



Star of the South Offshore Wind Farm

Technical report G: Onshore Ecology

**Prepared for Star of the South Wind
Farm Pty Ltd as trustee for Star of
the South Trust**

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AECOM



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This report is based on the scope, conditions and limitations, as described in the report. The report has been prepared for Star of the South Pty Ltd as trustee of the Star of the South trust for the sole purpose of satisfying the scoping requirements for the environment effects statement and the EIS guidelines for the environmental impact statement for the Star of the South project. Nature Advisory accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

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Executive summary

Overview

Star of the South is Australia's most advanced offshore wind project. Located off the central Gippsland coast, the project comprises an offshore wind farm and supporting transmission infrastructure to transfer energy to the existing electricity network.

A delegate of the Commonwealth Minister for the Environment decided that the project is a controlled action (as set out in notice dated 2 June 2020) and is required to be assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) through preparation of an Environmental Impact Statement (EIS) and the Victorian Minister for Planning determined that an Environment Effects Statement (EES) is required (as set out in notice dated 11 May 2020) under the *Environment Effects Act 1978* (EE Act).

Existing environment

The project area encompasses two distinct landforms, coastal and near-coastal zones and lowland plains, which support a mix of land uses including agriculture, commercial forestry (plantations), and biodiversity conservation reserves. The landscape has been historically cleared or heavily modified with remaining habitats predominantly comprised of grazing paddocks and plantations. Patches of forest and woodlands occur along roadsides, in conservation reserves (McLoughlins Beach – Seaspray Coastal Reserve and Woodside H28 Bushland Reserve) and on private land. Numerous ephemeral waterways occur along the alignment including Morris Creek and Warragul Creek.

Native vegetation and habitat

Native vegetation is primarily restricted to roadsides and conservation reserves with scattered trees and smaller patches occurring in the agricultural areas. Native vegetation is represented by 10 Ecological Vegetation Classes, but the most dominant vegetation type is Plains Grassy Forest which is vulnerable in the Gippsland Plain Bioregion.

Trees within the forest and woodland areas provide habitat for wildlife by providing food, shelter and breeding sites. The larger trees provide more resources for wildlife in terms of food (leaves, blossoms and nectar), shelter (hollows, bark, perches, cover) and breeding sites (hollows).

Aquatic habitat along the waterways is mostly represented by terrestrial grasses and vegetation that become periodically inundated. Riparian vegetation is absent for most waterways except for a patch of Estuarine Wetland on unnamed waterway UFI 42824679 and area of Swamp Scrub on unnamed waterway UFI 42806331.

Eight declared noxious weeds listed under the Victorian *Catchment and Land Protection Act 1994* (CaLP Act) were recorded within the project area. Most of these weeds are widespread in the region and most occurrences were recorded in roadside reserves and private land rather than in larger intact native vegetation associated with conservation reserves.

Threatened ecological communities

No threatened ecological communities were recorded in the project area.

Threatened flora species

Three FFG Act listed flora species were recorded within the project area during surveys: Pale Swamp Everlasting *Coronidium gunnianum* (critically endangered), Coast Grey-box *Eucalyptus bosistoana* (endangered) and Dune Wood-sorrel *Oxalis rubens* (endangered). Four other threatened flora species (three EPBC Act listed and one FFG Act listed) were identified with potential to occur based on habitats present and previous records.

Threatened fauna species

Four threatened fauna species were recorded during surveys: Gang-gang Cockatoo *Callocephalon fimbriatum* (endangered under FFG Act), Swift Parrot *Lathamus discolor* (critically endangered under EPBC Act and FFG Act) Glossy Grass Skink *Pseudemoia rawlinsoni* (endangered under FFG Act) and Lace Monitor *Varanus varius* (endangered under FFG Act). Several other species were identified with potential to occur and therefore considered in the impact assessment.

Impact assessment findings

An assessment was undertaken to evaluate potential impacts and risks associated with the project, considering the existing environment within the study area and associated construction, operation and decommissioning activities.

Impacts are those pathways that are certain and typically relate to works associated with construction that involve direct removal of ecological values. Risks are those pathways that are less certain and typically relate to mechanisms that have potential to affect ecological values.

The assessment considered the following broad impact and risk pathways:

- Loss of native vegetation (and associated habitat) including patches, scattered trees, endangered EVCs, and large habitat / hollow-bearing trees.
- Removal of habitat for threatened flora and fauna species.
- Impacts on waterways.
- Potential to the project to:
 - Indirectly impact on retained native vegetation and habitat through incursions of vehicles or materials beyond the project area (construction boundary), introduction and spread of weeds, pathogens and/or pest animals, dust, erosion and sedimentation and disturbance of wildlife through noise and light.
 - Affect connectivity in the landscape (habitat fragmentation).
 - Cause injury or death of wildlife during habitat removal or due to collision with project vehicles (wildlife-vehicle interactions).
 - Impact on native vegetation that could be ground-water dependent (Groundwater Dependent Ecosystems).
 - Exacerbate threatening processes.

The assessment findings are described below in order of the mitigation hierarchy applied to the project that comprises:

- Avoidance and minimisation of impacts on ecological values.
- Mitigation and management of potential impacts and risk to ecological values.
- Residual impacts that remain following application of avoidance, minimisation and mitigation.

- Offsets to compensate for the loss of native vegetation and any significant impacts on EPBC Act listed matters (if applicable).

Construction works proposed for the project will have unavoidable impacts on biodiversity in the project area as it assumed that the majority of vegetation and habitat in the project area will be permanently lost. The impacts described here are considered conservative, as they assume that all native vegetation and fauna habitat in the project area will be permanently lost. The design of the project is still being finalised and, as such, the project will continue to seek to reduce impacts.

Avoidance and minimisation

Avoidance and minimisation of social and environmental impacts is central to the projects' decision making. Examples of avoidance and minimisation during the design development process include the decisions to design the shore crossing to not directly impact coastal areas by drilling under and use existing roads for construction site access wherever possible, along with selection of a route for the onshore transmission infrastructure that avoids large tracts of remnant vegetation.

Underground installation of the onshore transmission lines was adopted to be less intrusive and have less impacts on native vegetation due to a narrower cable easement requirement, despite being more expensive to install and maintain than overhead transmission lines. This decision also meant that the risk of wildlife collision is avoided.

Other avoidances achieved by the project through refinement of the project area to reduce widths where it crosses patches of native vegetation on private land, between the two areas that comprise Woodside H28 Bushland Reserve and roadsides. These refinements reduce the extent of native vegetation patches and number of trees (including FFG Act listed Coast Grey-box) to be removed.

Key locations where the project has avoided and minimised impacts to native vegetation and sensitive ecological values are:

- Avoidance of native vegetation in the McLoughlins Beach-Seaspray Coastal Reserve at the shore crossing by HDD.
- Avoidance of unnamed waterway (UFI 42824679) and Estuarine Wetland by selecting trenchless crossing installation method.
- Avoidance of the native vegetation identified as the FFG Act Plains Grassland (South Gippsland) occurring in public land alongside Woodside Beach Rd.
- Minimisation of impacts to Plains Grassy Forest (endangered) within Woodside H28 Bushland Reserve by adjusting the alignment to avoid most of the bushland reserve.
- Exclusion of Notional Root Zones from the project area where project are encroaches on the NRZ by more than 10% in accordance with AS 4970-2025 - Protection of Trees on Development Sites.
- Reduction in working width of the project area where it crosses key sensitive areas to minimise impacts on native vegetation and habitat. Those reductions have been achieved by strategically removing the temporary construction area adjacent to the 40m cable easement at Stringy Bark Lane, Woodside H28 Bushland Reserve and private land adjacent, Giffard Road, and small patches on private land.

Implementation of No Go Zones on the project area boundary and around scattered trees where Notional Root Zones could be affected has reduced the extent of native vegetation impacted by the project.

Mitigation measures

Potential impacts and risks to onshore ecology resulting from the project will be avoided, minimised or managed to required standards through the recommended mitigation measures. Mitigation measures include:

- Continuing to identify opportunities to avoid sensitive ecological values during planning and design of construction.
- Preparation of an Environmental Line List which identifies all ecological values that occur within the project area. The ELL will guide all prescribed mitigation or management requirements associated with each identified value.
- Preparation of a Construction Environmental Management Plan to define measures to manage air quality, noise, site contamination, waste, water quality and monitoring to minimise construction activities impacting on the environment.
- Ensuring contractor awareness of areas of ecological value and protection measures to be implemented through inductions and training and provision of reference material such as environmental management plans and maps at the site office during construction.
- Preparation (and implementation) of management plans and protocols in consultation with DEECA to identify ecological values and measures to manage and control impacts. Those plans will include:
 - Flora and Fauna Management Plan to identify significant ecological values to be retained (native vegetation and threatened species habitat, Large Trees in Patches, Scattered Trees) and define measures to protect those values during construction. The FFMP will be developed in consultation with DEECA and include measures to
 - protect retained vegetation and habitat
 - minimise the risk of injury or death of wildlife.
 - Biosecurity Management Plan (BMP) that defines measures to manage and control impacts on fauna and flora values from biosecurity threats (weeds, pathogens, and pest animals) during construction and operational phases. The BMP will be developed in consultation with DEECA and define measures to prevent the introduction and spread of weeds and pathogens.
 - Protocol for works within Conservation Reserves that will also be developed in consultation with Parks Victoria.
 - Rehabilitation and Reinstatement Plan to guide the approach to rehabilitation following the completion of construction in conservation reserves and roadsides.
 - Designated Waterway Crossing Management Plan (DWCMP) to describe how the project will manage and control impacts during construction. The DWCMP will also be developed in consultation with the West Gippsland CMA and define the construction method, timing and duration for construction works, and outline mitigations appropriate to the waterways such as diversion drains to maintain environmental water flows during construction.
- Preparation and implementation of an Operation Environmental Management Plan to define controls around the protection of retained biodiversity values during operation including permitted maintenance activities (extent and type), maps showing No Go Zones

and/or maintenance zones, biosecurity controls, an audit framework and corrective actions if the outcomes are not achieved.

