, 2018), for slightly to moderately disturbed ecosystems; • *PFAS National Environmental Management Plan 3.0* (HEPA, 2025).	
Sediment Sampling (BMT, 2025a) **(Appendix A)**	Sampling completed April 2025	Refer to Section 6.3.1.	

7.3.1.1 Coastal Processes Methodology

The desktop assessment included a review of existing studies and data, records of historical modifications, and an analysis of shoreline and bed changes in the context of metocean drivers. While survey guidance is limited, and varies depending on the scale and cumulative risk, this assessment relied upon review and evaluation of the following;

- Geology and geotechnical information;
- Bathymetry;
- Aerial Imagery;
- Site Photographs;
- Wind Records;
- River Flow Records;
- Tide Gauge datasets;
- AWAC data;
- Flow record;
- Development records;
- DBCA riverpark datasets;
- Vessel specification;
- Terminal design;
- Previous hydrology studies:

- PWD (1985);
- Middelmann et al. (2005);
- URS (2013);
- BMT (2019).

The assessment reviewed existing and potential changes to foreshore, metocean, active processes (i.e. sediment transfer and erosion) and conditions (wind water levels, and currents). The impact of vessel movements, including wave wake and scour, and the installation of new jetty infrastructure in the context of current and future coastal processes was evaluated for all three sites with a focus on Matilda Bay and Applecross due to foreshore types.

7.3.1.2 Dredging Requirements Methodology

Dredging requirements for the proposal were assessed by BMT (2025c) (Appendix H), based on recent bathymetric data, terminal layout and vessel design specifications. The assessment was conducted in accordance with the Australian Standard for Marina Design (AS 3962). Wave conditions generated by extreme wind events based on a 50 year ARI were considered, along with the influence of wakes from passing vessels.

These factors were considered in conjunction with design requirements for AS3962:2020 *Guidelines for design of marinas,* including:

- A design life of 25 years, consistent with general navigation channels and design life recommended for the design of Small Craft Facilities (AS 4997–2005 *Guidelines for the Design of Maritime Structures*);
- A design storm event of a 50 year Annual Recurrence Interval;
- An under keel clearance and over dredge allowance of 0.3 m for each, consistent with soft bed material and AS 3962 *Marina design*.

7.3.1.3 BCH Methodology

The methodology of the BCH survey are detailed in Section 6.3.1.

7.3.1.4 Water Quality Monitoring Methodology

GHD have been commissioned to undertake monthly water quality monitoring. Monitoring commenced in April 2025 and will continue through to April 2026. Water quality monitoring involves a combination of in-situ probe measurements and laboratory analysis of collected water samples to understand baseline water quality in the DE and Swan River. Probe measurements and sampling occurs at three depths: approximately 0.5 m below the water surface, approximately 0.5 m above the riverbed, and at a mid-water column depth (which varies depending on the bathymetry at each sampling location). Field parameters are allowed to stabilise prior to taking readings for:

- Temperature;
- Electrical conductivity (EC);

- pH;
- Turbidity;
- Salinity;
- Chlorophyll;
- Dissolved oxygen (DO);
- Oxidation-reduction potential (redox).

Raw water is sampled at various locations using a Niskin bottle, with samples screened for toxicant concentrations of the following analytes:

- Metals: aluminium, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, and zinc;
- Ions and cations: sulfate, chloride, alkalinity, sodium, potassium, calcium, and magnesium;
- Contamination: total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polyaromatic hydrocarbons (PAH), organochlorine pesticides (OCP), polychlorinated biphenyls (PCBs), organotins including tributylin (TBT) and antifoulants, and per- and polyfluoroalkyl substances (PFAS)
- Dissolved organic carbon, sulfides, total dissolved solids (TDS) and total suspended solids (TSS);
- Nutrients: total phosphorus, filterable phosphorus, total nitrogen, total oxidised nitrogen, total ammonia, total organic nitrogen (filterable) and total Kjeldahl nitrogen
- Algae: identification and enumeration of plankton species, chlorophyll (a, b and c), and pheophytin a.

Field and analytical data were tabulated and presented in a summary report with the adopted assessment criteria sourced from the following guidelines:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018), for slightly to moderately disturbed ecosystems;
- PFAS National Environmental Management Plan Version 3.0 (HEPA, 2025).

The final report is expected to be received in early-mid 2026.

7.3.1.5 Sediment Sampling Methodology

The results of the sediment sampling are detailed in Section 6.3.2.

7.3.2 Survey Findings

7.3.2.1 Coast Processes Results

Results from the Preliminary Coastal Processes Impact Assessment (Seashore Engineering, 2025) showed that;

- Wind waves at Applecross and Matilda Bay typically reach shorelines over 1,000 times per hour while ferry vessels are expected to contribution two waves per passing.
- Key existing active coastal processes include wind generated wave energy and the wave energy attributed to expected increases in rising sea levels and increased erosion.
- The high silt and clay content of the riverbeds at Applecross and Matilda Bay makes them susceptible to scour and deepening beneath the berth pocket and the resuspension of sediments. The extent of sediment resuspension depends upon the water depth and vessel thruster energy. At Matilda Bay, the shallowest depth is approximately -4.5 m AHD. At this depth the dispersion of vessel thruster energy may be supported, limiting the extent of bed disturbance. At Applecross, the terminal is located against the terrace margin and there may be localised slumping into the channel. Wake energy may add to overall wave energy at both Matilda Bay and Applecross sites but not Elizabeth Quay due to the highly modified and retained sea wall. While there is a moderate likelihood of vessel scour within the berth pocket, including resuspension of sediments, the consequence is considered low and readily mitigated through operational procedures.
- Wake energy generated by vessel transit may contribute to overall wave energy however its influence, to overall sediment movements and wave energy reaching the shoreline, is anticipated to be significantly lower than the existing active coastal processes.
- Overall, the proposed new ferry terminals at Applecross and Matilda Bay are expected to have relatively minor impacts on coastal processes, based on their interaction with existing morphology, foreshore and bed dynamics, and active sediment transport pathways. Key factors contributing to this outcome include:
    - The shore-based elements (i.e. jetty abutments) being positioned landward of the existing shoreline at Matilda Bay and within an existing revetment footprint at Applecross, limiting potential interruption of sediment transport.
    - Facilities consisting of piled structures, with sheltering effects largely associated with berthed vessels and floating jetties, causing only slight reductions in wave and surface current energy on the lee side.
    - Adherence to the Swan-Canning Estuary speed limits, with maximum speeds of 8 knots as vessels approach the terminals, will ensure boat wakes generate waves smaller than the ambient wind wave climate, with impacts at Applecross primarily confined to the already walled foreshore areas.
- The small extensions of the jetty at Elizabeth Quay and continued use of the existing facility at Barrack Street Jetty (No. 1 or 2) will have negligible influence on coastal processes, due to:
    - Established high vessel usage and ferry operations at these locations;

- Extensive prior shoreline modification through dredging, reclamation, and continuous walling.

- Overall the impacts of construction and operation of the Proposal are expected to be minimal and fully mitigated and managed through a suite of management measures.

7.3.2.2 Dredging Requirements Results

The navigable depth at the terminals was calculated in line with AS 3962 *Marina Design* (Australian Standards, 2020), incorporating vessel draft, wave conditions, underkeel clearance, overdredge allowance and squat allowance. This found that a depth of -2.35 m Chart Datum was required.

The preliminary designs of the proposal were evaluated in line with this navigable depth, turning and manoeuvring requirements and existing bathymetry. This found that the depths at Applecross generally align with the navigable depth, while the depths at Matilda Bay were significantly deeper at -3.8 m CD. On this basis, BMT (2025c) (Appendix H) concluded that no dredging is required for the Proposal.

7.3.2.3 BCH Results

The results of the BCH survey are detailed in Section 6.3.2 above.

7.3.2.4 Water Quality Monitoring Results

GHD have been engaged to undertake monthly water quality monitoring for a period of 12 months commencing in April 2025 and will continue through to April 2026.

7.3.2.5 Sediment Sampling Results

Sediment characterisation results are detailed in Section 6.3.2 above.

7.4 Potential Environmental Impacts

The Proposal has the potential to impact on marine environmental quality within and outside of each DE. Potential direct and indirect impacts are listed below.

7.4.1 Potential Direct Impacts

Table 21 outlines potential direct impacts of the Proposal to MEQ.

Table 21 Potential Direct Impacts to Marine Environmental Quality

Proposal Activity	Potential Direct Impact
Piling construction	Mobilisation of sediments temporarily causing increased TSS and reduced water quality, including light reduction outside of DE boundaries (Matilda Bay and Applecross only).
	Mobilisation of sediments causing increased water toxicity from sediment toxicants in water column, increasing risk of toxicant

Proposal Activity	Potential Direct Impact
	harm to marine flora and fauna (Matilda Bay and Applecross only).
Vessel scour	While there is a moderate likelihood of vessel scour within the berth pocket, including resuspension of sediments, the consequence is considered low and readily mitigated through operational procedures.
Silt curtain use	*Alexandrium* sp. bloom within silt curtains poses a risk to human health and water quality (Matilda Bay and Applecross only).
Accidental spills or discharges	Increased water toxicity from accidental spills or discharges during construction or operation.
Removal of existing moorings	Temporary mobilisation of sediments causing increased TSS and reduced water quality (Matilda Bay).

Sediment sampling results indicate that they are suitable for minor disturbance (BMT, 2025a). Although some parameters slightly exceeded relevant DGVs, any mobilisation into the water column is unlikely to result in toxicity levels beyond those currently observed in the environment.

The removal of existing moorings to facilitate jetty construction will be carefully managed to minimise both environmental and operational impacts. A site specific assessment will be undertaken prior to removal to identify potential risks to marine habitats or species. Extraction methods will be selected to minimise seabed disturbance and sediment resuspension. Any biofouling or invasive marine species (IMS) present on the moorings will be handled in accordance with biosecurity protocols to prevent the spread of marine pests. Additionally, coordination with DBCA will ensure that removal process aligns with regulatory requirements and best practice guidelines, supporting the protection of the local marine environment during construction.

7.4.2 Potential Indirect Impacts

Table 22 outlines potential indirect impacts of the Proposal to MEQ.

Table 22 Potential Indirect Impacts to Marine Environmental Quality

Proposal Activity	Potential Indirect Impact
Piling construction	Mobilisation of sediments causing smothering of BPPH at settlement, affecting BPPH growth and/or survival (Matilda Bay and Applecross only).

Proposal Activity	Potential Indirect Impact
	Mobilisation of sediments causing light reduction, affecting BPPH growth and/or survival in BIAs (Matilda Bay and Applecross only).
	Mobilisation of sediments causing increased sediment toxicity in water column or at settlement on benthic habitats outside of DE (including BIAs) (Matilda Bay and Applecross only).
Site waste accumulation	Increased water toxicity and fouling of waterways from site waste (litter) accidentally released into Swan-Canning Estuary during construction.
Vessel movement	Mobilisation of sediments causing smothering of BPPH at settlement in BIAs, affecting BPPH growth and/or survival.
	Mobilisation of sediments causing light reduction, affecting BPPH growth and/or survival in BIAs.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 7.6 for both direct and indirect impacts.

7.5 Mitigation and Avoidance

Table 23 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to MEQ during the scoping phase of the Proposal.

Table 23 Mitigation and Avoidance Action Considered for Marine Environmental Quality

Design or management measure	Description
Avoid	
Screen sediment toxicant values at DE to prevent ecosystem changes to water quality	Elutriate and bioavailability testing of sediment quality was assessed, with results indicating that sediments are suitable for minor disturbance (BMT, 2025a).
Use of sediment control measures (i.e. silt curtains or similar) during construction	Prevention of sediments being mobilised into waters outside of the DE through the use of a sediment control measures to provide a physical barrier that prevents suspended sediments from leaving the construction areas.
Minimise	

Design or management measure	Description
Site Specific CEMP to include controls for management, monitoring and reporting of TSS plumes during piling and vessel use.	The implementation of management measures in the CEMP (Appendix I) provides a structured framework for monitoring and managing potential indirect impacts on MEQ including: • Collection of pre-development sediment samples to determine sediment quality; • Visual monitoring for sediment plumes, water quality monitoring and deploying sediment control measures; • Implement trigger levels, tolerance limits and shut down thresholds if sediment plumes observed outside of control measures and/or if severe weather conditions are forecast; • Waste and hazardous chemical management measures to prevent release into receiving environment; • Provide oil spill response plans, which incorporate the International Convention for the Prevention of Pollution from Ships (MARPOL) requirements and meet conditions from *Pollution of Waters by Oil and Noxious Substances Act 1987.* Development of the Proposal will be managed through a Part 5 development approval under the SCRM Act.
Site specific OEMP to include controls for management, monitoring and reporting of impacts associated with the operation of the Proposal.	Ongoing operation of the Proposal will be subject to an OEMP which will include controls relating to: • Ferry route, times and speeds. • Pollution controls (spill kits, regular ferry inspections and maintenance, reporting of any incidents). • Waste disposal (daily inspection of waste receptacles, provision of suitable waste disposal opportunities, passenger signage, use of low or no impact chemicals for cleaning). • Wastewater and rubbish management, ferry refuelling/charging and servicing requirements (including locations). The Proposal will be managed through a rivers reserve lease under Section 29 of the SCRM Act.
Rehabilitate	
No rehabilitation required.	N/A

7.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impacts of the Proposal on MEQ, following implementation of the mitigation measures detailed above, indicates that risks can be adequately avoided and/or managed.

The EPA's objective for marine environmental quality '*to maintain the quality of water, sediment and biota so that environmental values are protected'* has been considered in undertaking the following assessment.

Piling works associated with the construction of the jetties and terminals at Applecross and Matilda Bay are expected to result in a temporary localised increase in turbidity, generally within 5-20m of the pile location. Installation of a sediment control measures, visual observations and ongoing water quality monitoring (as outlined in the CEMP, I) will ensure that any localised impacts are adequately managed and do not spread beyond the DE.

Sediment sampling results indicate that other than high nutrient levels which are expected, sediment quality is generally within relevant criteria (Australian & New Zealand Guidelines for Fresh and Marine Water Quality) and therefore is unlikely to introduce any contaminants or toxicants above existing levels.

Sediment sampling results identified a number of exceedances of the National Assessment Guidelines for Dredging Screening Levels. While dredging is not required for implementation of the Proposal, these findings will inform the water quality monitoring program during piling activities to ensure that any suspended sediments do not adversely affect surrounding water quality.

As such, predicted impacts are considered minor and short-term in nature, and are unlikely to result in a significant effect to MEQ.