- Preparation and implementation of a Decommissioning Environmental Management Plan to define controls around the protection of biodiversity values during decommissioning. The plan will be developed in consultation with DEECA following an updated survey of biodiversity values immediately prior to the decommissioning phase.

Environmental management plans with subplans and protocols will be prepared and implemented to protect retained native vegetation and habitat and wildlife during construction, operation and maintenance. Plans related specifically to protection of ecological values (Flora and Fauna Management Plan, Biosecurity Management Plan, protocol for works in conservation reserves and protocol for wildlife encounters) will be prepared in consultation with DEECA.

Implementation of best-practice construction environmental management measures will ensure avoidance and minimisation of potential impacts from inadvertent vegetation and habitat removal, noise, dust, weeds, pathogens, erosion and sedimentation, chemical spills, rubbish and associated pest animal activity, and deaths of fauna from trench entrapment or vehicle collision.

Monitoring requirements and contingency measures will be defined by the project in the relevant plans to be prepared in consultation with DEECA. Regular review of mitigation measures will be conducted by the project to ensure continuing compliance with its environmental objectives and approval conditions and to ensure that the measures remain fit-for-purpose. If adverse residual effects on flora, fauna, ecological communities and other habitat values arise (outside of those being managed by the current suite of management and mitigation measures), or any new effects on fauna, flora or ecological communities are identified, they will be assessed on a case-by-case basis to determine an appropriate course of action to address the specific issue in consultation with DEECA where necessary.

Residual impacts and risks

Residual impacts are those that remain following avoidance and mitigation and therefore represent the impacts or risks that are unavoidable. The project will have a residual impact on native vegetation and habitat for threatened flora and fauna species including hollow-bearing trees. Risks associated with inadvertent impacts on retained native vegetation, introduction and spread of weeds and disturbance, injury or death of wildlife are low with mitigation.

Native vegetation

Removal of native vegetation is unavoidable but has been minimised as much as possible by the project. The total quantum of loss is substantial however the removal is not of one contiguous patch of vegetation and rather is represented by localised removals of numerous patches (habitat zones) at discrete locations in the landscape along the approximate 30 km alignment. The extent of loss in the context of percent of native vegetation that is modelled by DEECA as remaining in Gippsland Plain Bioregion and in Victoria following the reduction in extent that occurred because of the 2019/2020 bushfires is unlikely to be significant (<0.001%).

Summary of native vegetation patches and trees to be removed and offset

Native vegetation feature	Option AB	Option C	Option D
Patches	15.009 ha across 78 HZs	16.142 ha across 93 HZs	15.531 ha across 74 HZs

Native vegetation feature	Option AB	Option C	Option D
Large trees in patches	54	66	65
Scattered trees - large	28	53	42
Scattered trees - small	12	31	12
Endangered EVCs – Swamp Scrub	0.957 ha	0.954 ha	0.954 ha

The context of the landscape has also been considered with the removals occurring in an already substantially cleared landscape that is already highly fragmented. The project avoids most patches of native vegetation but intersects some roadside corridors. At those locations, the project area has been reduced to 40 m to minimise the gap needed for the cable easement. Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes.

The project will continue to seek reductions when planning construction works.

Threatened species

Removal of habitat is unlikely to represent a significant impact for EPBC Act listed threatened species. Threatened plants with potential to occur were not recorded during targeted surveys and there is a low likelihood an important population of those vulnerable species is present in the project area. In the case of fauna, potential habitat affected represents a small proportion of the habitat available in the region, with much of it protected in conservation reserves, and is not considered to be habitat critical to the species' survival.

Removal of habitat is unlikely to represent a significant impact for FFG Act listed threatened flora or fauna species. Impact on potential habitat or known occurrences of threatened flora would be localised with recovery through recruitment of new individuals possible in the long-term if individuals remain outside the project area. Removal of habitat for threatened fauna would also be localised with most species able to readily move or adapt to reduction in extent of habitat at the discrete locations along the alignment. More sedentary, territorial species (small birds, reptiles, frogs hollow-dwelling species) are more at risk of being impacted during habitat removal but mitigations to be implemented such as timing of construction work and salvage reduce this risk. Loss of individuals is unlikely to significantly affect the species' persistence.

Summary of threatened flora species and impacts

Flora species	Conservation status		Extent of impact on potential habitat (ha)		
	EPBC Act	FFG Act	Option AB	Option C	Option D
Thick-lipped Spider-orchid	VU	-	2.901 ha	4.201 ha	4.201 ha
Pale Swamp Everlasting	-	cr	0.653 ha 10 plants	0.653 ha 10 plants	0.653 ha 10 plants
Coast Grey-box	-	en	22 individuals	22 individuals	22 individuals
Dune Wood-sorrel	-	en	0.106 ha	0.106 ha	0.106 ha

Flora species	Conservation status		Extent of impact on potential habitat (ha)		
	EPBC Act	FFG Act	Option AB	Option C	Option D
Dense Leek-orchid	VU	cr	0 ha	0.101 ha	0 ha
Cobra Greenhood	-	en	3.197 ha	4.497 ha	4.497 ha
Spiral-leaved Sun-orchid#	VU#	en	2.901 ha	4.201 ha	4.201 ha

Notes: CR – critically endangered, EN – endangered, VU – vulnerable; # listed after referral decision (2 June 2020) therefore not matter of national environmental significance under Section 158A(4) of the EPBC Act

Summary of threatened fauna species and impacts

Fauna species	Conservation status		Extent of impact on potential habitat		
	EPBC Act	FFG Act	Option AB	Option C	Option D
Blue-winged Parrot #*	VU#	*	~ 9 ha 13 habitat trees	~10.5 ha 17 habitat trees	~11 ha 17 habitat trees
Chestnut-rumped Heathwren	-	vu	~4 ha	~3 ha	~2.5 ha
Gang-gang Cockatoo#	EN#	en	~7 ha 13 scattered habitat trees	~9 ha 17 scattered habitat trees	~9 ha 17 scattered habitat trees
Latham's Snipe	Mi	-	<0.1 ha	<0.1 ha	<0.1 ha
Little Eagle	-	vu	~9 ha	~10.5 ha	~11 ha
Powerful Owl	-	vu	~8 ha	~10 ha	~10.5 ha
Swift Parrot	CR	cr	~6.5 ha	~8.5 ha	~9 ha
Grey-headed Flying-fox	VU	vu	~8 ha	~10 ha	~10.5 ha
New Holland Mouse	-	vu	~4 ha	~2.5 ha	~2 ha
White-footed Dunnart	-	vu	~9 ha	~10.5 ha	~11 ha
Koala (Strzelecki population) *	-	-	~8 ha	~10 ha	~10 ha
Lace Monitor	-	en	~8 ha	~10.5 ha	~10.5 ha
Glossy Grass Skink	-	en	~2.5 ha	~2 ha	~2 ha
Southern Toadlet	-	en	~4 ha	~2.5 ha	~2 ha

Fauna species	Conservation status		Extent of impact on potential habitat		
	EPBC Act	FFG Act	Option AB	Option C	Option D
Martin's Toadlet#	EN#	en	~6 ha	~10 ha	~10.5 ha
Australian Mudfish	-	en	~6m unnamed waterway	~10m unnamed waterway	~10m unnamed waterway

Notes: CR – critically endangered, EN – endangered, VU – vulnerable; # listed after referral decision therefore not matter of national environmental significance under Section 158A(4) of the EPBC Act; * Koala not listed but the Strzelecki Ranges population is one of few remaining original populations in Victoria; *# Blue-winged Parrot listed under EPBC Act after referral decision and not listed under FFG Act but is still a species of note.

Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes. Some of the roadside vegetation is already discontinuous in places or, in some instances, does not connect through to patches of native vegetation east of the project area. The project has selected a route that avoids large tracts of remnant vegetation.

Some residual risk remains of wildlife being injured or killed as not all wildlife will be able to be found and salvaged during construction and not all wildlife-vehicle interactions will be preventable.

Legislative implications

A significant residual impact on EPBC Act listed threatened species or communities required to be assessed under the Referral is not anticipated therefore offsets under the EPBC Act Environmental Offsets Policy are not required.

Removal of habitat for protected flora (threatened and non-threatened species) from public land will require a permit under the FFG Act. Public land areas include Woodside H28 Bushland Reserve and roadsides.

A permit is required to remove native vegetation under Cl. 52.17 of the Wellington Planning Scheme.

Offsets

The project will offset the removal of native vegetation and habitat in accordance with the Victorian Native Vegetation Removal Regulations, specifically the *Guidelines for the removal, destruction or lopping of native vegetation* which is an Incorporated Document within the Victoria Planning Provisions under Clause 52.17 (Native Vegetation).

Third-party offset sites are currently available that meet the project's offset obligations within Wellington Shire and West Gippsland CMA areas.

A Planning Scheme Amendment is being prepared to address loss of native vegetation that would require a permit and offsets under Cl. 52.17 of the planning scheme and to address effects within the area of ESO1 that would require a permit.

Abbreviations

AECOM	AECOM Pty Ltd
BCS	Bioregional Conservation Status
BIA	Biologically Important Areas
BMP	Biosecurity Management Plan
Bonn	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
CaLP Act	<i>Catchment and Land Protection Act 1994</i>
CAM	Common Assessment Method
CAMBA	China- Australia Migratory Birds Agreement
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CR	Critically endangered
DBH	Diameter at Breast Height
DAWE	Department of Agriculture, Water and Environment (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
DECCW	Department of Environment, Climate Change and Water NSW
DEECA	Department of Energy, Environment and Climate Action (formerly DELWP)
DELWP	Department of Environment, Land, Water and Planning (now DEECA)
DEMP	Decommissioning Environmental Management Plan
DGPS	Digital Geographic Positioning System
DoE	Department of Environment (now DCCEEW)
DoEE	Department of Environment and Energy (now DCCEEW)
DPCD	Department of Planning and Community Development
DSE	Department of Sustainability and Environment (now DEECA)
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
DWCMP	Designated Waterway Crossing Management Plan
EE Act	<i>Environment Effects Act 1978</i>
EES	Environment Effects Statement
EIS	Environmental Impact Statement
ELL	Environmental Line List

EMP	Ecological Management Plan
En	Endangered
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESOs	Environmental Significant Overlays
EVC	Ecological Vegetation Class
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
FFMP	Flora and Fauna Management Plan
GDEs	Groundwater Dependent Ecosystems
GHU	General Habitat Unit
GIS	Geographic Information System
GPB	Gippsland Plain Bioregion
HBT	Hollow-bearing Tree
HGVs	Heavy Goods Vehicles
HHa	Habitat Hectare
HZ	Habitat Zone
IBRA	Interim Biogeographic Regionalisation for Australia
IPAC	Invasive Plants and Animals Committee
JAMBA	Japan-Australia Migratory Birds Agreement
Km	Kilometre
KP	Kilometre Point
MDS	Maximum Design Scenario
MNES	Matters of National Environmental Significance
NEM	National Electricity Market
NRZ	Notional Root Zone (replaces Tree Protection Zone)
NVCR	Native Vegetation Credit Register
NVIM	Native Vegetation Information Management tool managed by DEECA
NVR	Native Vegetation Removal
NVRR	Native Vegetation Removal Regulation
NVR Map	Native Vegetation Removal Regulation Map
OEMP	Operational Management Plan
PDE	Project Design Envelope
P&E Act	<i>Planning and Environment Act 1987</i>
PMST	Protected Matters Search Tool managed by DCCEEW

ROKAMBA	Republic of Korea Australia Migratory Birds Agreement
RRP	Rehabilitation and Reinstatement Plan
SBV	Strategic Biodiversity Value (now Habitat Value in NatureKit)
SMOs	Salinity Management Overlays
TEC	Threatened Ecological Community
TPZ	Tree Protection Zone (now referred as Notional Root Zone)
VBA	Victorian Biodiversity Atlas
VPOs	Vegetation Protection Overlays
VQA	Vegetation Quality Assessment
VU	Vulnerable
WoNS	Weeds of National Significance
WTG	Wind Turbine Generator

Glossary

Biodiversity	The variety of all life-forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.
Bioregional conservation status (BCS)	An assessment of the conservation status of the native vegetation type (EVC) in the context of a particular bioregion, taking account of how commonly it originally occurred, the current level of depletion and the level of degradation of condition typical of remaining stands.
Bioregion	A landscape-based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.
Buffer	An additional area surrounding the project area that is included in the assessment to account for any indirect impacts. For this project, a 15 m buffer has been applied.
Cable easement	The designated area where cables are installed, operated and maintained. The easement is a formal agreement with the landholder that imposes restrictions on how the land can be used, to protect both the infrastructure and land users.
Construction corridor	The construction corridor is a broadly used term to describe the area comprised of the cable easement and temporary construction areas adjacent to the cable easement. Along the alignment, the construction corridor is nominally 10 metres wider than the cable easement on each side, with some exceptions where the width has been reduced to minimise impacts.
Diameter at breast height (DBH)	Circumference of a tree (in cm) measured at 1.3 m above ground level. DBH informs the size of large trees in benchmarks for EVCs. Superseded by the term Diameter at Standard Height (DSH) in AS4970-2025 Protection of Trees on Development Sites but still referred to as DBH in many guidance documents in relation to native vegetation.
Diameter at standard height (DSH)	Circumference of a tree (in cm) measured at 1.4 m above ground level. Previously known as Diameter at Breast Height (DBH) in Australian Standard AS4970-2009 Protection of Trees on Development Sites. Updated in 2025 to AS4970-2025. Still referred to as DBH in many guidance documents in relation to native vegetation although DBH is measured at 1.3 m above ground level.
Ecological Vegetation Class (EVC)	Native vegetation in Victoria is classified into EVCs based on floristic, structural, and ecological features. Each EVC has been assigned a 'benchmark' condition for each of Victoria's bioregions. The EVC benchmark is used for comparison when assessing vegetation quality through a Vegetation Quality Assessment (VQA). The benchmark is also used for determining the size category of scattered trees.
Ecology	Ecology is the study of the interrelationships between living organisms and their environments.
Exotic vegetation	Any vegetation that does not meet the definition of native vegetation
Groundwater dependent ecosystem	A terrestrial, aquatic, or subterranean ecosystem that requires access to groundwater to meet all or some of its requirements.
Habitat hectare (HHa)	A site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type.

	For native vegetation: Habitat hectares of patch = extent of native vegetation × condition score For scattered trees: see definition 'Native vegetation – scattered trees' below
Habitat tree	Hollow-bearing tree with the potential to be occupied by fauna.
Habitat zone (HZ)	A discrete area of native vegetation consisting of a single vegetation type (EVC) with an assumed similar averaged quality. This is the base spatial unit for conducting a habitat hectare assessment.
High-threat weed	Introduced species, including native species occurring outside their natural range ('non-indigenous'), with the ability to out-compete and substantially reduce one or more native life forms in the longer term assuming on-going current site characteristics and disturbance regime.
High-quality native vegetation	Native vegetation with a condition score of >0.6
Hollow-bearing tree(s) (HBTs)	Large (DBH) trees with cavities formed in branches or trunk. Predominantly in mature (100+-year-old) trees but may form in younger trees of certain species. May be utilised as roosting and nesting resources for birds, mammals, frogs and reptiles.
Indigenous vegetation	Vegetation that is native to Australia as well as being native to a specific geographic region.
Matters of National Environmental Significance (MNES)	The EPBC Act defines and protects nine MNES: World Heritage properties, National Heritage places, wetlands of international importance (Ramsar sites), listed threatened species and ecological communities, migratory species protected under international agreements (JAMBA, CAMBA, ROKAMBA), Commonwealth marine areas, the Great Barrier Reef Marine Park, nuclear actions (including uranium mines), and water resources related to coal seam gas development and large coal mining developments.
Native vegetation	Plants indigenous to Victoria, including trees, shrubs, herbs and grasses (as defined in Victorian planning schemes).
Native vegetation - patch	An area of vegetation where at least 25% of the total perennial understorey plant cover is native, or any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or any Mapped Wetland included in the Current Wetlands map, available in DEECAP systems and tools (DEECA 2025a).
Native vegetation – scattered tree	A native canopy tree that does not form part of a patch (DEECA 2025a). Scattered trees were classified as <i>large</i> or <i>small</i> based on their DBH. The large scattered tree DBH is specified in the relevant EVC benchmark description. Small scattered trees are those less than the EVC benchmark for a large tree but greater than 3 m in height (DEECA 2025). The extent of a small scattered tree is the area of a circle with a 10-m radius, with the trunk at the centre. The extent of a large scattered tree is the area of a circle with a 15-m radius, with the trunk at the centre. Scattered trees are assigned a standard condition score of 0.2.
Native vegetation – large tree in patch	A native canopy tree with a DBH greater than or equal to the large tree benchmark for the relevant bioregional EVC (DEECA 2025a).

	If the large tree is located within the extent of a patch of native vegetation, it is a large tree in a patch.
Native vegetation offset	A native vegetation offset is any works of other actions to make reparation for the loss of native vegetation arising from the removal of native vegetation. This may include an area of existing remnant vegetation that is protected and managed, an area that is revegetated and protected, an area that is set aside for regeneration or restoration, or any combination of these. The relative size of an offset is graded according to its conservation significance.
Non-indigenous vegetation	Vegetation that is native to Australia but not to the geographic region of a site.
Notional Root Zone (previously known as Tree Protection Zone)	Defined as a specified area above and below ground and at a given distance from the trunk, which is set aside for the protection of a tree's roots and crown. The NRZ retains the viability and stability of trees to be retained that are potentially subject to damage by the development. The radius of the NRZ is the DSH x 12, measured at 1.4 m above ground level. The maximum applied NRZ is 15 m. This definition was in accordance with the Australian Standard - AS4970-2025 Protection of Trees on Development Sites. Unless otherwise determined by an arborist, the tree will be deemed lost if encroachment of compaction and excavation into the NRZ is more than 10 percent or inside the Structural Root Zone (SRZ). Previously known as Tree Protection Zone (TPZ).
Project area	The total onshore project footprint with all direct impacts contained within this boundary. The project area includes the cable easement, new access tracks, laydown areas and batch plants. For the purpose of this report, the term project area relates exclusively to the onshore area and excludes the footprint of the offshore area.
Riparian vegetation	Vegetation that is associated with waterways (i.e., rivers, streams, creeks)
Strategic Biodiversity Value (SBV)	Strategic Biodiversity Value is a DEECA model that identifies areas of relative biodiversity importance. High SBV areas have a score above 0.8 (DEECA 2025). SBV informs native vegetation offset calculations in NVR Map.
Structural Root Zone (SRZ)	The area required for tree stability as defined in Australian Standard AS4970-2025 Protection of Trees on Development Sites.
Study area	The study area is defined as the project area plus a 15m buffer.
Threatened ecological community (TEC)	Threatened ecological communities are ecological communities listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> , or the <i>Flora and Fauna Guarantee Act 1988</i> , or those communities with a bioregional conservation status of Endangered in Victoria
Threatened species	Threatened species are flora and fauna species listed under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and/or the <i>Flora and Fauna Guarantee Act 1988</i> .
Tree Protection Zone (now referred to as Notional Root Zone in AS4970-2025)	Refer to Notional Root Zone. Previously known as Tree Protection Zone (TPZ) in Australian Standard AS4970-2009 Protection of Trees on Development Sites. Updated in 2025 to AS4970-2025. Still referred to as TPZ in many guidance documents in relation to native vegetation
Vegetation Quality Assessment (VQA)	An assessment of vegetation condition undertaken using the Habitat Hectare method as described in the <i>Vegetation Quality Assessment Manual – guidelines for applying the habitat hectare scoring method</i> (DSE 2004a).

	Individual patches are termed Habitat Zones (HZs) in accordance with DEECA terminology.
Weeds of National Significance (WoNS)	The most problematic invasive plant species in Australia as determined by the federal government.

1. Introduction

The Star of the South Offshore Wind Farm (the project) is Australia's most advanced offshore wind farm. The project is located in Commonwealth waters off the coast of Gippsland, and will connect to the electricity network via the proposed VicGrid connection hub in Giffard.