7.7 Environmental Outcomes

Environmental outcomes and conditions to protect marine environmental quality are proposed in Table 24.

By implementing the Proposal in accordance with the PCD and the proposed environmental outcomes below, the protection of MEQ will be supported, ensuring the maintenance of biological diversity and ecological integrity within the region.

Table 24 Proposed Environmental Outcomes for Marine Environmental Quality

Proposed environmental outcomes	How environmental outcomes can be measured and assured
Maintain post development water clarity at pre-development levels to preserve ecosystem values	• TSS monitoring both pre and during development; • Visual observations and daily reporting.

Proposed environmental outcomes	How environmental outcomes can be measured and assured
Maintain water quality	Sediment and water quality monitoring parameters to be within background ranges (as guided by the pre-development baseline water quality monitoring results) within two years of construction being completed.
Benthic habitat maintained at acceptable levels to preserve ecosystem values	Benthic habitat surveys pre and post construction. Active management response and post surveys of benthic habitat if sediment plumes are identified outside of controls. Compliance reports for CEMP and OEMP conditions.
Aquatic biodiversity within Swan-Canning Estuary and the Pelican Point Marine Park to be maintained at current condition.	Habitat and water quality surveys post-completion to confirm no changes due to construction activity.
MEQ impacts as a result of construction activities are confined to the development envelope	No detectable impacts to marine water quality outside the development envelope based on sediment and water quality monitoring and observations.

Following consideration of impacts to MEQ, the PTA considers the Proposal can by managed to maintain and protect environmental values for MEQ and therefore the EPA's objective for this factor can be met.

8.0 Marine Fauna

The EPA Environmental Factor Guideline defines marine fauna as "*animals that live in the ocean or rely on the ocean for part or all of their lives*". This includes creatures that live their entire lives in marine waters (like sharks, whales, and fish), as well as those that use the ocean for breeding or resting (like turtles, seals, and penguins) (EPA, 2016e).

8.1 EPA Objective

The EPA's objective for the factor of marine fauna is "*To protect marine fauna so that biological diversity and ecological integrity are maintained.*"

And:

"In the context of this objective: Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural variation of these elements." (EPA, 2016e).

As such, proponents must also consider the ability of marine fauna to live with sufficient access to suitable habitat, spatial extent and living conditions that allow natural processes to occur.

8.2 Relevant Policy and Guidance

Table 25 summarises the relevant policy and guidance considered for the Marine Fauna factor.

Table 25 Policy and Guidance – Marine Fauna

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Marine Fauna (EPA, 2016e).	This guidance was used to inform the impact assessment undertaken for marine fauna and the significance of the potential environmental impacts.
Other State or Commonwealth Policy or Guidance	
***Swan and Canning Rivers Management Act 2006* (SCRM Act) (WA)**	Management of ecological health and impact risk assessment in areas of the Swan and Canning Rivers
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth)**	An assessment against MNES using the PMST has been undertaken to support the Proposal.
National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (DCCEEW 2017)	This guidance was used to inform risk assessment of Indo-Pacific bottlenose dolphins being struck by construction and operating vessels.

Policy and Guidance	Consideration
International Convention for the Prevention of Pollution from Ships (MARPOL), by extension through: ***Pollution of Waters by Oil and Noxious Substances Act (1987)*** **(WA)**	Management of sewage, garbage waste and hydrocarbon spills of ships and vessels, causing adverse changes to the water quality in habitats used by marine fauna.
Underwater Piling and Dredging Noise Guidelines (Government of South Australia, 2012)	Provides further guidance for the assessment of piling noise impacts on aquatic fauna and impact management requirements.
Biosecurity and Agriculture Management Act 2007 **(BAM Act) (WA)** **Biofouling Biosecurity Policy (DPIRD, 2017)** ***Fish Resources Management Act*** **1994 (FRM Act) (WA)**	Prevention of Invasive species incursion and management of proliferation into new regions for Western Australia. IMS are considered a risk factor for marine fauna as introduction of IMS could change the local ecology, impacting marine fauna species living conditions.
DBCA Guidance Note 1 (2024): Construction Environmental Management Plan	A CEMP identifies potential environmental risks or impacts to marine fauna that can arise during construction and the measures put in place to manage and minimise these impacts.
Guide on the Limitation of Effects of Obtrusive Light from Outdoor Lighting Installations (CIE 2003).	Minimising artificial lighting impacts to marine fauna.

8.3 Receiving Environment

8.3.1 Surveys and Studies

An aquatic noise assessment was undertaken as outlined in Table 26 below.

Table 26 Marine Fauna Surveys and Studies

Survey / Studies	Survey Timing	Survey Guidance	Survey Methods and Effort
Aquatic Noise Assessment **(SLR, 2025)** **(Appendix J)**	Assessment completed in July 2025.	SLR completed the aquatic noise assessment in accordance with *Technical Guidance for Assessment the Effects of Anthropogenic Sounds on Marine Mammal Hearing Version 3.0* (NFMS 2024).	Refer to Section 8.3.1.1.

Survey / Studies	Survey Timing	Survey Guidance	Survey Methods and Effort
		Modelled noise levels were assessed against the following guidance: • *Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects* (Southall et al., 2019); • National Oceanic and Atmospheric Administration (NOAA) noise exposure criteria for fish and sea turtles (NOAA, 2004); • Assessment criteria for impulsive and non-impulsive noise outlined in *Technical Guidance for Assessment the Effects of Anthropogenic Sounds on Marine Mammal Hearing Version 3.0* (NFMS 2024).	

8.3.1.1 Aquatic Noise Assessment Methodology

As part of the Aquatic Noise Assessment (SLR, 2025) (Appendix J), SLR was engaged to develop an aquatic noise model and assess potential impacts on selected marine fauna and human divers/swimmers.

The sensitive aquatic receptors that may be adversely affected by noise emissions from the construction and operation activities include marine mammals, particularly Swan River Dolphins (i.e. Indo-Pacific bottlenose dolphins), various fish species and human divers/swimmers. Further discussion on impacts to human receptors is provided in Section 9.0.

SLR modelled the worst-case credible scenarios which are listed in Table 27.

Table 27 Modelled Worst-case Scenarios of Underwater Noise

Scenario	Source Level
Construction piling at Matilda Bay	Unweighted 204 dB re 1 $\mu Pa^2.s$
Construction piling at Elizabeth Quay	

Scenario	Source Level
Construction piling at Applecross	
Ferry operation between Elizabeth Quay and Matilda Bay (return trip).	Overall unweighted 145 dB re 1 μPa^2.s
Ferry operation between Matilda Bay and Applecross (return trip).	
Ferry operation between Elizabeth Quay and Applecross without stopping (return trip).	
Ferry operation from Elizabeth Quay to Matilda Bay, and then to Applecross (return trip).	

For piling scenarios, the model assumes use of a 150 kilonewton metre (kNm) impact class hydraulic hammer, selected based on the diameter of each pile and the scale of each terminal footprint. Source noise was modelled to produce a spectral curve (one-third octave spectra) derived from piling activities with a sound exposure level[1] (SEL) of 199 decibels (dB re 1 μPa^2.s), based on a 49 kNm impact hammer (Kent et al, 2009). To estimate noise emissions from the larger 150 kNm impact hammer, it was assumed that the noise generated per piling strike is proportional to the energy delivered to the pile. Further details on this scaling approach are provided in Section 2.3.2.1. of SLR (2025).

A range of scenarios was then evaluated against safe noise exposure thresholds for various species. These scenarios considered different strike counts ranging from 100 to 3,000 strikes per 24-hour period, to determine safe setback distances for both impulsive and continuous noise impacts across different fauna groups.

In each operating scenario, the 24m electric catamaran passenger ferry travels at a speed of 20 knots (approximately 10 m/s), following the current Transperth Ferry Service timetable. The worst-case scenario assumes up to 67 return trips (a total of 134 single trips) per 24-hour period, operating between 6:00 am to 12:30 am.

Potential impacts on marine fauna were assessed against the following criteria:

- Audibility and Detection: Marine fauna detect sound based on frequency-dependent hearing sensitivity, with most having U-shaped audiograms, making them particularly sensitive to mid-range frequencies. Fish detect sound primarily through particle motion

[1] Sound exposure level (SEL) is a measurement type that is applied to impulsive signals such as piling or seismic pulses to determine their effect on marine fauna. Itis the integration of sound energy produced from a source, normalized to the level necessary to produce that amount of energy in a single second. These values are reported with units of dB re 1 $\mu Pa2 \cdot s$ and can represent the energy accumulated over a given time period (i.e., 24 hours) (SLR, 2025)

and, and in some species, also through sound pressure via specialized anatomical structures.

- Masking: Masking occurs when anthropogenic noise interferes with the ability of marine fauna to detect biologically significant sounds. However, many species can mitigate these effects through auditory adaptations and behavioural strategies.
- Behavioural Responses: Exposure to noise can trigger a range of behavioural changes in marine animals, from subtle shifts to strong avoidance, depending on the sound's characteristics and the individual traits of the affected species.
- Physiological Effects, Hearing Loss and Physical Injury: High levels of noise exposure may result in temporary or permanent hearing loss and other physiological damage. Among these, auditory impacts are considered the most severe, followed by behavioural disturbances.

Results were characterised into four levels:

- Temporary hearing Threshold Shift (TTS) – The distance boundary from the source noise that causes temporary hearing loss to fauna.
- Permanent hearing Threshold Shift (PTS) – The distance boundary from the source noise that causes permanent hearing loss to fauna.
- Recovery from injury – minimum distance boundary from which injury occurs to animals above hearing loss that is potentially recoverable to fauna.
- Mortality and potentially mortal injury – minimum distance boundary from which mortality can or will occur to fauna.

8.3.2 Survey Findings

8.3.2.1 Aquatic Noise Assessment Results

Construction Predictions

In summary, with direct line of sight[2] and with no mitigation measures implemented, the modelling predicts:

For Indo-Pacific bottlenose dolphins:

- Immediate impacts: Underwater noise from piling activities is unlikely to cause physiological harm to Indo-Pacific bottlenose dolphins. However, behavioural disturbances are predicted within 1.5km radius of the piling locations.
- Cumulative impacts: With up to 3,000 piling strikes over a 24-hour period, cumulative exposure is expected to result in increasing zones of auditory effects. Permanent Threshold Shift (PTS) may occur within 700 metres, while Temporary Threshold Shift

[2] Note that these distances are based on ‘direct line of sight’ and prior to any mitigation measures, i.e. assumes no screening from terrain, no specific mitigation and are conservatively rounded.

(TTS) effects may extend up to 2.0km, assuming the animals remain continuously within the affected area.

For fish species:

- Immediate impacts: physiological effects from piling noise is predicted within 20 m of the piling locations.
- Cumulative impacts: With cumulative exposure from up to 3,000 piling strikes over a 24-hour period, recoverable injury may occur within 400m, and TTS effects may extend up to 2.5km, provided the fish remain within the impacted zone (SLR, 2025).

Operation Predictions

Impact zones from the ferry operation were modelled and assessed based on cumulative continuous noise exposure over a 24-hour period for marine mammals.

The results show that, under the proposed operational conditions, including a source level equivalent to the current ferry, a speed of 20 knots, and adherence to the current ferry service timetable, the threshold levels for PTS and TTS are not exceeded for marine mammals.

A substantial margin of more than 20 dB exists between the assessed levels and the relevant threshold. Even under a hypothetical scenario where ferry speed is halved while maintaining the same sound power level (considered unlikely), noise emissions would still remain below threshold levels.

Modelled results also show that ferry noise poses very low physiological risks to fish species with swim bladder involved in hearing. Thresholds for mortality, recovery injury and TTS are not reached.

Potential behavioural disturbance from the non-impulsive noise emissions from ferry operations is predicted to be within 10m of the ferry routes for marine mammals across all hearing groups, as well as for human divers and swimmers. For fish and turtles, behavioural thresholds are not exceeded (SLR, 2025).

8.4 Potential Environmental Impacts

The Proposal has the potential to impact on marine fauna within the Proposal DE. Potential direct and indirect impacts are listed below.

8.4.1 Potential Direct Impacts

Table 28 outlines potential direct impacts of the Proposal to marine fauna.

Table 28 Potential Direct Impacts to Marine Fauna

Proposal Activity	Potential Direct Impact
Construction and Operation activities – vessel movements	Vessel strike or entanglement in equipment by individual/s of a vertebrate species.

Proposal Activity	Potential Direct Impact

Underwater noise from construction piling	The potential impacts of noise on marine fauna species include audibility, detection and masking of communication and other biological important sounds, behavioural responses and physiological impacts which generally include discomfort, hearing loss, physical injury and mortality (SLR, 2025).
	
	Modelling (SLR, 2025) suggests for Indo-Pacific Dolphins subject to cumulative exposure from up to 3,000 piling pulses within a 24-hour period the following may occur (if the mammals remain in the area continuously):
	• Behavioural disturbance effects within 1.5km from the piling locations;
	• Permanent hearing loss within 700m from the piling locations;
	• Temporary hearing loss within 2.0km from the piling locations.
	
	Modelling suggests for fish the following may occur:
	• Immediate impacts:
	  ○ Physiological effects within 20m of piling locations.
	• Cumulative exposure from up to 3,000 piling pulses within a 24-hour period (if the animals remain in the area continuously):
	  ○ Recoverable injury up to 400m from the piling locations;
	  ○ Temporary hearing loss within 2.5km from the piling locations.

Baseline mortality rates for dolphins in the Perth region remain poorly understood. However, available data suggest that most recorded dolphin deaths in the Swan River are not linked to human activities such as vessel strikes. A study by Chabanne et al. (2012) which analysed sighting data of Indo-Pacific bottlenose dolphins in the Swan-Canning Estuary between June 2011 and July 2012, documented 109 sightings. The study also reviewed mortality events over the preceding decade and found that the majority of deaths were attributed to bacterial or viral infections, rather than anthropogenic causes.

Anthropogenic factors are considered biologically significant when they affect key demographic parameters such as birth and death rates to the extent that population viability is threatened. However, this definition does not encompass non-lethal injuries (Chabanne et al. 2012). In complex estuarine environments like the Swan-Canning, multiple stressors interact, making it difficult to isolate indirect causes of mortality. Environmental changes and food

availability, when combined with human-related pressures, can increase susceptibility to infectious diseases due to physiological stress and injury (Van Bressem et al., 2009). Consequently, it may be impossible to determine whether vessel strikes have indirectly contributed to deaths. Therefore, management strategies must consider the overall risk of vessel strikes, not just direct fatalities.