The project represents a significant opportunity to diversify Australia's energy resources. As Australia's ageing coal fleet retires, new sources of power are needed to address the anticipated gap in electricity generation. The project will address this gap, by harnessing Bass Strait's strong, consistent winds and delivering significant amounts of clean, reliable power to the grid starting in 2032. With a capacity of up to 2.2 gigawatts (GW), the project can meet approximately 20 per cent of Victoria's current electricity demand, enough to power around 1.2 million homes annually.

The project is located within both Commonwealth and Victorian jurisdictions and is subject to planning and environmental assessment and approval under Commonwealth and Victorian legislation.

A delegate of the Commonwealth Minister for the Environment and Water has determined the project is a controlled action (as set out in a notice dated 2 June 2020) and must be assessed and approved under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) through an Environmental Impact Statement (EIS). The Victorian Minister for Planning has determined the project requires an Environment Effects Statement (EES) (as set out in a notice dated 11 May 2020) under the *Environment Effects Act 1978* (Vic) (EE Act). The purpose of this report is to assess the potential onshore ecology impacts associated with the project to inform the preparation of the EIS and EES required for the project. The investigations and reporting required to assemble this document were undertaken as follows:

- Native vegetation, threatened communities and threatened flora species surveys by AECOM Pty Ltd (AECOM);
- Fauna habitat assessment and threatened fauna surveys by Nature Advisory Pty Ltd; and
- Aquatic habitat assessment and threatened aquatic fauna surveys by Aquatica Environmental Pty Ltd.

Marine ecology aspects of the project are reported in Technical report D – Marine Mammals prepared by RPS and Technical report E – Seabirds and Shorebirds prepared by Biosis Pty Ltd.

2. Project description

This section provides a high-level overview of the project in its entirety as supplied by the project. Detailed descriptions of project components and construction processes are provided in Chapter 4 – Project description of the EIS for the whole of project assessment across the Commonwealth jurisdiction, and in Chapter 4 – Victorian works project description of the EES for the Victorian jurisdiction. Specific project parameters that have informed the onshore ecology assessment are detailed in Section 10.1 of this report.

2.1. Project overview

The offshore wind farm will be installed within a 586-square-kilometre offshore wind farm area, located approximately 10 to 40 kilometres off the coast of Gippsland, as shown in Figure 2-1.

The project comprises an offshore wind farm and supporting transmission infrastructure to generate and transfer power to the grid. The offshore infrastructure extends from the shore crossing at Reeves Beach, to the offshore wind farm area.

The onshore infrastructure primarily comprises of an underground cable system that will connect the project to the proposed VicGrid connection hub in Giffard (also referred to as ‘proposed Giffard terminal station area’). The onshore transmission infrastructure is located in Central Gippsland, extending approximately 30 kilometres from Reeves Beach to the proposed VicGrid connection hub.

This technical report focusses on construction, operation and decommissioning of the onshore transmission system], within the onshore project area shown in Figure 2-3.

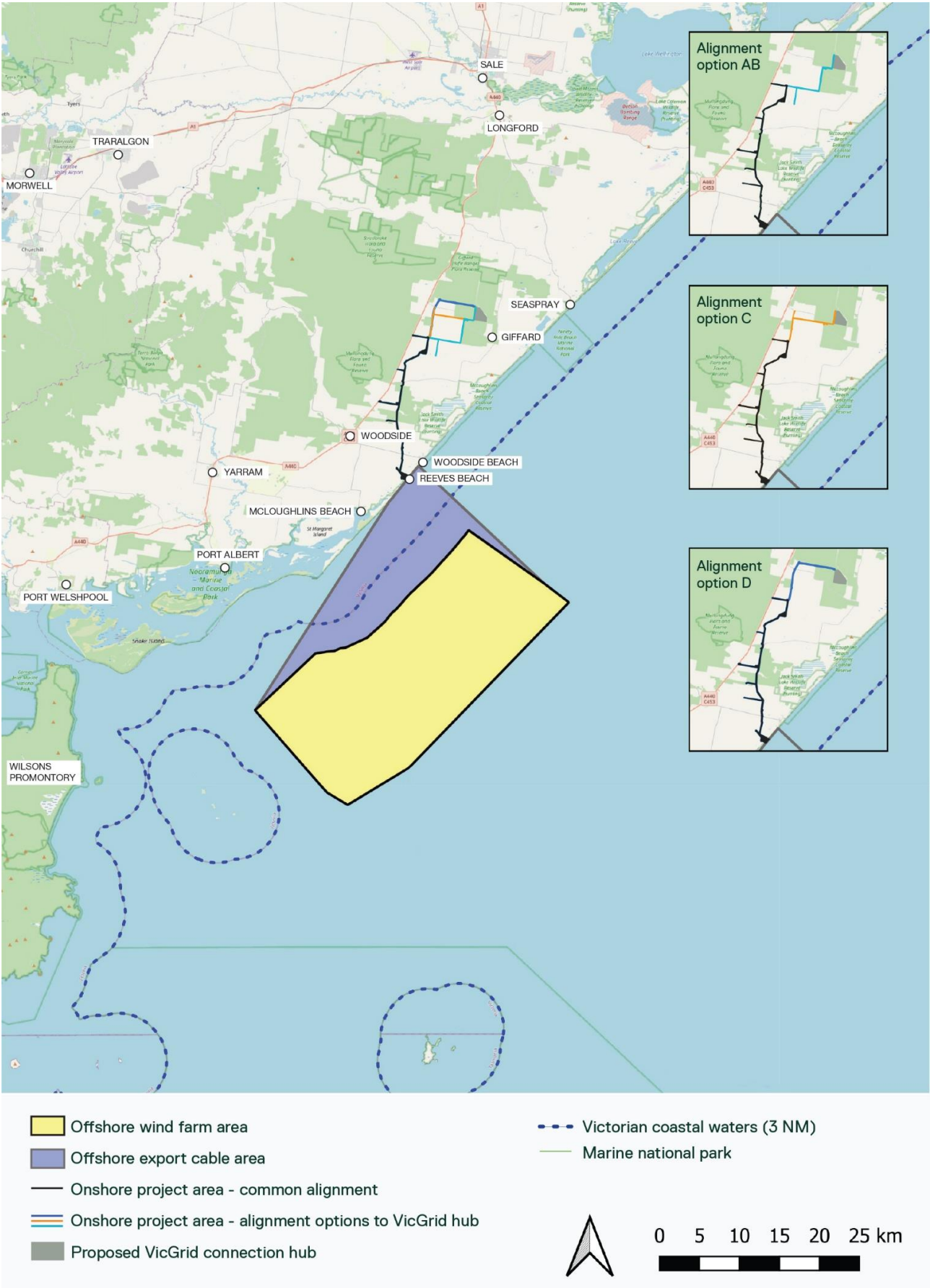


Figure 2-1 Project location

2.2. Project development

Over several years of project development, opportunities to avoid and minimise environmental impacts have been realised in accordance with the mitigation hierarchy shown in Figure 2-2. The assessment framework has also enabled the identification and adoption of further avoidance and minimisation measures as part of the planning and environmental approvals process.

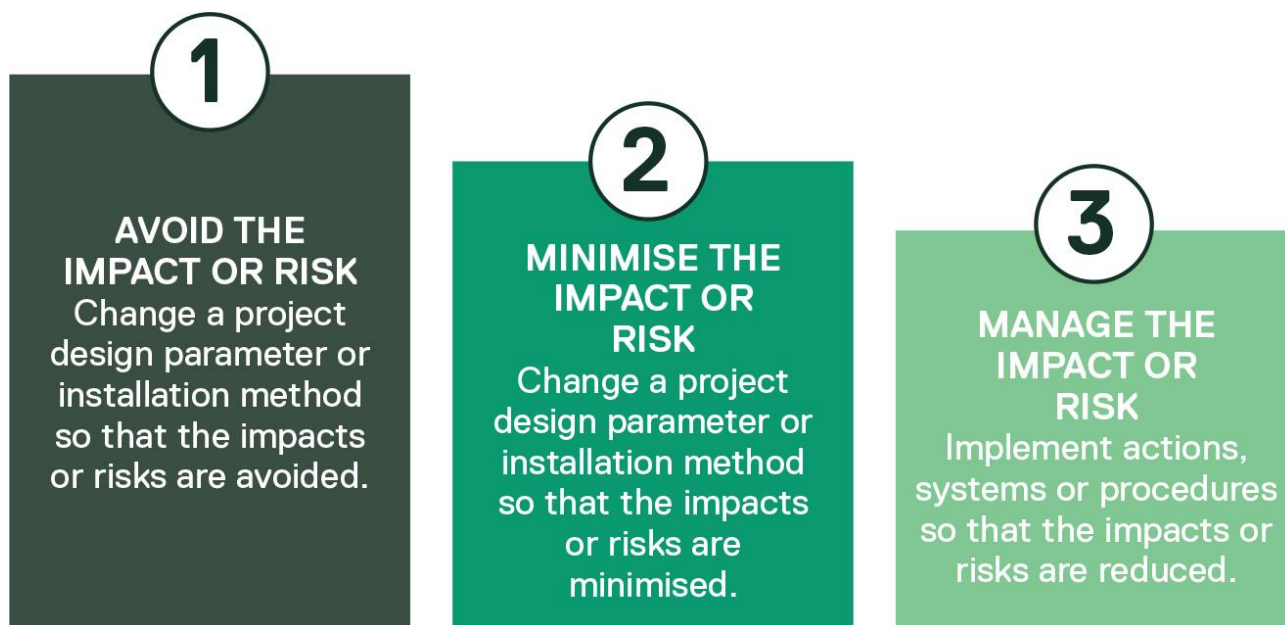


Figure 2-2 Mitigation hierarchy

Avoidance and minimisation of social and environmental impacts is central to the project's decision making and as such, the project will continue to be refined in response to technical requirements and potential environmental and social impacts identified during the development phase.

This was considered in the preparation of a project description which is found in Chapter 4 – Project description for the whole of project assessment across the Commonwealth jurisdiction and Chapter 4 – Victorian works project description of the EES for the Victorian jurisdiction. A description of how avoidance of impact has informed the design in relation to onshore ecology can be found in Section 6.6

Examples of this include the decisions to design the shore crossings to not directly impact coastal areas, use existing roads for construction site access wherever possible, and adopt construction techniques that avoid impacts on sensitive receptors.

Once avoidance and minimisation measures are exhausted, residual impacts and risks are managed. In the case of risks, mitigation measures can be applied both before and after an event occurs. Residual impacts and risks are then evaluated against the assessment criteria to ensure they are at an acceptable level.

2.3. Project area

The project area is shown in Figure 2-3 has been broken down into three main sections - offshore, shore crossing, and onshore areas.

1. Offshore project area, comprising:
 - Offshore wind farm area: A 586 square kilometre area extending approximately 10 to 40 kilometres offshore from the shore crossing. Includes offshore wind turbines installed on foundations, offshore substations and offshore transmission cables. This area is in Commonwealth waters.
 - Offshore export cable area: A 232 square kilometre area extending from the offshore wind farm area to the shore crossing. Includes offshore export cables to connect the wind farm to land. This area traverses Commonwealth waters and Victorian coastal waters.
2. Shore crossing: Located at Reeves Beach, this is where the offshore export cables will transition to land and connect to the underground cable system onshore.
3. Onshore project area: An approximately 30 kilometre corridor extending from the shore crossing to the proposed VicGrid connection hub. Includes an underground cable system within a (common) alignment to Giffard West, at which point there are three alignment options (AB, C and D) to reach the proposed VicGrid hub in Giffard.

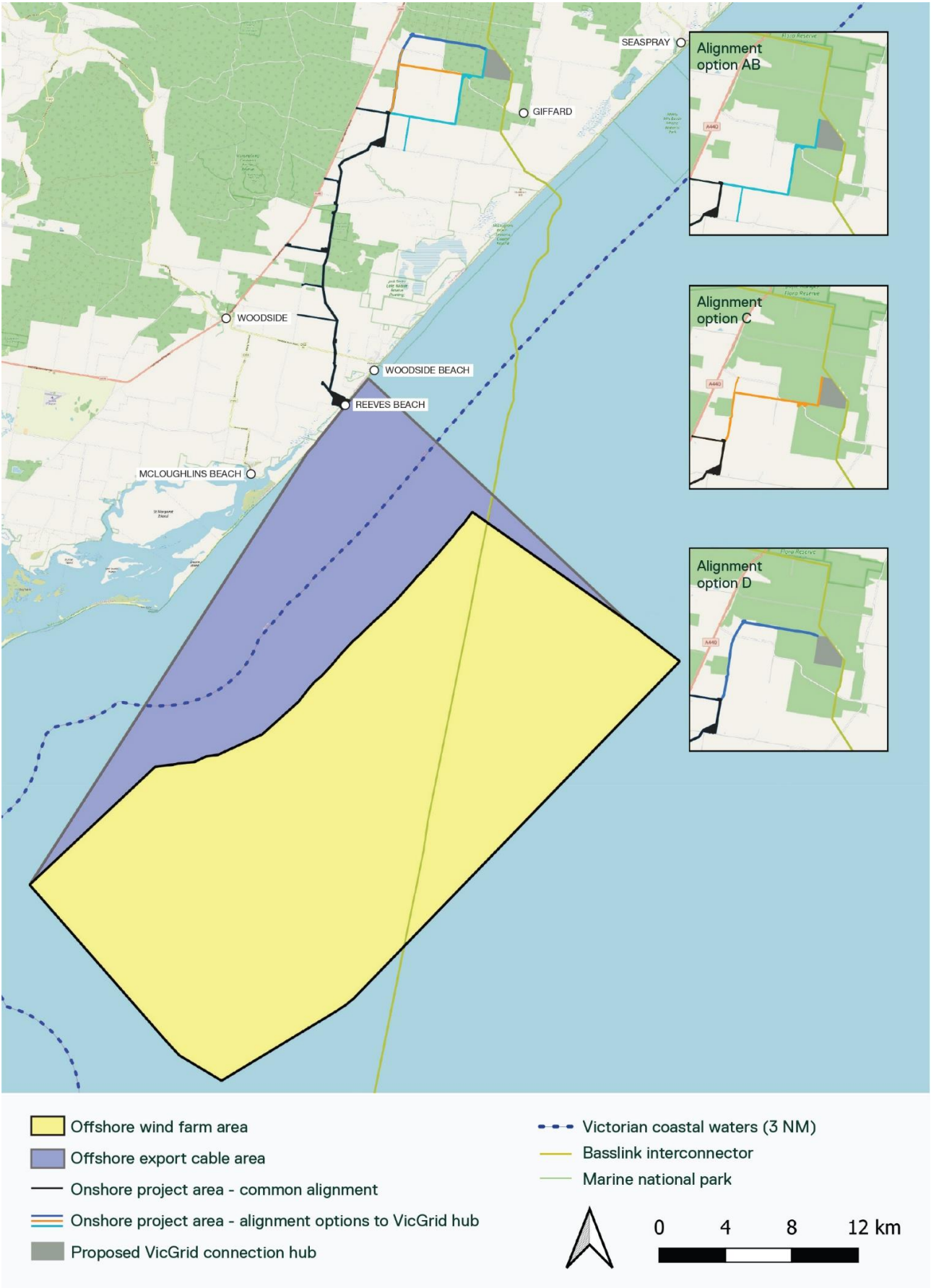


Figure 2-3 Project overview

2.4. Key project components

The key components that make up the project are the offshore wind farm and transmission infrastructure (inter-array cables, offshore substations and offshore export cables), the shore crossing infrastructure and onshore transmission infrastructure.

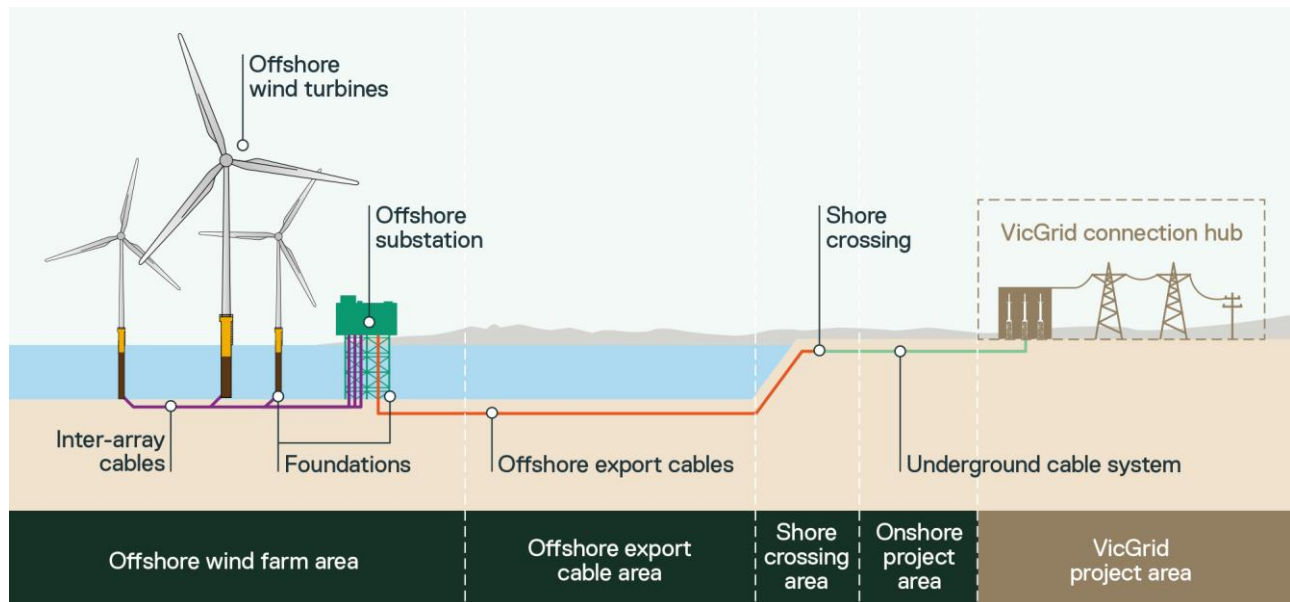


Figure 2-4 Project components

Key components are shown in Figure 2-4 and include:

- Offshore wind farm and transmission infrastructure:
 - Up to 147 offshore wind turbines installed on foundations with connecting inter-array cables
 - Up to five offshore substations and three interlink cables
 - Up to eight offshore export cables.
- Shore crossing infrastructure:
 - Up to eight trenchless crossings containing the offshore export cables.
- Onshore transmission infrastructure, which consists of:
 - An underground cable system connecting to the proposed VicGrid connection hub

2.5. Construction approach

The construction of the shore crossing and onshore transmission system would involve the following key activities:

- Site establishment
- Cable system construction (including trenching, installation and jointing)
- Pre-commissioning and commissioning of the cable system
- Demobilisation and rehabilitation of areas disturbed by construction.

2.6. Project timeline

The project has been under development for approximately seven years. If approvals are obtained in the next few years, construction could start around 2030 and electricity generation from 2032. The operational life of the project is approximately 30 years, with the possibility of repowering to extend its life, if deemed appropriate by Star of the South and regulators closer to the time.



Figure 2-5 Project timeline

2.7. Construction schedule

The project is expected to take up to seven years to construct, if built to its full capacity in a single stage. The project could also be built in two stages, depending on energy market and government requirements and timing. Figure 2-6 shows the order and maximum duration of construction for key components.