While there is no universal solution to mitigating vessel strikes involving cetaceans, the International Maritime Organization (IMO), with support from Australia, developed a guidance document in 2008 to address this issue. This guidance has informed national policies, including the *Australian National Guidelines for Whale and Dolphin Watching* (DCCEEW, 2017b), which incorporate principles aimed at reducing the risk of ship strikes.

When considering Indo-Pacific bottlenose dolphins in the Swan River, vessel speed, size and movement pattern (dedicated route versus erratic) influence the severity and frequency of collisions. The chance of an injury being lethal increases significantly as vessel speed increases up to 13-15 knots (Vanderlaan and Taggart, 2007; DOE, 2015). Nationally, lethal or severe injuries to cetaceans have been primarily associated with vessels over 80m in length and those travelling at speeds exceeding 14 knots. In contrast, vessels operating at speeds below 10 knots rarely collide with cetaceans (Laist et al., 2001; Vanderlaan and Taggart, 2007; Wiley et al., 2011).

8.4.2 Potential Indirect Impacts

Table 29 outlines potential indirect impacts of the Proposal to marine fauna.

Table 29 Potential Indirect Impacts to Marine Fauna

Proposal Activity	Potential Indirect Impact
Pollutant/waste discharge	Changes to toxicological parameters of receiving water due to waste release. Pollutants from construction vessels (such as sewage, waste or fuel) may lead to chemical toxins leaching into the waterways and ingested by marine fauna leading to sickness or potential deaths.
Sediment mobilisation from benthic disturbance (piling)	Changes to one or more of physico-chemical, toxicological or water turbidity parameters in the receiving environment due to suspended sediments may create conditions unsuitable for marine fauna to habitation.
Silt curtain use	*Alexandrium sp*. may bloom under certain conditions within silt curtains, posing a health risk to marine fauna and humans. *Alexandrium sp*. are considered irritant species.
Vessel movement	Vessel strike or entanglement in equipment may cause injuries to marine fauna that lead to subsequent infection in wounds.
Installation of artificial lighting over water	There is potential for artificial lighting to interfere with natural behaviours of marine fauna.

Proposal Activity	Potential Indirect Impact
IMS incursion	Risk of introduction of IMS if vessels used in construction are not locally sourced, which could change the local ecology, impacting marine fauna species.

8.5 Mitigation and Avoidance

Table 30 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to marine fauna during the scoping phase of the Proposal.

Table 30 Mitigation and Avoidance Actions Considered for Marine Fauna

Design or management measure	Description
Avoid	
Speed restrictions on operating and construction vessels	Speed restrictions as per current navigational conditions imposed by Department of Transport (8 knots) already significantly reduce likelihood of vessel strike on Indo-Pacific bottlenose dolphins to levels appropriate to manage risk.
Shut down zones for marine mammal observations	Piling activities will be suspended if dolphins are observed within an agreed distance from the site, depending on the expected daily hammer strike thresholds. Work may only resume once dolphins have moved beyond 200 m from the site or have not been sighted within the vicinity for at least 20 minutes.
Ferry type	Electric ferries are predicted to reduce noise impacts to marine fauna compared to traditional diesel-powered ferries.
No dredging of terminal berths	Terminals' design to incorporate berths with sufficient depth to safely accommodate vessel draught requirements and minimise sediment accumulation. This approach reduces the likelihood of suspended sediment interactions with marine fauna, therefore lowering the risk of indirect health impacts.
Minimise	
CEMP and contractor scope to include piling methods that do not displace sediments into the water column	Mobilisation of sediments outside of the DE to be avoided by minimising TSS plumes during construction activity. Sediment control measures (i.e. silt curtains or similar) to be implemented as a management approach to prevent spread of TSS.
Alternative piling methods	Alternative piling methods (such as vibration piling) will be explored and implemented where possible to reduce underwater noise impacts on marine fauna.
Manage suspended sediment toxicant values at DE's	Adapt construction techniques to prevent or minimise mobilisation of sediments from sites with toxicant values exceeding ANZG (2018). This reduces potential for interaction of marine fauna with suspended sediments, which can indirectly affect health.

Design or management measure	Description
Integrated waste management procedures	Reduce risk of ingestion, entanglement or toxicant exposure from waste items to marine fauna by implementation of waste and spills management measures as outlined in the CEMP (Appendix J).
Management of water toxicant concentrations during construction inside silt curtains	Manage water quality as per Section 7.0, bacterial outbreaks within silt curtains may cause poor water quality, subsequently affecting marine fauna if/when released.

Active management of underwater noise propagation from construction activity	Incorporate guidance from DBCA CEMP Guidance Note 1 (DBCA, 2024a), Underwater Noise Piling Guidelines (Government of South Australia, 2012) and Aquatic Noise Management Plan (Section 2.5 of SLR, 2025) report into CEMP, which includes:
	• Contract Documentation: Include all piling noise management and mitigation requirements in project contracts.
	• Trained Crew: Ensure a qualified person (e.g., Marine Mammal Observer) is present during piling to implement noise mitigation procedures.
	• Standard Operational Procedures:
	  ○ Pre-start Monitoring: Conduct 30-minute visual monitoring for marine mammals or human divers/swimmers before piling begins.
	  ○ Soft Start: Begin with low-energy strikes (6 strikes/min) and gradually increase over 10 minutes if no animals/divers are detected; also used after breaks longer than 30 minutes.
	  ○ Normal Piling: Proceed with full impact energy if no animals/divers are observed during soft start; continue visual monitoring throughout.
	  ○ Stand-by: If animals/divers are seen in the observation zone (500m), place piling rig on stand-by and continue monitoring.
	• Shut-down: Immediately stop piling if animals/divers enter or approach the shut-down zone (190m); resume only after 30 minutes without sightings or once they leave the zone, starting again with soft start. Stop operations during poor visibility if animals are detected.

Artificial lighting design	Engineering design for jetties to include minimum suitable lighting intensity that is fit-for-purpose so that it meets relevant Australian Standards and safety requirements. Lighting can be used to highlight the features of the infrastructure as a means of enhancing the amenity of the

Design or management measure	Description
	area. Where practicable, in areas of habitat or conservation significance unnecessary light spill should be minimised and lamp types selected to minimise adverse impacts on fauna. Design to incorporate the Guide on the Limitation of Effects of Obtrusive Light from Outdoor Lighting Installations (CIE 2003).
Vessel IMS clearance	Although the potential consequences of an incursion by IMS can be significant, the likelihood of occurrence from local vessel traffic, including work barges, is considered very low and does not warrant additional management measures. However, if vessels are sourced from regions outside Fremantle and its surrounding waters for use during construction or operational activities, they will be required to obtain clearance certificates prior to entry. Vessel clearance requires hull inspection for vessels entering the Swan River from regions outside of South-West WA. Vessel(s) to be registered in Vessel-Check. DPIRD manages these inspections through the Vessel-Check portal. Vessel-Check includes: • Assessment of risk of a vessel in relation to biofouling, according to International Maritime Organisation (IMO) in their Biofouling Guidelines. • Biofouling inspection by DPIRD certified inspectors.
Rehabilitate	
No rehabilitation required.	N/A

8.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impacts of the Proposal on marine fauna, following implementation of the mitigation measures detailed above.

The EPA's objective for coastal processes '*to protect Marine Fauna so that biological diversity and ecological integrity are maintained*' has been considered in undertaking the following assessment.

8.6.1 Direct Impacts to Marine Fauna

Adherence to navigational speed restrictions by construction vessels and operating ferries along designated routes is expected to effectively mitigate the risk of vessel strikes on marine fauna, resulting in negligible residual impacts.

Indo-Pacific bottlenose dolphins may be impacted by underwater noise generated during piling activities associated with jetty construction. Such noise can lead to behavioural changes including avoidance of the area, reduced foraging efficiency, disruption of social communication, and in extreme cases, physical harm or mortality. However, the residual risk of these impacts is expected to be effectively mitigated through the implementation of the control measures outlined in the CEMP (Appendix I). These include soft start procedure for piling activities, marine mammal observers present during piling and piling shut down if dolphins are observed within an established distance of the piling location based on area of potential impacts as outlined in the noise assessment (SLR, 2025).

While temporary and localised alterations to the underwater acoustic environment may affect the foraging behaviour of marine fauna during construction, these changes are not anticipated to result in long-term or persistent effects following the completion of works.

To further reduce underwater noise impacts, the PTA will explore alternative piling methods and physical mitigation measures such as bubble curtains, isolation casings and double pile sleeves. These approaches can significantly reduce residual impacts, for example, replacing a hydraulic hammer with a vibration hammer can reduce the impact zone for Indo-Pacific bottlenose dolphins by up to tenfold (Appendix J).

8.6.2 Indirect Impacts to Marine Fauna

Implementation of the CEMP and the design and management measures outlined in Table 30 will effectively minimise potential indirect impacts, resulting in a negligible risk associated with:

- Accidental pollution or waste discharge;
- Sediment mobilisation beyond the designated DE.

Additionally, artificial light is not expected to pose a residual risk provided that design specifications meet agreed standards. The risk of IMS incursion is also considered negligible if management procedures are appropriately followed.

8.6.3 Significance of Residual Impact

Based on an assessment of the significance of residual impacts with reference to the '*consideration of significance*' matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a), the construction and operation of this proposal are not expected to result in significant residual impacts on marine fauna for the following reasons:

- The DE is not within a BIA, or critical habitat for any marine fauna species and the habitat is unlikely to support State or Federally protected cetaceans, fish or marine turtles.

- While more common marine fauna such as the Indo-Pacific bottlenose dolphins, prawns and fish could traverse the habitat or potentially feed in the habitat beneath the jetties, any impacts from construction or operation are expected to affect only a small number of individuals. For example, behavioural responses to piling or isolated vessel strikes may occur, but these are not anticipated to result in population level effects.
- Electric ferries are expected to produce significantly less underwater noise compared to traditional diesel-powered vessels. This reduction in acoustic output is beneficial for marine fauna, particularly cetaceans such as Indo-Pacific bottlenose dolphins which rely on sound for navigation, communication, and foraging. The EPA's Marine Fauna guideline emphasises the importance of minimising underwater noise to avoid behavioural changes or displacement. Given the quieter operation of electric ferries, management measures to be implemented, the risk of long-term behavioural disturbance or hearing damage to Indo-Pacific bottlenose dolphin populations is very unlikely.
- Underwater noise from piling activities may temporarily affect marine fauna. However, these impacts will be short-term (no longer than 6 months per terminal) and can be effectively managed through mitigation measures such as soft start piling procedures, exclusion zones, and observations by marine mammal observers. It is likely an Indo-Pacific bottlenose dolphin or fish will move away from the noise source before PTS or TTS can occur. These controls align with EPA expectations for managing construction-phase impacts and ensure that any residual effects are insignificant at a population level.
- The footprint of the jetty and associated infrastructure is small and located in a previously disturbed or developed area, reducing the likelihood of significant habitat loss or fragmentation. The EPA considers habitat integrity a key factor in assessing impacts on marine fauna. Since the project avoids critical habitats such as seagrass beds, or known breeding grounds, and does not introduce barriers to movement, the residual impact on habitat availability and connectivity is considered insignificant.
- The operation of electric ferries within Swan River supports the EPA's broader environmental objectives by reducing emissions, noise, and the risk of fuel spills. These benefits contribute to a healthier marine environment and reduce cumulative pressures on marine fauna.
- The risk of vessel strikes to marine mammals is considered low, given the high volume of vessel traffic on the Swan River—including large vessels such as the Rottnest ferry and the existing PTA ferry service—and the minimal number of reported dolphin fatalities attributed to such incidents. Furthermore, vessel speeds will be strictly regulated during operations, further mitigating the potential risk of marine mammal strikes.

8.7 Environmental Outcomes

The environmental outcomes that apply to marine fauna during the construction and operation phases of the Proposal are provided in Table 31.

Table 31 Proposed Environmental Outcomes for Marine Fauna

Proposed environmental outcomes	How environmental outcomes can be measured and assured
No population level impacts to marine fauna.	Implement CEMP and avoidance and mitigation measures discussed above (Table 30) to ensure impacts are minor temporary and contained within the DE.
No reported behavioural changes, displacement, or injury to marine fauna and habitat, particularly cetaceans such as *Tursiops sp.*	Marine mammal observations and shut down procedures during piling works, including record logs and reporting. The jetties will not impede the movement or behaviour of marine fauna, nor permanently displace marine fauna.
No reported collisions or physical harm to marine fauna such as *Tursiops sp.* by construction vessels or operating ferries.	Implement and monitor vessel speed limits. Incident reporting systems should be in place to document any interactions or near misses with marine fauna. A zero-incident target is ideal for demonstrating effective mitigation.
No significant or long-term degradation of important marine habitats (e.g., seagrass beds, benthic communities).	Conduct pre- and post-construction habitat mapping. Monitor turbidity levels during construction to ensure sedimentation does not exceed ecological thresholds.

Following consideration of impacts to marine fauna, the PTA considers the Proposal can by managed to maintain and protect environmental values for marine fauna and therefore the EPA's objective for this factor can be met.

9.0 Social Surroundings

The EPA guidelines define social surroundings as "*the social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings*" (EPA, 2023a). This, in effect, means there must be a clear link between a proposal or scheme's impact on the physical or biological surroundings and the subsequent impact on a person's aesthetic, cultural, economic or social surrounding (EPA, 2023b).

9.1 EPA Objective

The EPA's objective for the factor of Social Surroundings is "*to protect social surroundings from significant harm*" (EPA, 2023a).

9.2 Relevant Policy and Guidance

Table 32 describes the relevant policy and guidance that has been considered for the factor Social Surroundings.

Table 32 Policy and Guidance – Social Surroundings

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Social Surroundings (EPA, 2023a).	The information provided in Section 5.3 addresses the 'considerations for environmental impact assessment' listed in this document.
Technical Guidance: EIA of Social Surroundings – Aboriginal Cultural Heritage (EPA, 2023b).	This document guides the appropriate obtainment and collation of ACH data to be used in EIA. All studies conducted for the Proposal are in accordance with these guidelines.
Other State or Commonwealth Policy or Guidance	
Environment Protection (Noise) Regulations 1997 (Noise Regulations)	Th Regulations operate as a prescribed standard under the EP Act and set limits on noise emissions for WA.
Planning and Development Act 2005 (WA)	Administered by WAPC this act provides regulation for the zoning and management of land within Western Australia.
City of Perth Local Planning Scheme No. 2	The scheme outlines the planning framework, zoning, land use controls, and approval requirements, guided by the Local Planning Strategy and policies for the City of Perth.
City of Melville Local Planning Scheme No. 6	The scheme outlines the planning framework, zoning, land use controls, and approval requirements, guided by the Local Planning Strategy and policies for the City of Melville.