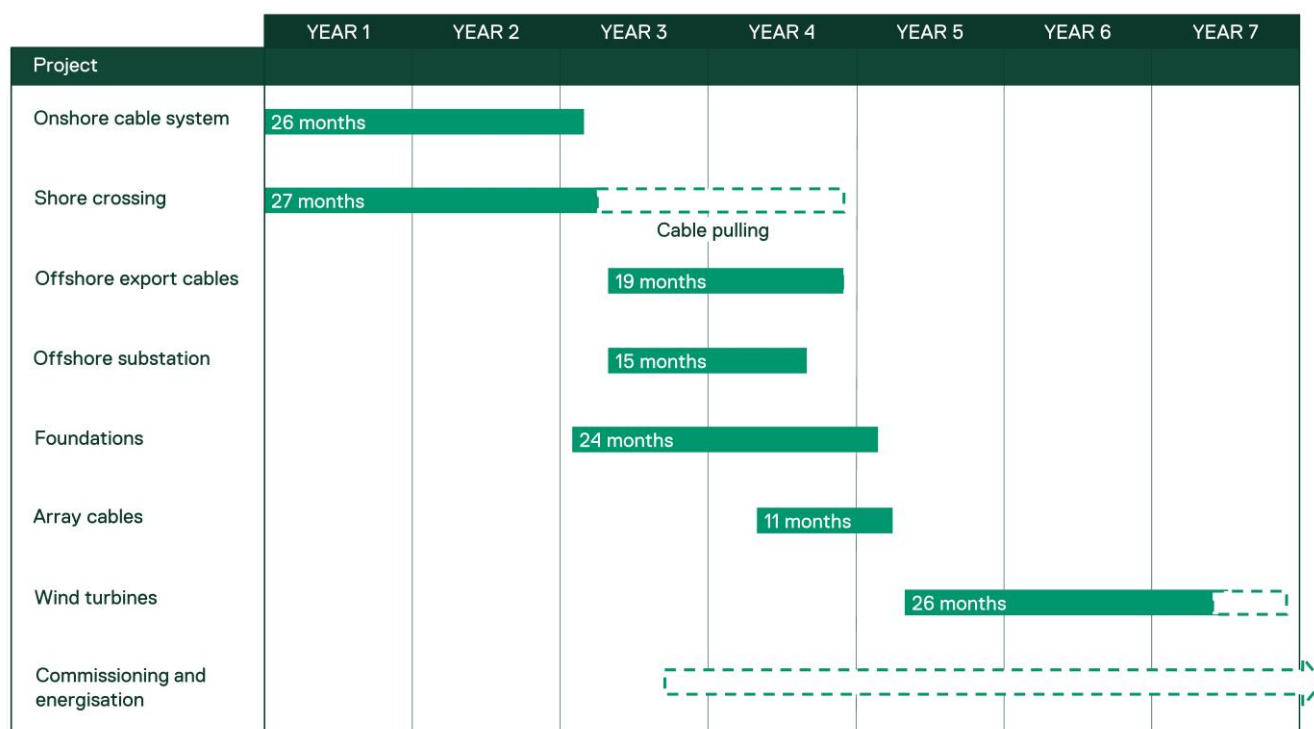


Figure 2-6 Indicative project construction schedule

2.8. Operational requirements

The underground cable system will be remotely monitored through control and condition monitoring systems. Routine access will be minimal, with testing required once or twice a year at the link pits located at each joint bay.

A small workforce will undertake periodic inspections and routine maintenance of the cable system using light service vehicles, including cable easement inspections to monitor and control vegetation and confirm compliance with easement terms.

2.9. Decommissioning

Decommissioning of onshore components will be planned and carried out in accordance with regulatory and landholder requirements current at the time. The decommissioning approach is expected to be agreed with regulators before project operations cease. The assessment of the project assumes current industry practices will be adopted.

To minimise disturbance, most below-ground infrastructure is expected to be left in place, with cable ends cut, sealed and securely buried. Surface infrastructure such as signage, markers, link and fibre pits may be removed if required by landholders or if environmental impacts arise.

3. Scoping

3.1. Study objective

The objective of this study is to assess and avoid, minimise or offset potential adverse effects on native vegetation, habitats, listed threatened species and ecological communities, migratory species, and other protected flora and fauna, including within the more ecologically significant areas of McLoughlins Beach-Seaspray Coastal Reserve and Woodside Bushland Reserve H28.

This objective guides the approach to assessments and the avoidance and minimisation of potential impacts and encompasses the detailed Commonwealth EIS guidelines and the Victorian EES Scoping Requirements.

3.2. EIS guidelines

The Guidelines for the Content of a Draft Environmental Impact Statement for Star of the South Offshore Wind Farm Project ('the guidelines') set out the requirements necessary for the Commonwealth Minister for the Environment to make an informed decision on project approval under the EPBC Act.

Table 3-1 summarises the aspects of the guidelines relevant to the onshore ecology assessment and cites the relevant sections within this report.

Table 3-1 EIS requirements addressed within this onshore ecology assessment

Requirement	Sections addressed
5b) A description of listed species, which includes listed threatened species and ecological communities (EPBC Act sections 18 & 18A), listed migratory species (EPBC Act sections 20 & 20A) and listed marine species (protected under EPBC Act sections 23 & 24A) that are likely to be present in the vicinity of the onshore or offshore components of the proposed action (and in areas that may be impacted by the project), including the following details: ▪ Details of the scope, timing (survey seasons) and scientifically robust methodology for studies or surveys used to provide information on the listed species/community/habitat at the site (and in areas that may be impacted by the project). ▪ How studies or surveys are consistent with (or a justification of divergence from) relevant Departmental guidelines or policy statements, or are in accordance with best-practice studies or surveys ▪ Marine, migratory and threatened species and ecological communities' abundance, distribution and site fidelity at the proposed development site and in areas that may be impacted by the development, and known habitat utilisation or requirements, including Biologically Important Areas (BIAs) and habitat critical to the survival of the species; ▪ Usage of the project area by listed species in regional context including, but not limited to migratory pathways and foraging behaviours; ▪ The predicted temporal and spatial variability in occurrence of listed species within the onshore or offshore project area and in areas that may be impacted by the project; ▪ Relevant identified threats to the survival, habitat utilisation, site fidelity and essential life functions of listed species, including foraging, breeding or migratory behaviours, and past and projected trends and existing threats to the condition of habitat.	Sections 7 and 8
6a) The EIS must include a description of all the relevant impacts of the action ▪ Relevant impacts are impacts that the action will have or is likely to have on a matter protected by a controlling provision as listed in the preamble of this document. Impacts during both the construction, commissioning, operational and the decommissioning phases of the project should be addressed, and the following information provided:	Sections 10, 11, 12 and 13.

Requirement	Sections addressed
▪ A detailed assessment of the nature, extent, severity/intensity and duration of the likely short-term and long-term relevant impacts; ▪ A statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; ▪ Analysis of the significance of the relevant impacts; and ▪ Any technical data and other information used or needed to make a detailed assessment of the relevant impacts	
Assessment of cumulative impacts with other existing and proposed developments for which applications have been submitted in the region including but not limited to: ▪ Review and analysis of residual impacts of the proposed development and of other known proposals where there may be a spatial or temporal overlap; ▪ Consideration of the potential for cumulative impacts on the ecological character of the Corner Inlet and Western Port Ramsar sites, resilience of any important populations of listed marine species, migratory species, threatened species and ecological communities and on overall habitat quality and availability; ▪ Discussion of the potential for existing pressures and threats to be exacerbated by the proposed development.	Section 13.
7) The EIS must include a consolidated list of measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including: ▪ A description of the environmental outcomes the measures are expected to achieve including details of any baseline data, environmental indicators and proposed monitoring to demonstrate progress towards achieving these outcomes; ▪ A description of proposed mitigation measures to avoid relevant direct and indirect impacts of the action, including avoidance measures to avoid areas of high conservation value as far as possible; ▪ A description of the measures proposed to be undertaken by the proponent that have been proposed by State or local governments; ▪ Details of ongoing management of the construction, operation and decommissioning of the project, an analysis as to the effectiveness of these management measures, monitoring programs to determine the effectiveness of the measures proposed, and a framework for adaptive management including: a) management strategies that will be implemented if mitigation and management measures are insufficient and/or ineffective b) adequate monitoring regimes and defined trigger levels that will prompt further management and/or remediation actions to prevent unacceptable impacts to protected matters occurring ▪ Who will be responsible for such measures and the extent of their responsibility	Sections 10, 11 and 12

3.3. EES evaluation objectives and scoping requirements

The Scoping Requirements for Star of the South Offshore Wind Farm Environment Effects Statement ('scoping requirements') published by the Minister for Planning in August 2021 set out the specific environmental matters the project must address in order to satisfy the Victorian assessment and approval requirements.

The scoping requirements include a set of evaluation objectives. These objectives identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project in accordance with the *Ministerial Guidelines for Assessment of Environmental Effects under the Environmental Effects Act 1978* (DTP 2023).

The following evaluation objective is relevant to the onshore ecology assessment:

- *“To avoid, and where avoidance is not possible, minimise, potential adverse effects on protected native vegetation and listed threatened species and their habitat and listed ecological communities, in both onshore and offshore environments, as well as address offset requirements consistent with state policies.” (p. 13)*

The aspects from the scoping requirements relevant to the evaluation objective are shown in Table 3-2, as well as the location where these items are addressed in this report.