Policy and Guidance	Consideration
Aboriginal Heritage Act 1972 (AH Act) (WA)	The Act defines and protects ACH in WA, by requiring approval for any activities that could potentially harm ACH sites.
***Heritage Act 2018* (WA)**	This Act recognises, protects and promotes understanding of WA's cultural heritage.

9.3 Receiving Environment

9.3.1 Surveys and Studies

Table 33 outlines relevant technical studies and surveys completed for Social Surroundings to determine baseline environment and inform Proposal avoidance and design. These surveys will be provided for reference within the Proposal's referral package.

Table 33 Social Surroundings Surveys

Survey	Survey Timing	Survey Guidance and Adequacy	Survey Methodology and Effort
Aboriginal Ethnographic and Archaeological Survey Report (AHA, 2025c)	Field survey was completed in July 2025.	Field survey with Whadjuk and Noongar family representatives was undertaken in accordance with the Noongar Standard Heritage Agreement for which the PTA is a signatory. The Aboriginal Ethnographic and Archaeological Survey and Consultation was completed in accordance with the following: • *Aboriginal Heritage Act 1972* • *Aboriginal Heritage Regulations 1974* • *Native Title Act 1993*	AHA Logic undertook an Aboriginal ethnographic and archaeological survey of the DE at the Matilda Bay and Applecross terminal locations, within the course of the Swan River. The survey area is wholly within the Whadjuk alternative settlement area. The Whadjuk Aboriginal Corporation (WAC) manages the Whadjuk Indigenous Land Use Agreement (ILUA) on behalf of the Whadjuk community. The ILUA provides for the Noongar Standard Heritage Agreement (NSHA), which the PTA is a signatory. Consultation for the SRFE was undertaken with Whadjuk and Noongar family representatives over two days using a ferry to access and inspect the key locations of the SRFE in August 2025. The inspection allowed representatives to assess potential impacts from the water and to discuss the scope and nature of proposed works, including riverbed

Survey	Survey Timing	Survey Guidance and Adequacy	Survey Methodology and Effort
			footings for the floating jetties and limited foreshore works.
Aboriginal Ethnographic and Archaeological Survey and Consultation (AHA, 2025a; AHA 2025b)	Field surveys completed in September 2024 and April 2025.	The Aboriginal Ethnographic and Archaeological Survey and Consultation was completed in accordance with the following: • *Aboriginal Heritage Act 1972* • *Aboriginal Heritage Regulations 1974* • *Native Title Act 1993*	Two Aboriginal Ethnographic and Archaeological Reports have been prepared by AHA Logic (2025) to support a Regulation 10 approval for sediment sampling and for the geotechnical sampling activities. This included consultation with the South West Aboriginal Land and Sea Council (SWALSC), who responded on behalf of the WAC and requested the Proponent consult with representatives of the Whadjuk ILUA Group due to the intersect with a Registered ACHS (Swan River Site ID 3536). A survey was conducted with seven Whadjuk representatives on 25 September 2024 using a ferry to access the Proposal areas within the course of the Swan River. A similar survey was also undertaken on 26 September 2024 with representatives of three Noongar families with a longstanding association with the Swan River and sites within the Swan Coastal Plain. Additional consultation was conducted with Whadjuk representatives (16 April 2025) and Noongar representatives (19 April). On both occasions the consultation teams presented details of the geotechnical works with visual aids, maps and technical data.
Aquatic Noise Assessment (SLR, 2025) **(Appendix J)**	Assessment completed in July 2025.	The Aquatic Noise Assessment was completed in accordance with the *Environmental*	An Aquatic Noise Assessment was prepared by SLR (2025b) to determine potential noise and vibration impacts from the Proposal on nearby terrestrial and marine

Survey	Survey Timing	Survey Guidance and Adequacy	Survey Methodology and Effort
		Protection (Noise) Regulations 1997.	environments. The assessment included: • Undertaking aquatic noise modelling and impact assessment on human divers/swimmers, • Prediction and assessment of airborne noise, and • A review of ground vibration risks. The Environmental Noise Assessment was completed in accordance with the Government of South Australia's Underwater Piling and Dredging Noise Guidelines (2023), that set out guidance on procedures for piling underwater noise management. These guidelines provide a framework for management and mitigation for underwater noise and incorporate safety zones and both standard and additional management and mitigation procedures (see Section 9.3.2.3). The full Environmental Noise Assessment report is presented in Appendix J.

9.3.2 Survey Findings

9.3.2.1 Aboriginal Heritage

Native Title and Cultural Context

The survey area is wholly within the Whadjuk alternative settlement area. The Whadjuk Aboriginal Corporation (WAC) manages the Whadjuk Indigenous Land Use Agreement (ILUA) on behalf of the Whadjuk community. The ILUA provides for the Noongar Standard Heritage Agreement (NSHA), which the PTA is a signatory.

Aboriginal Cultural Heritage Sites

The Aboriginal and Historical Heritage Desktop Assessment identified one Registered Aboriginal site listed on the Aboriginal Cultural Heritage Inquiry System (ACHIS): the Swan

River (ID 3536), registered as a Mythological site. The site intersects with the Proposal DE for both the Matilda Bay and Applecross locations (Figure 9).

No new Aboriginal sites, places, or objects relevant to the *Aboriginal Heritage Act 1972* were identified during the survey (AHA, 2025c).The Matilda Bay and Applecross foreshores are already extensively modified, and much of the riverbed in the project area has been altered by historical dredging, reclamation, and maritime activity. As a result, the archaeological potential of the DE areas is considered very low. However, the cultural and spiritual significance of the Swan River remains, and the project area continues to form part of an active cultural landscape.

Environmental impacts were also a key concern for the Whadjuk and Noongar representatives, particularly the need to protect fish populations, dolphins, bull sharks, bird species, and overall river health.

The Whadjuk and Noongar families participants discussed concerns and also technical points of the proposed construction at length. The Whadjuk and Noongar families representatives were satisfied that:

- The PTA is working in collaboration with the Swan River Trust and the Department of Biodiversity, Conservation and Attractions (DBCA) to avoid and minimise environmental impacts, supported by environmental studies conducted through all six Noongar seasons to ensure accurate and representative data collection.
- The project design aims to avoid dredging and other high-impact activities that would disturb the riverbed, water health, or aquatic habitats.
- The PTA has committed to implement management measures to reduce the effects of noise, vibration, and other construction-related disturbances on river fauna and habitats.
- Ongoing operational measures will be developed to protect river health and wildlife, including the use of electric, low-wake ferries; controls to limit pollutant inputs; and measures to reduce light spill into the river environment.
- Arboreal and vegetation assessments are being undertaken to inform vegetation and wildlife management, and retain existing vegetation wherever possible.

The inclusion of these environmental protections was noted by the Whadjuk and Noongar families representatives as a positive step in aligning project delivery with the cultural responsibility of caring for country. This approach recognises that the health of the river's ecosystems is inseparable from its cultural heritage significance.

During the ferry survey, Whadjuk and Noongar representatives also considered the potential for Aboriginal cultural material to be present within the DE. On the basis of the history of disturbance of the Swan River, the archaeological potential of the DE was assessed as very low (AHA, 2025c). The Whadjuk and Noongar representatives agreed that monitoring of any ground-disturbing activity within the boundary of Aboriginal site ID 3536 would be an appropriate measure to ensure that any cultural or archaeological material, if present, is identified and protected.

Representatives of the Whadjuk and Noongar families concluded that, provided appropriate heritage and environmental safeguards are in place, they do not oppose the PTA seeking the consent from the Minister for Aboriginal Affairs under section 18 of the *Aboriginal Heritage Act 1972*.

Key recommendations from the representatives included:

- Heritage protection – Monitoring by representatives from the Whadjuk and Noongar families people involved in the SRFE heritage survey work during riverbed-disturbing phases of terminal construction should be undertaken to protect the cultural values of the river, and ensure that any Aboriginal cultural material, should it be encountered, is identified and appropriately managed.
- Environmental protection – Implementation of measures to avoid or minimise potential impacts to trees, seagrass and river fauna, with particular attention to species of cultural and ecological importance, including dolphins, bull sharks, and bird populations.

The outcomes of these investigations will inform whether additional approvals may be required under the AH Act. Where necessary, the proponent will continue to consult with Whadjuk and Noongar representatives and will seek the appropriate consent prior to commencement of works.

9.3.2.2 Historic Heritage

A desktop search of the State Heritage Register (inherit database) and the City of Perth Municipal Inventory, indicates that the Proposal intersects one known site of heritage significance, Canning Bridge (Site ID 16178). An additional site, the Raffles Hotel (Site ID 1544), is also located in the vicinity of the Proposal area. Both sites are classified as State Registered Historic Heritage Places under the *Heritage Act 2018* (Figure 9).

The entirety of the Matilda Bay Reserve and an associated Archaeological site (Site ID 09209) identified as a low river wall within the area are on the assessment program for consideration by the Heritage Council of Western Australia

The Proposal works are not expected to directly impact upon these sites. Heritage Impact Statements (HIS) have been prepared to accompany the Proposal's development application to the WAPC.

9.3.2.3 Noise and Vibration

The Proposal is located in an urbanised, metropolitan area intersecting the Swan River. The noise environment in the Proposal DE comprises a range of noise sources, including natural sources such as wind and disturbance to vegetation, and anthropogenic sources such as local resident activities, road traffic and existing ferry operations.

The Environmental Noise Assessment completed for the Proposal (SLR, 2025) involved noise modelling based on worst-case noise levels predicted for construction and operation of the Proposal. Evening background sound levels were measured to be in the range of L_{A90} 50 to 53

dB across all Proposal sites. Night period background sound levels were measured to be about L_{A90} 45 dB, due to distant road traffic (SLR, 2025).

The Environmental Noise Assessment (SLR, 2025) considered the aquatic noise impacts of the Proposal on marine fauna species and human divers/swimmers through underwater noise modelling predictions, comprising assessment of three source locations for impact associated with piling operations and four ferry operation scenarios. The predicted piling noise levels were compared with relevant threshold criteria as outlined in the report (Appendix J) based on the scaled SEL level of a 150 kNm impact hammer with overall unweighted SEL level of 204 dB re 1 µPa2·S or equivalent, to determine distances at which the criteria are considered to be met.

The Environmental Noise Assessment also included an assessment of airborne noise emissions during the Proposal's construction and operational phases in line with the *Western Australia Environmental Protection (Noise) Regulations 1997*. Key sources of potential noise emissions during construction were considered to be:

- Civil earthworks such as excavation and compaction;
- Piling at the Matilda Bay and Applecross sites, particularly impact piling with a hydraulic hammer.

Key sources of potential noise emissions during operation were considered to be:

- Ferry movements;
- Bus movements on existing roads;
- Battery charging systems and fixed plant .

Of the operational noise emissions, only the charging infrastructure and fixed plant were considered assessable.

A ground vibration assessment was conducted to consider construction and operation activities with significant potential for vibration emissions. This included assessment of:

- Piling, particularly impact piling with a hydraulic hammer; and
- Civil earthworks, such as excavation and compaction.

The main findings of the Environmental Noise Assessment (SLR, 2025) are as below:

- **Construction Phase** – noise from both general construction and piling activities are predicted to be well above typical ambient levels at the nearest noise sensitive premises and therefore has the potential to cause adverse impacts. Noise associated with piling is considered most significant and is proposed to be audible at distances beyond 1 km, assisted by enhanced noise propagation over water (SLR, 2025).
- **Operational Phase** – the only significant source of noise assessable under State noise regulations is the charging facility located near the Proposal's Matilda Bay site. Noise emissions from the charging facility are predicted to be above existing background noise levels, prior to any noise mitigation treatments.

- **Underwater Acoustic Noise -** with direct line of sight immediate impact from piling noise is predicted to present risk of adverse hearing effects out to 4.5 km, where there is an unobstructed noise path.

The Aquatic Noise Assessment (SLR, 2025) determined that if appropriate mitigation measures are implemented (outlined below), the Proposal can be managed to comply with the *Western Australia Environmental Protection (Noise) Regulations 1997* and the EPA's Environmental Factor for Social Surroundings (EPA, 2016f).

The following recommendations were made by SLR (2025) to deliver compliance via a combination of noise mitigation and/or source control measures:

- Implement an aquatic noise management plan, with proposal specific management and monitoring procedures to minimise piling noise impacts on assessed aquatic sensitive receptors.
- Allow for noise screening elements to be applied to manage noise from the electrical charging infrastructure to levels consistent with the surrounding environment.
- Physical vibration monitoring for vibration intensive construction activity within 100 m of residential areas to provide certainty in received ground vibration levels.

9.3.2.4 Visual Amenity

The Proposal is located in a heavily disturbed, urban area characterised by diverse land uses. Both the Matilda Bay and Applecross foreshore areas are popular recreational areas for residents, visitors and tourists with associated infrastructure including parking, paths, viewpoints, picnic areas and toilets. Landscaping including areas of maintained lawn is also available to encourage use of the areas, with nearby restaurants and cafes taking advantage of the natural viewsheds.

A number of key local stakeholders have been identified across the Matilda Bay and Applecross site areas, including the Raffles Hotel, The University of Western Australia Boat Club and Royal Perth Yacht Club, as well as other nearby residents and businesses.

Visual impact photomontages have also been prepared to assess visual amenity impacts to support the Proposal's design evolution and to ensure the development meets the expectation of stakeholders and the local community (Appendix K).

9.3.2.5 Recreational Amenity

The Swan River is a defining feature of Perth's landscape, offering unique visual and recreational amenity. The river supports a wide range of recreational activities, including kayaking, sailing, cycling, walking, and picnicking, making it an important space for community wellbeing and outdoor enjoyment. Its accessibility and integration with urban and natural environments enhance Perth's liveability, while also contributing to cultural identity and tourism appeal. The Matilda Bay foreshore is an area that has been identified for the purpose of recreation and vested with the Conservation and Parks Commission and managed by DBCA for this purpose, as guided by the Matilda Bay Management Plan (1992 – 2002).

During the construction phase, temporary disruptions are anticipated. Activities such as piling are likely to generate noise and vibration, affecting the tranquillity of the river environment and diminishing the experience for passive recreation and wildlife observation. Access to foreshore areas, jetties, and water zones may be restricted, limiting opportunities for public use. Additionally, the presence of construction machinery and infrastructure may detract from the visual appeal of the river. Water quality may also be temporarily impacted due to sediment disturbance and potential spills, which could affect swimming, fishing and aquatic ecosystems. Safety concerns may arise from increased vessel and machinery movement, posing risks to recreational users, particularly those operating small watercraft.

Once operational, the ferry service may contribute positively to recreational amenity by improving public access to the river and surrounding areas. Enhanced connectivity could encourage greater use of riverside amenities and activate underutilised riverfronts, potentially leading to the development of new public spaces, cafes, and parks. The service may also support tourism and recreational events, increasing community engagement with the river. However, operational impacts must be carefully managed. Increased ferry traffic may interfere with existing recreational boating, sailing, and paddling activities, while ferry wake could disturb small watercraft users and contribute to shoreline erosion. Regular ferry operations may also alter the natural ambiance of quieter stretches of the river through noise and visual intrusion. Environmental considerations include potential impacts on biodiversity, particularly in areas valued for birdwatching and nature appreciation.

While the new ferry service may introduce temporary and ongoing challenges to recreational amenity, these have been proactively addressed through comprehensive planning, early and ongoing stakeholder engagement, and the development of targeted mitigation strategies. These measures have been integrated into both the construction and operational phases of the project to ensure that potential impacts are effectively managed. As a result, the Swan River will continue to serve as a valued recreational space for the community. Moreover, the ferry service presents a significant opportunity to enhance public access and appreciation of the river, contributing positively to its long-term social and cultural value.

9.4 Potential Environmental Impacts

The Proposal has the potential to impact on social surroundings within the Proposal DE and surrounding area. Potential direct and indirect impacts are listed below.

9.4.1 Potential Direct Impacts

Table 34 outlines potential direct impacts of the Proposal to Social Surroundings.

Table 34 Potential Direct Impacts to Social Surroundings

Proposal Activity	Potential Direct Impact
Aboriginal Cultural Heritage	
Construction and Operation activities	Minor disturbance to the Swan River (ID 3536) Registered Aboriginal Heritage Site.
Historic Heritage	
N/A	The construction and operation of the Proposal is not expected to have direct impacts to State Registered Historic Heritage Sites.
Noise and Vibration	
Construction and Operation activities	Minor amenity impacts to sensitive receptors and the environment as a result of exposure to noise from general construction and piling activities, dust and particulate matter. Impact piling noise is considered most significant. Noise emissions from the charging infrastructure during operation of the Proposal. Vibration from piling (impact piling with a hydraulic hammer) and civil earthworks (excavation and compaction) for the duration of construction activities have the potential to be noticeable to residents at distances of approximately 100 m. Underwater noise impacts to swimmers and divers up to 4.5 km from piling (based on worse-case piling method).
Landscape and Visual Amenity	
Construction and Operation activities (Matilda Bay and Applecross)	Minor and temporary impacts on visual receptors, including to residents and users of the foreshore area. However, it has been designed to enhance the visual experience and will align with the character of the surrounding urban environment.
Loss of Recreation	
Construction and Operation activities (Matilda Bay and Applecross)	The construction and operation of the Proposal may result in minor impacts on recreational activities at the Matilda Bay and Applecross foreshores. These impacts include temporary restrictions to access and use of grassed foreshore areas during construction, removal of existing boat moorings at Matilda Bay, and a reduction in marine space previously available for recreational use near the Matilda Bay jetty and terminal.

9.4.2 Potential Indirect Impacts

Table 35 outlines potential indirect impacts of the Proposal to Social Surroundings.

Table 35 Potential Indirect Impacts to Social Surroundings

Proposal Activity	Potential Indirect Impact
Aboriginal Cultural Heritage and Historic Heritage	
Construction activities	Vibrations from construction works that may affect the foundations and structural integrity of nearby Registered Historic Heritage Places: • Canning Bridge (Site ID 16178) • Raffles Hotel (Site ID 1544)
	Visual impacts on Aboriginal and Historic Heritage places.
	Accumulation of dust and pollution from construction activities on heritage sites.
Operation activities	Noise, ground and hydrological vibrations from the operation of ferries.
Noise and Vibration	
Construction and Operation activities	Loss in local property value due to construction and operation noise and vibration.
Landscape and Visual Amenity	
Construction and Operation activities	Loss of associated tourism for nearby businesses due to impacts on local landscape character, views and visual amenity. Construction lighting impacts on the amenity of the local area for local residents.
Recreational Amenity	
Construction and Operational Activities	Some disruption to the use of the foreshore and waters around the construction sites during construction. Some loss of recreational area at Matila Bay following construction, primarily for water-based recreation activities.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 9.6 for both direct and indirect impacts.

9.5 Mitigation and Avoidance

Table 36 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to social surroundings during the scoping phase of the Proposal.

Table 36 Mitigation and Avoidance Action Considered for Social Surroundings

Design or management measure	Description
Avoid	
Site selection and location	The DE has existing operational ferry services and a history of significant disturbance. The Matilda Bay and Applecross site locations have been strategically chosen to avoid impacts to sensitive receptors, including Historic Heritage places. The ferry terminals and supporting infrastructure have been designed to minimise visual intrusion through careful consideration of the terminal's location, size and materials.
Visual amenity	Visual impact photomontages have also been prepared to assess visual amenity impacts and to ensure the building heights and locations are in keeping with the existing structures. Visual amenity will need be a key issue for the SRT when considering a Part 5 development application under the SCRM Act. DBCA have therefore been consulted in relation to design and visual amenity outcomes.
Consultation	Ongoing consultation with Traditional Owner representatives will be undertaken to inform the implementation of the Proposal and if required separate approvals will be sought under the *Aboriginal Heritage Act (1972).* Development approval under Part 5 of the SCRM Act will need to demonstrate that consultation with Traditional Owner representatives has been undertaken and that Aboriginal Heritage has been appropriately considered and will be managed during development and construction.
Noise Impacts	Technical studies have been used to inform Proposal design evolution and avoidance of sensitive receptors (including a noise assessment). Construction activities will primarily occur during normal working hours to avoid noise impacts (i.e. 7 am to 7 pm Monday to Saturday and 9am to 7pm on Sundays and Public Holidays). A Noise and Vibration Management Plan will also need to be prepared for approval by the relevant Local Authority for any out of hours works, which will include the requirement to notify nearby affected stakeholders.
Minimise	

Design or management measure	Description
Stakeholder engagement	The Proponent has commenced engagement and consultation to identify key stakeholders and issues of interest for local community members and groups. This allows for the mitigation strategies to be tailored to specific community concerns. The Proponent has committed to the formation of a waterways stakeholder reference group for Matilda Bay and two community reference group for both the Applecross and Matilda Bay terminals.
	The Proponent is undertaking ongoing engagement and consultation with Traditional Owner representatives and will execute and agree to terms of the NSHA.
Additional surveys	Additional surveys and consultation will be undertaken prior to construction activities, including the potential requirement for dilapidation surveys to ensure construction activities do not indirectly result in impacts to nearby State Registered Historic Heritage Places. Should dilapidation surveys indicate a risk of impacts to nearby heritage places, specific management measures will be implanted following consultation with the local authorities and DPLH.
Management Plans	A CEMP, addressing dust, fire, sediment, noise and vibration impacts and mitigation controls, will be prepared prior to construction. The CEMP will include the following measures to control noise and vibration and dust: • Controls of environmental noise practices set out in Section 4 of AS 2436-2010 Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites (Australian Standards 2010). • Ensure the equipment used on the construction site is the quietest reasonably available. • Provide commitments around timing of construction and ensuring no construction works occur outside the hours of 7am to 7pm Monday to Saturday. Should construction works be required outside those times then noise limits will need to be applied and monitored during works in accordance with a Noise Management Plan that will need to be approved by the Local Authority. • Implement low or non-vibration construction activities where possible. • Monitor vibration levels and should levels exceed a pre-determined threshold then works will cease and alternative construction methodologies will be investigated.

Design or management measure	Description
	• Measures to control sediment runoff and dust including regular monitoring, dust suppression (water trucks and spray hoses), avoiding works during high wind periods, erection of silt fences where there is risk of runoff into the river to prevent turbidity. • Undertake monitoring of swimming and diving use within the modelled extent of underwater noise impacts based on the final piling method. This will include consultation and observing the area of impact to ensure no one is in the water during piling. • Allow for noise screening elements to be applied to manage noise from electrical charging infrastructure to levels consistent with the surrounding environment. • Physical vibration monitoring for vibration intensive construction activity within 100 m of residential areas to provide certainty in received ground vibration levels. The FMP will also be developed as a condition on the Development Approval to outline any required management of potential coastal erosion impacts to ensure the foreshore integrity is maintained. The FMP will also outline a landscaping approach for the Proposal that will aim to improve visual amenity and incorporate the establishment of native plants and trees.
	Operational impacts will be managed via rules around open water operations versus speed restricted areas which will be detailed in an Operational Environmental Management Plan. The *Western Australian Marine Act 1982*, Division 2 regulations, Section 114 Powers in relation to regulations, sub section (h) provides for traffic management plans that regulate the movement of vessels, persons and other things in or on specified State waters and for the enforcement of those plans.
	An unexpected finds procedure will be developed prior to the commencement of site works.
Rehabilitate	
Rehabilitation of temporary construction areas	Temporary construction areas including site offices, equipment storage and laydown areas, site fencing will be rehabilitated to reflect the pre-development land use (primarily planted turf). Any trees removed during works will be replaced post construction.

9.6 Assessment and Significance of Residual Impact

This impact assessment focuses on potential residual impacts of the Proposal on the social surroundings, following implementation of the mitigation measures detailed above. Notable environmental values for the factor of Social Surroundings in the vicinity of the Proposal are:

- One State Registered Aboriginal Cultural Heritage Site – the Swan River (Site ID 3536), intersecting the Proposal.
- One State Registered Historic Heritage Place intersecting the Proposal - Canning Bridge (Site ID 16178). An additional State Registered Historic Heritage Place is located nearby, Raffles Hotel (Site ID 1544).
- Associated impacts relating to noise and vibration and visual and recreational amenity.

The EPA's objective for social surroundings '*to protect social surroundings from significant harm*' has been considered in undertaking the following assessment.

9.6.1 Direct Residual Impacts to Social Surroundings

9.6.1.1 Aboriginal Cultural Heritage and Historic Heritage

The Proposal DE contains one Registered Aboriginal Cultural Heritage Site (Swan River, ID 3536). Consultation and engagement with Traditional Owners are ongoing, with verbal support for initial components of the Proposal. Additional approvals may be required and sought under the AH Act.

Impacts to heritage values will be managed via the CEMP and an unexpected finds procedure will be development prior to the commencement of site works.

During the Aboriginal Ethnographic and Archaeological survey (AHA, 2025c) the Whadjuk and Noongar representatives considered the potential for Aboriginal cultural material to be present within the DE. It was concluded that based the history of human disturbance in the Swan River, the archaeological potential of the SRFE is assessed as very low. The Whadjuk and Noongar representatives agreed that monitoring of any ground-disturbing activity within the boundary of Aboriginal site ID 3536 would be an appropriate measure to ensure that any cultural or archaeological material, if present, is identified and protected.

As such the PTA will ensure that an Aboriginal Artefacts Monitor (AAM) will be present during terrestrial ground disturbance for unexpected finds assessment.

The Proposal is not expected to impact the two identified State Registered Historic Heritage Places, Canning Bridge (ID 16178) and Raffles Hotel (ID 1544). Heritage Impact Statements (HIS) have been prepared to accompany the Proposal's development application.

Should dilapidation surveys be required and indicate that there is a risk of impacts to nearby local heritage sites, then specific management measures will be implemented through consultation with the Local Authority and the DPLH.

Therefore, given the above the residual impacts to Aboriginal Cultural Heritage and Historic Heritage are considered to be minor and manageable.

9.6.1.2 Noise and Vibration

The Environmental Noise Assessment (SLR, 2025) concluded that, without management controls, noise and vibration levels during the construction phase of the Proposal could be high enough to generate community complaints. However, with the implementation of appropriate noise mitigation and source control measures, the Proposal can comply with State noise regulations.

To address potential impacts on swimmers or divers, the PTA is investigating alternative piling methods and physical mitigation measures such as bubble curtains, isolation casings and double pile sleeves or a combination of thereof. These approaches are aimed at reducing underwater noise levels in areas used by the public. Notably, substituting a hydraulic hammer with a vibration hammer can reduce the impact zone for human divers by nearly tenfold, significantly lowering residual impacts (refer to Appendix J).

The CEMP (Appendix I) also addresses noise and vibration impacts, including noise mitigation measures, hours of operations, notification of affected stakeholders and a complaints procedure to capture any adverse impacts.

The primary noise and vibration impacts will be associated with construction activities which will be localised and temporary in nature. Ongoing noise from the sub-station and ferry operations will be minor and manageable with the implementation of controls.

As a result, it is expected that residual impacts from noise and vibration will be low and manageable in accordance with the *Environmental Protection (Noise) Regulations 1997*.

9.6.1.3 Visual Amenity

Visual amenity Impacts arising from dust and sediment disturbance during the Proposal's construction phase will be mitigated through the implementation of on-site controls outlined in the CEMP.

To further support the minimisation of visual impacts, Photomontages (Appendix K) have been developed to simulated potential changes to the landscape and assist in communicating these to stakeholders. Feedback from key stakeholder groups, has also been integrated into the design evolution of the Proposal, ensuring alignment with local community expectations and values.

Given the proactive approach to mitigation and the incorporation of stakeholder informed design refinements, residual impacts to visual amenity are anticipated to be negligible.

9.6.1.4 Recreational Amenity

During the construction phase of the ferry project, recreational amenity may be temporarily affected by noise, vibration, restricted access to foreshore areas and jetties, reduced water quality, and safety risks from increased machinery and vessel movement. These disruptions could diminish the experience for passive recreation, wildlife observation, and water-based activities such as swimming and fishing.

Once operational, the ferry service is expected to enhance public access and activate underutilised riverfronts, potentially improving recreational opportunities and supporting tourism. However, ongoing impacts such as ferry traffic, wake disturbance, and changes to the river's natural ambiance will be carefully managed.

Comprehensive planning and stakeholder engagement have informed mitigation strategies to ensure the Swan River remains a valued recreational space while benefiting from improved connectivity and social use.

Given the implementation of these mitigation strategies, residual impacts to recreational amenity are considered negligible.

9.6.2 Indirect Residual Impacts to Social Surroundings

The CEMP (Appendix I) outlines monitoring, mitigation and reporting strategies to address indirect residual impacts associated with dust, noise and vibration and visual amenity. As a result, any indirect impacts to social surroundings will be negligible.