Table 3-2 Scoping requirements relevant to onshore ecology

Aspect	Scoping requirement	Section addressed
Key issues	1. Direct or indirect loss of native vegetation or other habitat values due to project works or operational maintenance activities	Sections 10.2.1, 10.3.2 and 10.3.6
	2. Direct or indirect loss, disturbance and/or degradation of listed or other protected species and nearby habitat that may support listed or other protected flora, fauna or ecological communities	Sections 10.2.3, 10.2.4, 10.2.5, 10.2.6, 10.2.7, and 10.3
	3. Potential initiation or exacerbation of listed potentially threatening processes under the FFG Act	Section 10.3.6
	4. Potential impacts on habitats within protected areas, such as national parks, state parks or other conservation reserves	Sections 10.2.1 and 10.3.1
	5. Potential impacts on planted vegetation established through environmental programs	Section 7.7
	7. Disruption to the movement of fauna between areas of habitat across the broader landscape, for example, through collisions with transmission line infrastructure	Section 10.3.1
	8. Potential cumulative effects on listed threatened flora and fauna species, and their habitats, from the project in combination with other projects	Section 13
	9. The availability of suitable offsets for the loss of native vegetation and habitat for listed threatened species under the FFG Act	Section 16
Existing environment	1. Characterise the type, distribution and condition of biodiversity values within a suitable study area, comprising the project site and its environs, including native vegetation, terrestrial and aquatic habitat, marine habitat, and habitat corridors or linkages	Sections 7 and 8
	2. Identify planted or recovered vegetation established through environmental programs	Section 7.7

Aspect	Scoping requirement	Section addressed
	3. Describe the biodiversity values that could be directly or indirectly affected by the project, including: - native vegetation and any ecological communities listed under the FFG Act; and - presence of, or suitable habitats for, protected flora and fauna species, in particular species listed under the FFG Act and DEECA advisory lists	Sections 10.2.1, 10.2.3 and 10.3.2
	4. Describe any existing threats to biodiversity values, including but not limited to: - historic or ongoing disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, changes to water quantity or quality and fire hazards); - potentially threatening processes listed under the FFG Act; and - the presence of any declared weeds, pathogens and pest animals within and in the vicinity of the project area	Sections 7.1 and 7.10
	5. Describe any trends observed in existing biodiversity values, including but not limited to historic or ongoing increases or declines in populations or communities, including their reasons where known.	Section 7.1
	6. Characterisation of the existing environment is to be informed by relevant databases, literature (and published data), community observations (including citizen science and information from residents and landholders in or adjacent to the area of interest), appropriate targeted and/or seasonal surveys and modelling of the potential and actual presence of threatened species and communities consistent with DEECA survey guidelines, conservation advices and threatened species recovery plans or action statements. Where surveys do not identify a listed species or community, but past records and/or habitat analysis suggests it may occur, a precautionary approach to the further investigation and assessment of its occurrence should be applied.	Sections 7, 8, 9
Mitigation measures	1. Identify and describe potential alternatives, proposed design options and mitigation measures and their expected effectiveness in avoidance or reduction of significant effects on any flora, fauna and ecological communities listed on the FFG Act or DEECA advisory lists or other protected species or protected area estate. Provide clear statements noting which avoidance and/or mitigation measures will be committed to.	Section 11.3, 12.3 and 14.
	2. Identify staging or timing options for works that could help to avoid or minimise adverse effects on seasonal values (e.g. migratory species, breeding behaviour)	Section 10.3.4
	3. Justify and describe the assumptions and level of uncertainty associated with the proposed measures achieving their desired outcomes	Sections 10, 11 and 12
	4. Describe the application of the three-step approach to: 1) avoiding the removal of native vegetation, 2) minimising impacts from removal of	Sections 10.2.4, 14 and 16

Aspect	Scoping requirement	Section addressed
	native vegetation that cannot be avoided, and 3) providing offsets to compensate for the biodiversity impact from the removal of native vegetation	
Likely effects	1. Assess the direct and indirect effects of the project including feasible design, location and alignment alternatives, and including transport route upgrades and other ancillary activities, on native vegetation, listed ecological communities, and listed threatened and other protected flora species	Sections 10.2.1, 10.2.3, 10.2.4, 10.2.6, 11 and 12.
	2. Assess the direct and indirect effects of the project and feasible alternatives, on listed threatened and other protected fauna species under the FFG Act and/or DEECA advisory lists or their habitats	Section 10.2.5
	3. Assess the direct and indirect effects on planted or recovered vegetation established through environmental programs	Section 7.7
	4. Assess the direct and indirect effects on the project during construction and operation on biodiversity values, including: - disturbance or alteration of habitat conditions (e.g. habitat fragmentation, severance of wildlife corridors or habitat linkages, displacement due to avoidance of project infrastructure, changes to water quantity or quality and fire hazards); - direct removal of individuals or destruction of habitat; - Threats of mortality of listed threatened or other protected fauna (including site and species-specific risk factors); and - The presence and potential spread of any declared weeds, pathogens and pest animals within and in the vicinity of the project area	Sections 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5
	5. Assess the potential effects on listed threatened or other protected fauna species having considered issues and experiences with similar projects elsewhere in the world, as well as being cognisant of unique values existing in this locale	Section 10.2.5 and 10.2.7
	6. Assess the potential impacts on habitat connectivity of listed or other protected species, both onshore and offshore, including but not limited to migratory species	Section 10.3.1
	7. Assess the potential cumulative effects on listed threatened or other protected fauna species, and their habitats, from the project in combination with other projects that might have similar types of impacts.	Section 13
Performance objectives	1. Describe and evaluate proposed commitments to manage residual effects of the project on biodiversity values, including an outline of an offset strategy to secure appropriate offsets to satisfy state offset requirements	Sections 10.4, 11.4, 12.4 and 16.
	2. Develop contingency measures to be implemented in the event of unintended adverse residual effects (including ineffective mitigation) on flora and fauna values requiring further management	Section 14.3

4. Evaluation framework

The assessment will consider legislation, policy and standards relevant to onshore ecology along with specific assessment criteria that have been derived for the purposes of the study.

4.1. Legislation, policies, guidelines and standards

The legislation, policy, guidelines and standards relevant to this assessment are summarised in Table 4-1.

Table 4-1 Legislation, policy, guidelines and standards relevant to the assessment

Legislation, policy, guideline or standard	Description	Project relevance
Commonwealth Government		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	The <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) is the Australian Government's key piece of environmental legislation which provides a national approach to environment and heritage protection and biodiversity conservation. The EPBC Act focuses on the protection of Matters of National Environmental Significance (MNES) including World Heritage Properties, National Heritage Places, Ramsar wetlands, nationally listed threatened species and ecological communities and listed migratory species. The EPBC Act states that 'controlled' actions (i.e., actions that are determined as likely to have a significant impact on MNES) are subject to assessment and approval under the EPBC Act.	Any significant impacts on these matters require the approval of the Australian Minister for the Environment. This is done through a three-step process: Referral, Assessment and Approval. The project was referred to the Commonwealth under the EPBC Act (EPBC Act referral number 2020/8650) in 2020. On 2nd June 2020 the project was deemed a controlled action and requires assessment and approval under the EPBC Act. The Act requires projects to be assessed against published guidelines for significant impacts, either generic for categories of matters of national environmental significance, or species-specific from published policy statements. The Act also requires application of the 'precautionary principle'. This report informs the assessment and approval under the EPBC Act.
Victorian Government		
<i>Flora and Fauna Guarantee Act 1988</i>	The <i>Flora and Fauna Guarantee Act 1988</i> (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the FFG Act is the listing process, whereby native species and communities of flora and fauna and associated threatening processes are listed in	Flora and fauna species listed under the FFG Act were recorded within the project area. This includes threatened species, as well as protected flora. In addition, the project has the potential to contribute to threatening processes listed under the FFG Act.

Legislation, policy, guideline or standard	Description	Project relevance
	the schedules of the Act. This assists in identifying species and communities that require management to survive and the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria	
<i>Flora and Fauna Guarantee Amendment Act 2019</i>	The <i>Flora and Fauna Guarantee Amendment Act 2019</i> (the Amendment Act) took effect in June 2020. The Amendment Act updates the FFG Act to provide a modern and strengthened framework for the protection of Victoria's biodiversity including adoption of a Common Assessment Method (CAM) to achieve a consistent national approach to assessing and listing threatened species, and, the provision of two categories of protected flora (restricted use flora and generally protected flora). Under the changes to the FFG Act (gazetted in May 2021) all threatened taxa are included on a single list of species known as the FFG Act Threatened List. The changes also require Ministers and public authorities to consider the objectives of the FFG Act as well as impacts on biodiversity, including listed species and communities in their decision-making.	The project has been assessed in line with the recently enacted FFG Act Threatened list. This report enables Ministers and public authorities to consider the objectives of the FFG Act as well as impacts on biodiversity, including FFG Act listed species and communities
<i>Wildlife Act 1975</i>	The <i>Wildlife Act 1975</i> (Wildlife Act) forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. Under the Wildlife Act, it is an offence to wilfully damage, disturb or destroy wildlife habitat, disturb protected wildlife or take or destroy take or destroy threatened or protected wildlife (including listed fish) without authorisation. With the exception of pest animals declared under the CaLP Act or wildlife declared to be unprotected wildlife, all fauna species native to Victoria are listed as protected under the Wildlife Act. Threatened wildlife means protected wildlife that are listed under the FFG Act.	Fauna species listed under the FFG Act were recorded within the project area. This includes threatened and common species protected under the Wildlife Act.
<i>Environment Effects Act 1978</i>	Under Victoria's <i>Environment Effects Act 1978</i> (EE Act), projects that could have a 'significant effect' on Victoria's environment can require an Environment Effects	The project was referred to the Victorian Minister for Planning under the EE Act (EES referral number 2020R-06). On 11 May 2020, the minister determined that an EES

Legislation, policy, guideline or standard	Description	Project relevance
	Statement (EES). This Act applies to any public works 'reasonably considered to have or be capable of having a significant effect on the environment'. The EES referral criteria for impacts to ecological values are listed in (DTP, 2023). If either any single mandatory referral criterion, or combination of two or more referral criteria are met, then the proponent is required to submit a referral to the Minister for Planning who will then determine whether an EES is required.	was required for the project due to the potential for a range of significant effects on native vegetation, habitat of terrestrial and aquatic species listed under the Flora and Fauna Guarantee Act 1988 and/or DEECA Advisory list water environment, Aboriginal cultural heritage, the local and regional socioeconomic environment and landscape values
<i>Planning and Environment Act 1987</i>	The <i>Planning and Environment Act 1987</i> (P&E Act) establishes the framework for the use, development and protection of land in Victoria. The P&E Act provides for the preparation of standard provisions for planning schemes which are administered by local government.	A Planning Scheme Amendment is proposed for the onshore transmission assets including the removal of any native vegetation. The onshore transmission assets are subject to the requirements of the Wellington Planning Scheme. Loss of native vegetation and associated offset requirements outlined in this impact assessment are in line with the requirements set out in the Guidelines (DEECA 2025a) The impact on native vegetation from the project is being assessed under the detailed assessment pathway.
<i>Catchment and Land Protection Act 1994</i>	The <i>Catchment and Land Protection Act 1994</i> (CaLP Act) establishes a framework for management and protection of catchments through the management of land and water resources. The CaLP Act is the principal legislation relating to the management of pest plants and animals in Victoria.	Several weeds and pest animals listed under the CaLP Act were recorded within the project area. Effects of weeds and pest animals on the existing values recorded within the project area are considered in this impact assessment
<i>Water Act 1989</i>	The <i>Water Act 1989</i> (Water Act) sets the legal framework for managing and protecting water resources across the State. It seeks the integrated management of all elements of the water cycle and maximises community involvement in the implementation of arrangements relevant to the use, conservation and management of water resources.	See Technical report I: Surface water (AECOM 2021) Project infrastructure crosses waterways protected under the Water Act. Approval from the West Gippsland Catchment Management Authority required for any works on, over or under a designated waterway.
<i>Crown Land (Reserve) Act 1978</i>	Section 4 (1) of the <i>Crown Land (Reserve) Act 1978</i> reserves land that is deemed to provide public purpose, being in particular the	The project intersects crown land reserves including McLoughlins Beach-Seaspray Coastal Reserve and Woodside H28 Bushland Reserve.