9.7 Environmental Outcomes

Environmental outcomes and conditions to protect social surroundings are proposed in Table 37.

The implementation of the Proposal in accordance with the PCD, alongside the proposed environmental outcomes will ensure that social surroundings are safeguarded from significant adverse impacts. These measures are designed to maintain the integrity of local amenity, community values, and land use compatibility throughout the life of the Proposal.

Table 37 Proposed Environmental Outcomes for Social Surroundings

Proposed environmental outcomes	How environmental outcomes can be measured and assured
No disturbance of known Aboriginal and Historical Heritage values outside of approved site boundary.	The Proposal Content Document defines the extent of the Proposal DE and IDF. Regular environmental compliance reporting and internal procedures and record keeping. An Aboriginal Artefacts Monitor (AAM) will be present during ground disturbance.
• Maintain existing landscape character and scenic quality. • Minimize visual intrusion of new infrastructure on sensitive viewpoints. • Preserve culturally or historically significant views.	• The Proposal fits within the existing landscape type and character • Positive public perception of the new infrastructure • Increase in native vegetation associated with landscaping.

Proposed environmental outcomes	How environmental outcomes can be measured and assured
• Ensure visual integration of structures through design, materials, and landscaping.	
Compliance with the Western Australia Environmental Protection (Noise) Regulations 1997	No reported noise complaints from the general public in relation to the Proposal.
Minimal disturbance to local residents and the community during construction.	No reported noise, dust or vibration complaints from the general public during construction activities.

10.0 Other Environmental Factors

While the following environmental factors are not expected to be significantly impacted by this Proposal, they are recognised as relevant considerations. Accordingly, they are addressed in detail in the tables below to demonstrate a comprehensive assessment approach.

- Coastal Processes;
- Flora and Vegetation;
- Terrestrial Fauna;
- Terrestrial Environmental Quality;
- Inland Waters;
- Human Health.

10.1 Coastal Processes

Table 38 outlines the assessment of coastal processes.

Table 38 Coastal Processes

Factor	Coastal Processes
EPA Objective	*To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.*
Policy and Guidance	• Environmental Factor Guideline – Coastal Processes (EPA, 2016f).
Receiving Environment	An assessment of coastal processes has been undertaken for Matilda Bay and Applecross (Appendix L) and is summarised below. Note Elizabeth Quay was excluded given the shorelines are all artificial constructed walls. **Matilda Bay** The broader Matilda Bay foreshore has undergone historic reclamation, with fill used to raise bank levels. Since the earliest available imagery from 1953, the broader foreshore has undergone progressive erosion, estimated at approximately 5–10m across much of the bay. This erosion has impacted amenity and use of foreshore sections due to exposure of building rubble used as fill, formation of steep banks and scarps, and encroachment into mature trees. In response, limestone block walling has been installed along parts of the bay. The proposed project site is located on a part of the foreshore less affected by erosion, mainly due to its gentler sloping bank and absence of trees. **Applecross**

	The Applecross site is relatively low-lying, with the adjacent shared path currently set at approximately +1.1 m AHD. At this elevation, the path is already susceptible to overtopping during elevated water level and northerly wave events, with inundation frequency to increase under projected sea level rise scenarios over the 50-year design life. Design of the jetty's landward connection will need to accommodate future conditions and allow for integration with both present and future path levels if raised. Any raising of levels may require local upgrades to the existing revetment involving raising and strengthening. The broader foreshore adjacent to the site has experienced a net loss of sediment since reclamation of the foreshore to the west in the late 1950s, with a revetment constructed around 2003 to protect the shared path from ongoing erosion. Erosion stress has subsequently propagated westward, with retreat now encroaching on the path.
Potential Environmental Impacts	Small extensions of the jetty at Elizabeth Quay and continued use of the existing facility at Barrack Street Jetty (No. 1 or 2) are considered to have negligible influence on coastal processes, due to: • Existing jetty structures already experiencing high vessel use, including established ferry operations; and • Extensive prior modification of these areas, with shorelines entirely constructed through dredging and reclamation, and bordered by continuous walling. The proposed new ferry terminals at Applecross and Matilda Bay are expected to have relatively minor impacts on coastal processes, based on their interaction with existing morphology, foreshore and bed dynamics, and active sediment transport pathways. This is primarily due to: • The shore-based elements (i.e. jetty abutments) being positioned landward of the existing shoreline at Matilda Bay and within an existing revetment footprint at Applecross, limiting potential interruption of sediment transport; • Facilities consisting of piled structures, with sheltering effects largely associated with berthed vessels and floating jetties, causing only slight reductions in wave and surface current energy on the lee side; and • Existing speed limits and vessel approaches ensure boat wakes generate waves smaller than the ambient wind wave climate, with impacts at Applecross primarily confined to the already walled foreshore areas. During construction, a temporary silt curtain at the Applecross and Matilda Bay sites may be used which may prevent water and sediment flow. However, this impact would be small in scale and temporary and would not lead to permanent changes in coastal processes.

	The potential impacts of the Proposal on existing coastal processes has been evaluated by Seashore Engineering (2025) (Appendix L). The Indicative Ferry Route (Figure 1) suggests that, aside from terminal approach areas, the closest proximity to the shoreline is likely to occur between Matilda Bay and Elizabeth Quay, particularly as vessels transit beneath the Narrows Bridge. In this section, both sides of the foreshore have been reinforced with hard-edged retaining walls and rock groynes, which are not expected to be adversely affected by residual wake generated by ferry operations. A review of the DBCA foreshore data (Figure 11) highlights that the highest susceptibility to wave wake impacts is associated with modified shorelines. Given the engineered nature of these areas and the mitigation measures in place, wake wash is not anticipated to result in significant shoreline disturbance. Consequently, residual impacts are expected to be negligible.
Proposed Mitigation	During construction of the Applecross and Matilda Bay terminals, temporary sediment trapping methods will be employed (i.e. silt curtains or similar) which will prevent sediments dispersing and maintain water clarity. Proposal design has evolved to reduce impacts to coastal processes, with jetty infrastructure sited on piles to allow adequate water flow underneath surface structures. Jetty abutments will be positioned landward of the existing shoreline at Matilda Bay and within an existing revetment footprint at Applecross, limiting sediment transport, deposition and overall impacts to coastal morphology. Adherence to speed limits and designated passage routes will ensure waves generated from ferry wakes are not significantly different from the naturally occurring wave environment, ensuring potential impacts to coastal erosion are reduced. Proposal management plans including a CEMP, OEMP and FMP will also be prepared to manage and mitigate impacts associated with coastal processes. These documents will include regular site inspections and surveys and where required will outline mitigation options in consultation with DBCA.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to coastal processes from the Proposal are not considered significant. The Proposal will result in minor and manageable deposition of sediments at the Applecross and Matilda Bay sites during periods of low catchment flows. Natural changes in seasonal deposition due to flow rates re-mobilising settled sediments are expected each winter. Wave wake impacts are expected to be minimal and limited to existing modified shoreline environments.

Environmental outcome	It is considered that the implementation of the Proposal will successfully meet the EPA's objective for coastal processes (i.e. to maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected).

Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 11a - Foreshore Types: Applecross Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Foreshore Asset Type (DBCA-079)

- Sedimentary - Beach
- Vegetated - Sedges

Foreshore Asset Type (DBCA-065)

- Revetment
- Wall
- Gabion
- Groyne/Beach

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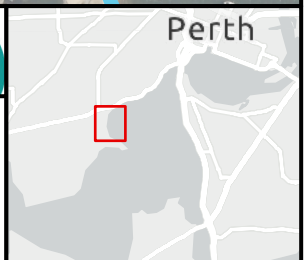
Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 11b - Foreshore Types: Matilda Bay Site



LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Foreshore Asset Type (DBCA-079)

- Sedimentary - Beach

Foreshore Asset Type (DBCA-065)

- Wall
- Groyne/Beach

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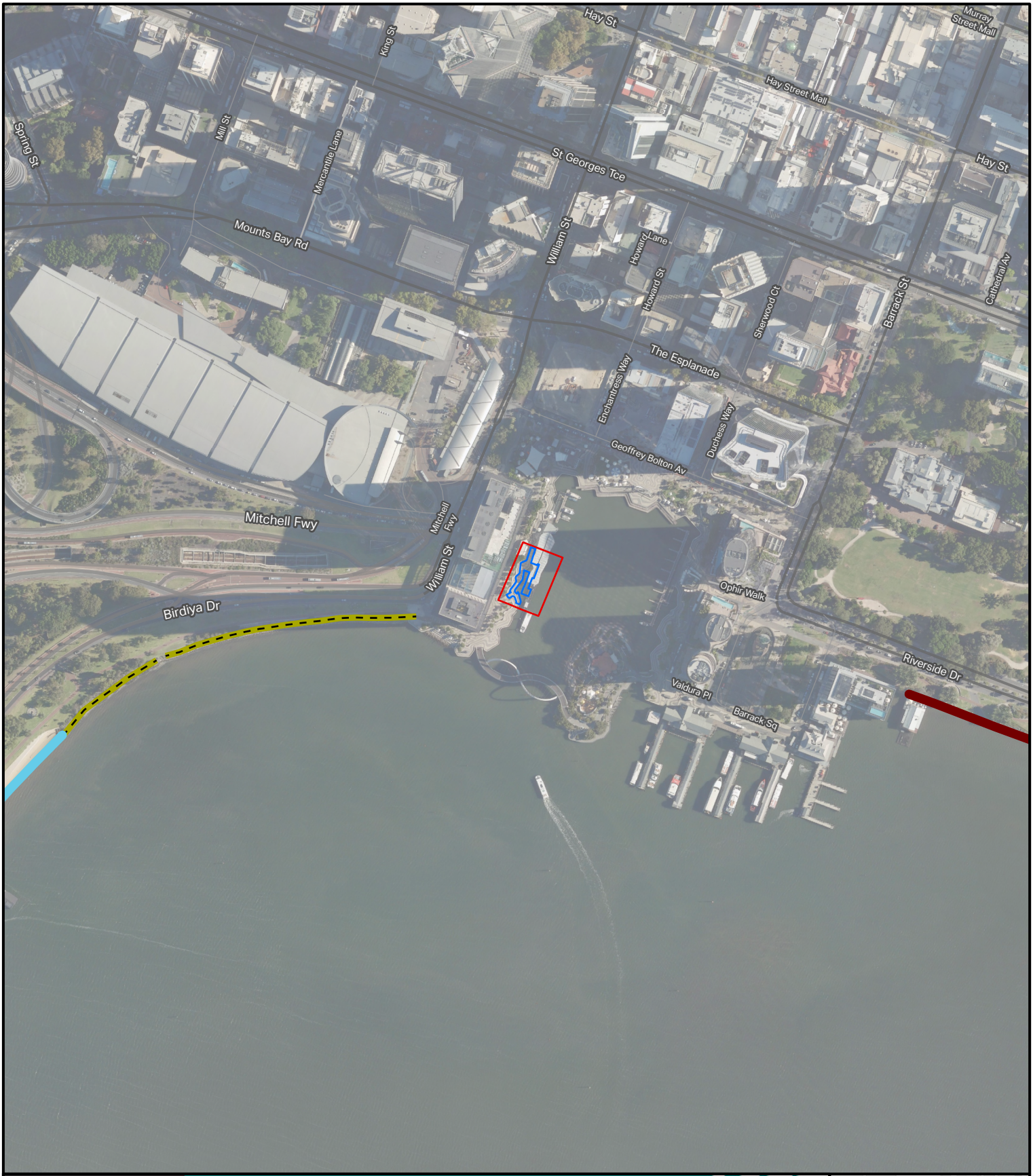

Public Transport Authority

METRONET on Swan Ferry Service Expansion: Perth to Applecross

Figure 11c - Foreshore Types: Elizabeth Quay Site

LEGEND

- Development Envelope
- Indicative Disturbance Footprint

Foreshore Asset Type (DBCA-065)

- Revetment
- Wall
- Groyne/Beach

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Approved by: L.ROGERS
File: 60752828_EPAR_010_A4P_v5
Scale: 1:5,000 @ A4
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10.2 Flora and Vegetation

Table 39 outlines the assessment for flora and vegetation.

Table 39 Flora and Vegetation

Factor	Flora and Vegetation
EPA Objective	*To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
Policy and Guidance	• Environmental Factor Guideline – Flora and Vegetation (EPA, 2016h). • Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016i).
Receiving Environment	A biological survey of the Proposal DE, including a desktop assessment and a basic reconnaissance flora and vegetation survey, was completed on 7 March 2025 and 27 March 2025 (GHD, 2025a) (Appendix B). The results are summarised below: **Applecross site** Three vegetation types were recorded at the Applecross site, including Replanting, Wetland/Shoreline and Parkland with Planted Trees. The remaining areas were recorded as cleared. No native vegetation was recorded. A total of six flora species were recorded, including two native flora taxa (planted). The remaining four species were considered introduced. **Matilda Bay site** Three vegetation types were recorded at the Matilda Bay site, including Revegetation and Replanting, Parkland with Planted Trees over Lawns and Wetland/Waterline Shore-bank. The remaining areas were recorded as cleared. One native tree was recorded, a *Eucalyptus rudis,* with the remaining vegetation considered non-native. A total of 17 flora species were recorded, including 12 native taxa (planted). **Elizabeth Quay site** One vegetation type was recorded at the Elizabeth Quay site, Replanting. The remaining areas were recorded as cleared. No native vegetation was recorded. A total of five flora species were recorded, including three native taxa (planted). For all three sites, the GHD (2025a) survey confirmed: • No flora listed under the EPBC Act or BC Act or DBCA-listed were recorded;

	• No EPBC or State listed Threatened Ecological Communities (TECs) or DBC listed Priority Ecological Communities (PECs) were recorded; • No species listed as declared pests under the BAM Act were observed.
Potential Environmental Impacts	The GHD (2025a) biological survey recorded no native vegetation in the Proposal DE. The IDF has been designed to avoid impacts to non-native vegetation. The Proposal DE comprises 1.62 ha of non-native vegetation consisting of: • 1.46 ha planted trees, including Eucalypt and non-native species, over hardstand and lawn, and • 0.16 ha planted shoreline vegetation • The 1.62 ha of non-native vegetation includes 1.44 ha at Matilda Bay, 0.18 ha at Applecross and 0 ha at Elizabeth Quay. Potential indirect impacts include: • Introduction and spread of weeds from construction activities; • Damage and disturbance to non-native vegetation during construction activities, including generation of dust and waste.
Proposed Mitigation	A CEMP will be prepared and introduced prior to any ground disturbance activities. This will include, but is not limited to, the following measures: • Delineation and fencing of Proposal IDF to avoid impacts to flora and vegetation. • Implementation of tree protection measures for any trees that will be retained within close proximity to the works in accordance with *AS4970 – Protection of Trees on Development Sites*. • Ensure all vehicles and equipment entering the site are 'clean on entry' and free of any vegetative matter to minimise the distribution of weeds. • Ensure all contractors are aware of the environmental sensitivity of the surrounding environment and are adequately brief prior to commencement of works. • Replacement of trees removed.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures, the residual impacts to flora and vegetation are anticipated to be negligible.
Environmental outcome	It considered that the implementation of the Proposal will meet the EPA's objective for flora and vegetation (i.e. to protect flora and vegetation so that biological diversity and ecological integrity are maintained).

10.3 Terrestrial Fauna

Table 40 outlines the assessment for terrestrial fauna.

Table 40 Terrestrial Fauna

Factor	Terrestrial Fauna
EPA Objective	*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*
Policy and Guidance	• Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016j).
Receiving Environment	A biological survey of the Proposal DE, including a desktop assessment and a basic reconnaissance fauna survey, was completed on 7 March 2025 and 27 March 2025 (GHD, 2025a) (Appendix B). The desktop assessment identified 44 threatened fauna species with the potential to occur within 5 km of the Proposal DE. It was considered that due to the highly modified nature of the terrestrial component of the Proposal and the notable fragmentation and small size of vegetation patches, the vegetation is unlikely to provide suitable habitat for mammals and medium to large reptiles. Only avian taxa (terrestrial species inhabiting wetlands in urbanised environments), smaller reptiles and amphibian species were considered as having the potential to occur in the locality. However, the Proposal does not constitute important habitat for the establishment or maintenance of migratory avian species and is likely to receive only transient visitors on their way to a more suitable environment. In addition, the regular presence of domestic dogs (*Canis familiaris*) within the Proposal DE and surrounding area is expected to be a deterrent to the persistence of threatened fauna species. **Applecross site** Five broad fauna habitats were mapped within the Applecross site, including Riparian, River and Shoreline, Native and exotic plantings and Parkland with planted trees, Cleared and Open Water. A total of eight birds and one mammal species were recorded during the field survey, with no reptile, fish or frog species observed. One introduced species, the Rainbow Lorikeet (*Trichoglossus moluccanus*), was recorded. No conservation significant fauna species were recorded within the Applecross site (GHD, 2025a). **Matilda Bay site** Five broad fauna habitats were recorded within the Matilda Bay site, including Shoreline Wetlands or Riparian and River, Scattered Trees,

	Parkland over revegetation and re-planed vegetation, Cleared Areas and Open Water. A total of 11 bird species were recorded during the field survey, with no mammal, reptile, fish or frog species observed. Two introduced species were recorded: the Rainbow Lorikeet (*Trichoglossus moluccanus*) and the Long-billed Corella (*Cacatua tenuirostris*). No conservation significant fauna species were recorded within the Matilda Bay site (GHD, 2025a). **Elizabeth Quay site** Two broad fauna habitats were recorded within the Elizabeth Quay site, including Natie and exotic mixed plantings and Cleared areas. A total of four bird species were recorded during the filed survey, with no mammal, reptile or fish species identified. One introduced species was recorded, the domestic pigeon (*Columba livia*). No conservation significant fauna species were recorded within the Elizabeth Quay site (GHD, 2025a). **Black Cockatoos – Matilda Bay** A targeted Black Cockatoo Habitat Assessment was completed for the Matilda Bay Site (AECOM, 2025a) (Appendix C). Twenty-nine trees with suitable DBH and of a suitable species known to be used for black cockatoo breeding were identified; however, none contained hollows. The absence of hollows suggests limited breeding habitat value, and the potential for future hollow development is considered unlikely. Bamford Environmental Consultants (2020) habitat scoring tool was used to assess the foraging value of the non-native vegetation at Matilda Bay. The 1.31 ha, primarily consisting of 'planted trees, including Eucalypt and non-native species, over hardstand and lawn' was considered to provide 'low or negligible' foraging value for Baudin's and Carnaby's Cockatoo, and 'low to moderate' foraging value for Forest Red-tailed Black Cockatoos. The low scores for Baudin's and Carnaby's reflect absence of preferred foraging species, while the presence of foraging evidence confirms use by Forest Red-tailed Black Cockatoo. In total 1.31 ha of 'low to moderate' quality foraging habitat for Forest Red-tailed Black Cockatoo was recorded across the ferry terminal site.

Potential Environmental Impacts	• Loss of up to 1.62 ha of non-native vegetation consisting of:
	  ○ 1.46 ha planted trees, including Eucalypt and non-native species, over hardstand and lawn, and
	  ○ 0.16 ha planted shoreline vegetation
	  ○ The total 1.62 ha includes;

	▪ 1.44 ha at Matilda Bay, ▪ 0.18 ha at Applecross and ▪ 0 ha at Elizabeth Quay • This 1.62 ha is highly modified, fragmented, in small patches and domestic dogs and cats are regularly present. It is unlikely to provide valuable habitat to mammals, reptiles, amphibians and most avian species. • Removal of up to 29 trees with a suitable diameter at breast height (DBH) (i.e. >300mm) and of a species known to be used by black cockatoo's species for nesting. However none of the DBH trees contained hollows. • Permanent removal of up to 1.31 ha moderate to low quality black cockatoo foraging habitat for Forest Red Tail Black Cockatoos. • No conservation significant fauna species were recorded within the Proposal DE. • Evidence of Forest Red Tail Black Cockatoos foraging was recorded in the Proposal DE. • Impacts to fauna habitat through the introduction of weeds from construction activities and equipment. • Injury or death of fauna individuals as a result of construction activities, including vehicle strike and laydown of equipment.
Proposed Mitigation	Avoid: • The Proposal has been designed to avoid impacts to black cockatoo habitat. • Establishment of retention zones around trees to be retained in accordance with AS4970 – *Protection of Trees on Development Sites.* Minimise: • The Proposal has been designed to minimise impacts to black cockatoo habitat. • Preparation and implementation of the CEMP (Appendix I) prior to any ground disturbing activities to manage and mitigate impacts to terrestrial fauna and habitat.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to terrestrial fauna from the Proposal are not considered significant.

Environmental outcome	It is considered that the implementation of the Proposal will successfully meet the EPA's objective for terrestrial fauna (i.e. to protect terrestrial fauna so that biological diversity and ecological integrity are maintained).

10.4 Terrestrial Environmental Quality

Table 41 outlines the assessment for terrestrial environmental quality.

Table 41 Terrestrial Environmental Quality

Factor	Terrestrial Environmental Quality
EPA Objective	*To maintain the quality of land and soils so that environmental values are protected.*
Policy and Guidance	• Environmental Factor Guideline: Terrestrial Environmental Quality (EPA, 2016g).
Receiving Environment	The EPA defines Terrestrial Environmental Quality as "the chemical, physical, biological and aesthetic characteristics of soil". A single soil system has been identified within the Proposal DE: the EnvGeol S14 Phase (211Sp). This unit is characterised by pale grey to white sand, medium-grained sub-angular, quartz and feldspar. The soil is well sorted, and contains abundant whole and fragmented bivalves and gastropod shells, indicative of its alluvial origin (DPIRD, 2022). Soil across the terrestrial portion of the Proposal DE ranges from 'High to Moderate' and 'Moderate to Low' risk of encountering ASS.
Potential Environmental Impacts	The clearing of vegetation can result in the loss of soil nutrients through organic matter oxidisation and removal of surface cover leaving soil vulnerable to erosion. Nutrient stores and cycles will adjust to new land uses, but generally the net loss of nutrients and leakage is greater than under natural conditions. Excavation of soils containing ASS can lead to the release of sulfuric acid and other harmful substances.
Proposed Mitigation	Delineation and fencing will be undertaken to avoid ground disturbance and impacts to soil outside the Proposal IDF. Excavation at all three sites will be limited with significant soil disturbance or soil removal unlikely to be required. No excavation of soils greater than 100 m3 will occur at the Elizabeth Quay site (mapped as 'High to Moderate' risk of encountering ASS). Dewatering is not proposed at the three sites.

	The following mitigation measures will limit impact to terrestrial environmental quality: • Vegetation clearing and soil disturbance will be limited to the IDF; • Soil integrity will be preserved during removal of vegetation. A CEMP will be developed and implemented prior to any ground disturbance activities, including contingency measures for ASS and regular monitoring of acidity during initial excavation works. Should pH levels indicate the exposure of ASS beyond agreed thresholds, then works will cease until the cause can be investigated and if required contingency measures implemented in consultation with DBCA (such as the application of lime). Detailed site-specific CEMP's will also be developed prior to works commencing that will outline monitoring parameters and contingency responses in consultation with DBCA.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to terrestrial environmental quality from the Proposal are not considered significant. Vegetation clearing and soil disturbance will be limited to the IDF. Given that the Proposal does not involve extensive excavation of soil, nor requires dewatering or drainage activities, and considering the already developed and degraded nature of the Proposal DE, residual impacts on terrestrial environmental quality are expected to be negligible.
Environmental outcome	It is considered that the implementation of the Proposal will successfully meet the EPA's objective for terrestrial environmental quality (i.e. to maintain the quality of land and soils so that environmental values are protected).

10.5 Inland Waters

Table 42 outlines the assessment for inland waters.

Table 42 Inland Waters

Factor	Inland Waters
EPA Objective	*To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*
Policy and Guidance	• Environmental Factor Guideline – Inland Waters (EPA, 2018).

Receiving Environment	The Proposal intersects the Swan River, located within the Swan-Canning Estuary. The Swan River Estuary is classified by DBCA as a CCW (UFI 13316). The Proposal sits within the Perth Groundwater Proclamation Area and therefore a licence will be required to take groundwater under the RiWI Act. The Proposal does not intersect any PDWSAs.
Potential Environmental Impacts	The Proposal has the potential to result in the following impacts to inland waters: • Changes in water quality as a result of spills and waste release from construction vessels. • Mobilisation of sediments from construction activities causing changes to water toxicant levels. • Stormwater runoff into the river during construction or from the development of additional hardstand areas resulting in increased turbidity and the release of nutrients and other contaminants into the river.
Proposed Mitigation	A CEMP will be prepared prior to construction for DBCA approval. This will include: • Installation of silt fencing to capture any sediment runoff from the construction site to the river. • Impacts to sandy areas of the foreshore will be minimised and fenced to avoid having laydown areas or equipment movement across the foreshore that may disturb sand and sediments. • Details of a waste management, including municipal and construction waste. Water abstraction will be managed under the RiWI Act. A Stormwater Management Plan will also be prepared prior to construction for approval by WAPC and DBCA. Water quality sampling is ongoing, and results will be reviewed once provided.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures, the predicted residual impacts to inland waters from the Proposal are not considered significant.
Environmental outcome	It is considered that the implementation of the Proposal will successfully meet the EPA's objective for inland waters (i.e. to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected).

10.6 Human Health

Table 43 outlines the assessment for human health.

Table 43 Human Health

Factor	Human Health
EPA Objective	*To protect human health from significant harm.* EIA considerations include: • Design, operation, and ongoing management of proposals to minimise radiation emission into the environment, ensuring emissions remain within acceptable limits. • Ensuring that radiation exposure complies with regulatory does limits and is further reduced to levels that are as low as reasonably practicable, through the application of best practice controls and continuous monitoring.
Policy and Guidance	• Environmental Factor Guideline – Human Health (EPA, 2016k).
Receiving Environment	One contaminated site labelled 'remediated for restricted use' is located 590 m north of the Proposal's Matilda Bay site. The Proposal's Applecross site is located in the vicinity of two contaminated sites, both characterised as 'remediated for restricted use', located approximately 150 m south of the site. Preliminary Site Investigations (PSIs) have been undertaken for the three sites (GHD, 2025b; GHD, 2025c & GHD, 2025d) (Appendix D, Appendix E and Appendix F) which found that: • **Matilda Bay:** Materials indicative of uncontrolled fill were observed. However, due to the anticipated limited scale of soil disturbance and the low potential for surface water quality impacts, the risk posed by construction activities associated with the proposed ferry landing is currently considered low and acceptable for relevant receptors (GHD, 2025d). To further manage potential risks, it was recommended that targeted soil sampling be conducted within the Proposed DE prior to construction to confirm the presence and extent of any contaminants and ensure appropriate handling and disposal of soil, particularly if offsite disposal is required. • **Applecross**: Based on current land use and available information, the area is unlikely to pose an unacceptable risk to human health. To manage potential soil related impacts, it was recommended that any excavated materials

	be reused onsite where feasible. If off-site soil disposal is required, soil sampling should be undertaken to determine the presence of any contaminants and to guide appropriate soil disposal in accordance with regulatory requirements. • **Elizabeth Quay:** Construction activities associated with the proposed ferry landing are expected to involve limited disturbance. Based on this preliminary assessment, such minimal disruption is unlikely to pose an unacceptable risk to relevant receptors at this time.
Potential Environmental Impacts	The PSIs undertaken across the three sites indicate that construction and soil exposure is unlikely to pose an unacceptable risk to sensitive receptors under the current land use. The Proposal does not involve the use or presence of fibrous or radioactive materials.
Proposed Mitigation	Further soil testing will be undertaken for excavated material if off-site disposal is required to ensure its removal and disposal is in accordance with DWER requirements and guidelines. • Soil excavation and offsite soil disposal will be avoided where possible. • Further soil testing will be undertaken for excavated material if off-site disposal is required to ensure its removal and disposal is in accordance with DWER requirements and guidelines. • The implementation of management measures in the CEMP (Appendix I): o Collection of pre-development sediment samples to determine sediment quality; o Visual monitoring for sediment plumes, water quality monitoring and deploying sediment control measures; o Implement trigger levels, tolerance limits and shut down thresholds if sediment plumes observed outside of control measures and/or if severe weather conditions are forecast; o Waste and hazardous chemical management measures to prevent release into receiving environment.
Residual Impacts	In consideration of the proposed avoidance and mitigation measures there are no significant residual impacts associated with the Proposal that are expected to pose a risk to human health.

Environmental outcome	It is considered that the implementation of the Proposal will successfully meet the EPA's objective for human health (i.e. to protect human health from significant harm).

11.0 Residual Impact Offsets

Under the *WA Environmental Offsets Policy* (Government of Western Australia, 2011), environmental offsets are required to counterbalance significant residual impacts that remain after all reasonable efforts to avoid, minimise and rehabilitate have been applied. The Proposal has been developed in alignment with this mitigation hierarchy, ensuring that potential environmental impacts are proactively managed and reduced to the lowest practicable level.

Comprehensive surveys and technical assessments have been undertaken in accordance with relevant technical guidance documents, covering the full extent of potential disturbance areas for jetties, berthing and associated infrastructure. These assessments confirm that the actual disturbance footprint is likely to be smaller than the maximum assessed area, and that any potential impacts can be effectively mitigated through targeted management strategies.

The significance of environmental impacts has been evaluated against criteria outlined in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a). Based on this evaluation, the Proponent considers there is no reasonable likelihood of significant environmental impacts arising from the Proposal.

Following application of the mitigation hierarchy, the Proposal is expected to result in the following residual impacts:

- Benthic Communities and Habitats: Loss of up to 0.63 ha of BCH – SM at Matilda Bay (0.37 ha) and Applecross Sites (0.26 ha)
    - This includes the potential loss of up to 0.09 ha of BCH – SM from shading includes BCH – SM located directly under the infrastructure (i.e. IDF) (0.03 ha) and the shadow cast from the infrastructure at winter solstice (0.04 ha) and summer solstice (0.02 ha). This 0.09 ha of impact is located within the total 0.63 ha of impact.
- Marine Environment Quality: Temporary mobilisation of sediments during construction activities (i.e. piling) increasing TSS and reducing water quality at the Matilda Bay and Applecross sites.
- Marine Fauna: Underwater noise emissions from construction activities during piling operations causing temporary disturbance to marine fauna species and sensitive receptors.
- Social Surroundings: Minor, temporary and manageable impacts to social surroundings associated with construction activities.
- Terrestrial Fauna:
    - Loss of up to 1.31 ha of low to moderate value foraging habitat for Forest Red-tailed Black Cockatoos;
    - Loss of up to 29 trees with suitable DBH >300mm and of a suitable species known to be used for black cockatoo breeding, none contained hollows;

- 1.62 ha of non-native vegetation consisting of:
  - 1.46 ha planted trees, including Eucalypt and non-native species, over hardstand and lawn;
  - 0.16 ha planted shoreline vegetation.

These residual impacts are not considered significant and will be fully mitigated and managed through a suite of measures as outlined in the CEMP (Appendix I). These include:

- Continued application of the mitigation hierarchy through design and construction phases including careful siting of infrastructure to minimise unnecessary disturbance to BCH and BPPH, limit sediment transport, deposition and overall impacts to coastal morphology.
- Benthic Community and Habitat Monitoring (i.e. pre and post construction)
- Implementation of sediment control devices to contain suspended particles during piling activities.
- Daily Water Quality Monitoring Program (i.e. visual and samples)
- Community Engagement and Consultation (i.e. amenity and heritage impacts)
- Aquatic fauna monitoring and noise and vibration mitigation procedures
- The development and implementation of detailed management plans, including:
  - A CEMP (Appendix I), which outlines monitoring and management actions for:
    - Hydrocarbons and waste;
    - Noise and vibration;
    - Stormwater run-off;
    - Water quality and turbidity;
    - Impacts to BCH;
    - ASS;
    - Ground disturbance and vegetation clearing;
    - Protection of heritage values (ACH, European and Municipal);
    - Protection of marine fauna;
    - Indirect impacts (i.e. dust generation);
    - Visual amenity.
  - An OEMP which will include details on the implementation of management measures including but not limited to:
    - Vessel speed restrictions;
    - Pollution controls;
    - Fauna collision controls and reporting;

- Shoreline erosion;
- Waste disposal.

- An FMP to be prepared as a condition of Development Approval, addressing the requirements of *State Planning Policy 2.6 – Coastal Planning* (DPLH, 2013).

The ferry project has been designed based on avoidance, mitigation and management measures to proactively limit environmental harm. Minimisation strategies, including the implementation of detailed and enforceable management plans (e.g., CEMP, OEMP and FMP), provide robust controls to limit emissions, manage waste, protect water quality, and safeguard marine and terrestrial fauna. Rehabilitation efforts, where applicable, will further restore disturbed areas and enhance environmental resilience.

Despite these efforts impacts to 0.63 ha of BCH – SM and have been assessed as not significant based on the following considerations:

Ecological value: The black cockatoo habitat is of low foraging quality and does not contribute meaningfully to regional population viability. The seagrass area is limited in extent and not part of a critical or high-value meadow.

- Scale and context: Both losses are small in area, spatially isolated, and do not affect broader ecological connectivity or function.
- Mitigation hierarchy applied: Impacts have been reduced to the lowest practicable level through design refinements, site selection, and targeted management.
- No impact on key receptors: The residual effects do not compromise the integrity of significant environmental or social values.

Other residual impacts—such as minor vegetation clearing, limited benthic disturbance, and temporary construction-related effects—are similarly localised, short-term, and manageable and do not pose a threat to the integrity of key environmental or social receptors.

As such, the Proposal remains consistent with the principles of the WA Environmental Offsets Policy and the EPA's framework for assessing significance. The proactive and integrated mitigation approach ensures that no significant residual impacts are expected to arise, and that the Proposal can proceed without the need for environmental offsets.

12.0 Matters of National Environmental Significance

A separate assessment of impacts to Matters of National Environmental Significance (MNES) has been undertaken to determine the requirement for referral of the Proposal under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This assessment was completed against the MNES *Significant Impact Guidelines 1.1.* (DoE, 2013) and included an assessment of:

- EPBC Act listed Threatened flora and fauna species;
- EPBC Act listed Migratory fauna species;
- EPBC Act listed Marine fauna species.

Desktop assessments identified several MNES as potentially occurring within the Proposal DE. However, no MNES flora or fauna species were recorded within the DE during the flora, vegetation and fauna survey (GHD, 2025a).

The PMST identified seventeen (17) threatened species including two species of sharks, four species of turtles and eleven species of birds. Additionally, the PMST identified twenty-two (22) migratory species of which three species were sharks and nineteen species were migratory birds.

The five shark species identified in the PMST are:

- Freshwater Sawfish (*Pristis pristis*), listed as Vulnerable and Migratory under the EPBC Act;
- Scalloped Hammerhead (*Sphyrna lewini*), listed as Conservation Dependent under the EPBC Act;
- Giant Manta Ray (*Mobula birostris*), listed as Migratory under the EPBC Act;
- Reef Manta Ray (*Mobula alfredi*), listed as Migratory under the EPBC Act;
- Porbeagle (*Lamna nasus*), listed as Migratory under the EPBC Act.

The four species of turtles identified in the PMST are:

- Green Turtle (*Chelonia mydas*), listed as Vulnerable, Migratory and Marine under the EPBC Act;
- Flatback Turtle (*Natator depressus*), listed as Vulnerable, Migratory and Marine under the EPBC Act;
- Loggerhead Turtle (*Caretta caretta*), listed as Endangered, Migratory and Marine under the EPBC Act;
- Leatherback Turtle, (*Dermochelys coriacea*), listed as Endangered, Migratory and Marine under the EPBC Act.

The threatened sharks and turtles are not expected to occur within the Proposal DE as the area does not offer suitable habitats for these species (refer to Section 1.6.17).

While the PMST identified migratory bird species as potentially relevant to the Proposal, these species are highly mobile and are not expected to rely exclusively on habitat within the Proposal DE for their maintenance or survival. The terrestrial portion of the Proposal DE is highly modified and fragmented, consisting of small, isolated patches of vegetation that are unlikely to support permanent or continuous breeding populations of migratory bird species.

The proposed clearing of up to 1.62 ha of non-native vegetation, including 1.31 ha of low to moderate quality foraging habitat for the Forest Red-tailed black cockatoo, and the removal of up to 29 trees with a suitable DBH and of a suitable species for black cockatoo nesting without hollows, is localised and has been assessed as not significant. The affected area is of limited ecological value, and its removal is not expected to materially affect the availability of foraging resources or the ecological functioning of the area for migratory or threatened terrestrial fauna.

In the marine environment, open water habitats within the DE, specifically at the Matilda Bay and Applecross sites, BCH that is likely to provide temporary foraging opportunities for a range of locally common marine species such as fish, crustacean and marine mammal species such as Indo-Pacific bottlenose dolphins (GHD, 2025a). However, the loss of 0.63 ha of BCH – SM represent a small fraction of the total habitat in surrounding marine and estuarine habitats. These areas therefore, are unlikely to support significant sheltering or sustained foraging activity by various marine species that may occur in the DE on a temporary basis (GHD, 2025a).

The impacts of the Proposal are not likely to have a significant impact to Matters of National Environmental Significance (MNES) and referral to Department of Climate Change, Energy, the Environment and Water (DCCEWW) under the EPBC Act is not required.

13.0 Holistic Impact Assessment

While the preceding sections have evaluated the potential impacts on individual environmental factors, it is important to recognise that the Proposal will not affect relevant environmental factors in isolation. Environmental factors are inherently interconnected, and a holistic assessment is essential to understand the interactive effects of the Proposal. This section integrates the key environmental factors, BCH, MEQ, Marine Fauna, and Social Surroundings, focusing on their interrelationships and interactions, to assess the overall environmental outcome of the Proposal.

The Swan River supports ecologically important benthic habitats such as seagrass beds and soft sediment communities, which play a vital role in maintaining aquatic biodiversity. The Proposal's design has evolved to minimise impacts to BCH as much as possible through careful siting of infrastructure, avoidance of dredging and careful planning of the ferry route. Vessel design incorporates shallow drafts and low wake wash technology to minimise disturbance to the marine and benthic environment.

While the risk of degradation to BCH is considered low, the maintenance of MEQ is important to ensure BCH is protected. The Proposal avoids activities that could lead to significant sediment resuspension or pollution, with any impacts minor, temporary and localised. During construction temporary sediment trapping methods will be employed (i.e. silt curtains or similar) which will prevent sediments dispersing and maintain water quality. The use of electric ferries maintains water quality and minimises impact on the river ecosystem by eliminating the risk of discharge of hazardous substances. With robust operational protocols and emergency response plans in place, the Proposal is expected to sustain the river's environmental quality standards.

Maintaining MEQ and minimising impacts to BCH are also important in ensuring no significant impact to Marine Fauna. To mitigate impacts such as turbidity, sedimentation, and contaminant release during ferry construction and operation, a range of best-practice management measures will be implemented. These include the use of sediment control devices to contain suspended particles during piling activities and undertaking water quality monitoring to ensure compliance with MEQ objectives.

The interaction between Marine Fauna and Social Surroundings is particularly relevant in the Swan River, where the estuarine environment supports species such as dolphins, fish, and waterbirds that are highly valued by the local community. These species contribute to the river's identity and are integral to recreational activities such as wildlife watching, boating, and fishing. The presence of marine fauna enhances the aesthetic and cultural value of the river, fostering a strong sense of place and community connection. Potential impacts such as underwater noise and vessel strikes can impact Marine Fauna and in turn affect Social Surroundings. To address this, mitigation measures including, but not limited to, speed restrictions, the use of low-noise propulsion systems and designated passage routes by the ferries, piling shut down if dolphins are observed within an agreed distance from construction activities, water quality monitoring and deployment of sediment control measures are

proposed. These measures are expected to effectively reduce the likelihood of adverse interactions with marine species.

In summary, a holistic assessment of the Proposal's impact on key environmental factors has been considered in relation to the EP Act environmental principles and the EPA's environmental objective for each key environmental factor. Connections and interactions between environmental factors, and the overall impact of the Proposal on the environment as a whole, is not expected to be significant. Through careful planning, stakeholder engagement, and the implementation of targeted mitigation and management strategies, the Proposal aligns with the EPA's objectives and is expected to deliver improved transport connectivity with minimal environmental and social impact.

14.0 Cumulative Environmental Impact Assessment

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA, 2024b). The EPA (2021a) defines reasonably foreseeable future activities as "*Third party (or Proponent) activities which are already approved, are in a government approvals process, or are otherwise reasonably likely to proceed or be ongoing*".

Potential impacts of the Proposal on the Swan River and river foreshore ecosystem processes, and aesthetic and cultural values, are not expected to result in significant cumulative environmental impacts, particularly when compared to conventional ferry systems.

The Swan River is already subject to pressures such as nutrient enrichment, stormwater runoff, habitat modification, and recreational use. The river foreshore is subject to habitat loss, erosion and development. The adoption of electric ferry technology offers a low-impact transport alternative that aligns with the river's long-term ecological sustainability goals.

Significant effort has been undertaken by the Proponent during the planning of the Proposal to minimise impacts to environmental factors. Construction activities will be carefully managed to minimise turbidity, sedimentation, noise and vibration, using best-practice mitigation measures such as the adoption of silt curtains to manage the spread of silt and sedimentation, protecting sensitive ecosystems and maintaining water quality. The timing of construction activities that result in noise and vibration will avoid sensitive periods to minimise adverse impacts to sensitive receptors. The implementation of environmental monitoring and management during construction and post development will ensure any potential adverse impacts to water quality, BCH and marine fauna are minimised. Operationally, electric ferries produce no direct emissions, generate minimal wake, and significantly reduce underwater noise, which collectively helps protect aquatic fauna and sensitive benthic habitats.

Importantly, the Proposal has been designed to integrate with existing river uses and environmental values, ensuring that any additional pressures are negligible in the context of the river's current condition. With robust environmental management plans and adaptive monitoring in place, the Proposal is expected to operate within acceptable environmental thresholds, contributing to a more sustainable and modern transport solution for Perth without compromising the health of the Swan River and river foreshore ecosystems and values. The Proponent anticipates that the environmental impacts of the Proposal can be appropriately managed through the measures discussed within this document and considers the EPA's objectives for each key environmental factor can be met.

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Appendices

Appendix A

Sediment Sampling Report (BMT, 2025a)

Appendix B

Biological Survey Report (GHD, 2025a)

Appendix C

Black Cockatoo Habitat Assessment (AECOM, 2025a)

Appendix D

Preliminary Site Investigation – Applecross (GHD, 2025b)

Appendix E

Preliminary Site Investigation – Elizabeth Quay (GHD, 2025c)

Appendix F

Preliminary Site Investigation – Matilda Bay (GHD, 2025d)

Appendix G

Benthic Communities and Habitat Mapping Report (BMT, 2025b)

Appendix H

Assessment of Dredging Requirements (BMT, 2025c)

Appendix I

Construction Environmental Management Plan (AECOM, 2025b)

Appendix J

Aquatic Noise Management Plan (SLR, 2025)

Appendix K

Photomontages (Element, 2025)

Appendix L

Preliminary Coastal Processes Impact Assessment (Coastal Engineering, 2025)