Legislation, policy, guideline or standard	Description	Project relevance
	purpose of recreation, leisure, tourism and conservation.	
Local government		
Clause 52.17 of the P&E Act - Guidelines for the removal, destruction or lopping of native vegetation (DEECA 2025a) Relevant Local Council (or Victorian Minister for Planning)	In Victoria, a municipal planning permit is required for the removal of native vegetation. The Guidelines for the removal, destruction or lopping of native vegetation (The Guidelines) are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria under Clause 52.17.	The project will remove native vegetation protected under Clause 52.17 of the P&E Act. Documentation of losses of native vegetation and associated offset requirements outlined in this impact assessment are in line with the requirements set out in the Guidelines (DEECA 2025a)

4.2. Assessment criteria

The Assessment Framework for the onshore ecology impact assessment is outlined in Section 6.1.

Assessment of project impacts on onshore ecology relate to whether the project impacts on ecological values that include:

- Native vegetation with impacts based on:
 - EVC extent (ha)
 - Large trees (estimated)
 - Endangered EVCs
 - DEECA Mapped Wetlands
- Named waterways
- Threatened flora species listed under the EPBC Act and/or FFG Act.
- Terrestrial fauna species listed under the EPBC Act and/or FFG Act.
- Connectivity (number of threatened terrestrial fauna species affected by habitat fragmentation).

The assessment also considers availability of offsets for impacts on native vegetation and threatened species habitat as calculated via the Native Vegetation Removal Report (NVR) tool.

These also informed evaluation of the project against the impact and risk criteria methods presented in Sections 6.4 and 6.5 respectively.

Assessment of potential impacts of the project on MNES included a systematic evaluation against the criteria for significant impacts provided in the Significant impact guidelines 1.1 – Matters of National

Environmental Significance (Australian Government, 2013) and any species-specific significant impact guidelines as relevant. Potential for threatened species to occur in the project area and the impact assessment considers the information contained in threatened community descriptions, species-specific conservation advice and recovery plans prepared under the EPBC Act, where available and relevant.

The assessment also considers Australia's obligations under international conventions and threat abatement plans.

5. Consultation and engagement

The project has undertaken extensive engagement with a broad range of stakeholders and communities throughout the project's development phase and preparation of the EIS/EES to communicate project information; obtain, understand and discuss feedback; and identify potential issues and opportunities for consideration in the EIS/EES. A summary of this engagement is documented in Appendix III - EIS/EES Consultation Report.

Consultation specific to onshore ecology has also been undertaken with identified stakeholders to inform this report. A summary of this engagement is provided below.

Engagement activities

Key activities undertaken between 2019 and 2025 to engage with identified stakeholders include:

- Direct engagement with landholders along the project's proposed transmission route; including phone calls, emails and meetings
- Discussions with community members through via phone calls, emails or visits to the Gippsland office
- Conversations with relevant community groups and organisations through phone calls, emails, meetings and presentations
- Community Advisory Group
- Notification of ecology surveys along transmission alignment
- Fact sheet containing information about the project's onshore ecology surveys and site investigations
- Sharing of information via the project's website, social media and monthly e-news
- Presence at community events and pop-up stalls across Gippsland
- Community information sessions.

Stakeholders

Key stakeholders identified and engaged on this report include:

- General community
- Landholders along the project's proposed transmission route
- Australian Conservation Foundation
- Birdlife Australia
- Guardians of Nooramunga
- Wellington Shire Council
- West Gippsland Catchment Management Authority
- Woodside Landcare Group
- Yarram Yarram Landcare Network.

Table 5-1 lists specific feedback and how this feedback has been applied to the assessment of impacts on onshore ecology.

Table 5-1 Stakeholder engagement undertaken for onshore ecology

Stakeholder/partner and type of response	Issues raised	Response to issues raised and/or where considered within this report or associated appendices
General community	Clearing of vegetation and associated impact to habitat and biodiversity in native forests and on farm and public land, including within: - McLoughlins Beach-Seaspray Coastal Reserve - Reeves Beach Nature Reserve - Woodside Bushland Reserve and H28 - Roadsides - Private property including farmland.	As outlined in Section 7 and 8 of this report, the project area options include Woodside Bushland Reserve H28 and McLoughlins Beach-Seaspray Coastal Reserve, roadsides, and private property including farmland. The project is seeking to avoid and minimise clearance of native vegetation within conservation reserves, private and public land in alignment with the Guidelines for the removal, destruction and lopping of native vegetation (DEECA 2025a) – ‘the Guidelines’. Where native vegetation cannot be avoided or minimised and is considered lost, native vegetation will be offset in accordance with the Guidelines
	Removal of large trees, particularly those providing habitat for native fauna.	Impacts to large remnant trees have been carefully considered during the concept design process of the project. The final alignment and associated construction project area will avoid and minimise impacts to large trees as much as feasible, especially to those that provide habitat for native fauna.
	Any impacts to threatened flora species and ecological communities, including: - Subtropical and Temperate Coastal Saltmarsh - Gippsland Red-Gum Grassy Woodland and Associated Native Grassland - Natural Damp Grassland of the Victorian Coastal Plains - Seasonal Herbaceous Wetlands (freshwater) of the Temperate Lowland Plains	As discussed in Sections 10, 11 and 12 of this report, threatened flora and ecological communities were recorded or identified as being possible or likely to occur within the project area. The project is in the early stages of the detailed design and is seeking to avoid and minimise clearance of native vegetation and habitat within conservation reserves, and private and public land in the alignment in accordance with the Guidelines. Where possible, avoidance of threatened ecological communities, flora species and habitat for flora species will be prioritised in accordance with the Guidelines.
	Disruption to the coastal dune structure, vegetation and habitat at Reeves Beach.	As outlined in Section 2: Project description, the project would avoid impacts at the Reeves Beach shore crossing location through the use of trenchless construction methods beneath the dune system.

Stakeholder/partner and type of response	Issues raised	Response to issues raised and/or where considered within this report or associated appendices
	Increased traffic during construction on native animals (roadkill)	Consideration of construction traffic speed limits and minimisation in most sensitive areas, such as nature reserves.
	Any impacts to native fauna including: - Gang-gang Cockatoo - Glossy Grass Skink - Southern Toadlet - Blue-winged Parrot - Chestnut-rumped Heathwren - Powerful Owl - Lace Monitor 'Strzelecki' Koala	As outlined in Sections 8, 10, 11 and 12, the project footprint includes parts of protected area estates and conservation reserves, including McLoughlins Beach-Seaspray Coastal Reserve, Reeves Beach Nature Reserve, and Woodside Bushland Reserves H27 and H28. Some of these areas hold populations of threatened fauna species, none of which will be significantly impacted by the project. Opportunities to avoid and minimise impacts to fauna species and habitat were considered and implemented in the project's concept reference design. Other threatened species affected in negligible ways include Black Falcon White throated Needle-tail, Grey-headed Flying Fox. Where fauna habitat cannot be avoided or minimised and is considered lost, habitat removal for listed fauna species will be offset in accordance with the Guidelines.
	Any impact to birds (including species listed above) from: - Construction activities and disturbance - Collision risk with any above ground transmission infrastructure - Artificial lighting (collision risk and increased predation risk) - Substation infrastructure - Noise and vibration.	Significant fauna survey efforts over several years (described in Section 6.3.3) has identified where key fauna habitats occur. The project has prioritised avoidance and mitigation to reduce construction phase impacts. There is no risk of bird collisions as the transmission infrastructure will be underground. Above-ground substations will be subject to a VicGrid-coordinated separate Environmental Effects Statement. Construction works will be restricted to daylight hours in accordance with EPA civil construction hours. If security lighting is required for construction compounds, lighting is to be designed and managed to avoid/minimise light spill into adjacent habitat in general accordance with guidance in the National Light Pollution Guidelines for Wildlife (Section 10.3.2)

Stakeholder/partner and type of response	Issues raised	Response to issues raised and/or where considered within this report or associated appendices
		Offshore impacts to birds are described in Technical report E: Seabirds and shorebirds.
Landholders along transmission corridor	Removal of large trees from private property	Impacts to large remnant trees have been carefully considered during the concept design process of the project, and where possible the alignment has been altered to avoid large trees.
Yarram Yarram Landcare Network	Potential interaction with existing Landcare projects in the area.	Revegetation plantings were noted during the ecology field assessments (see Section 7.7). Where possible, the project has tried to avoid impacts to these areas.

6. Methods

As context to the assessment approach, the Star of the South Offshore Wind Farm is a large project that covers a wide geographic area and has the potential for significant influence across Commonwealth waters and Victorian coastal waters, the state of Victoria and in particular the central Gippsland region. Accordingly, the impacts (both positive and negative) of the project are assessed in terms of their materiality at the scale of Commonwealth waters and Victorian coastal waters, the state of Victoria and the central Gippsland region.

6.1. Overview of assessment framework

This section describes the framework used to assess potential environmental impacts and risks associated with the proposed project.

The assessment has been guided by an evaluation framework that comprises applicable legislation, policy, guidelines and standards, the Commonwealth EIS guidelines and the EES scoping requirements and study-specific assessment criteria.

An overview of the assessment framework is presented in Figure 6-1 Methods used to survey for ecological values in the project area are also described in this section.

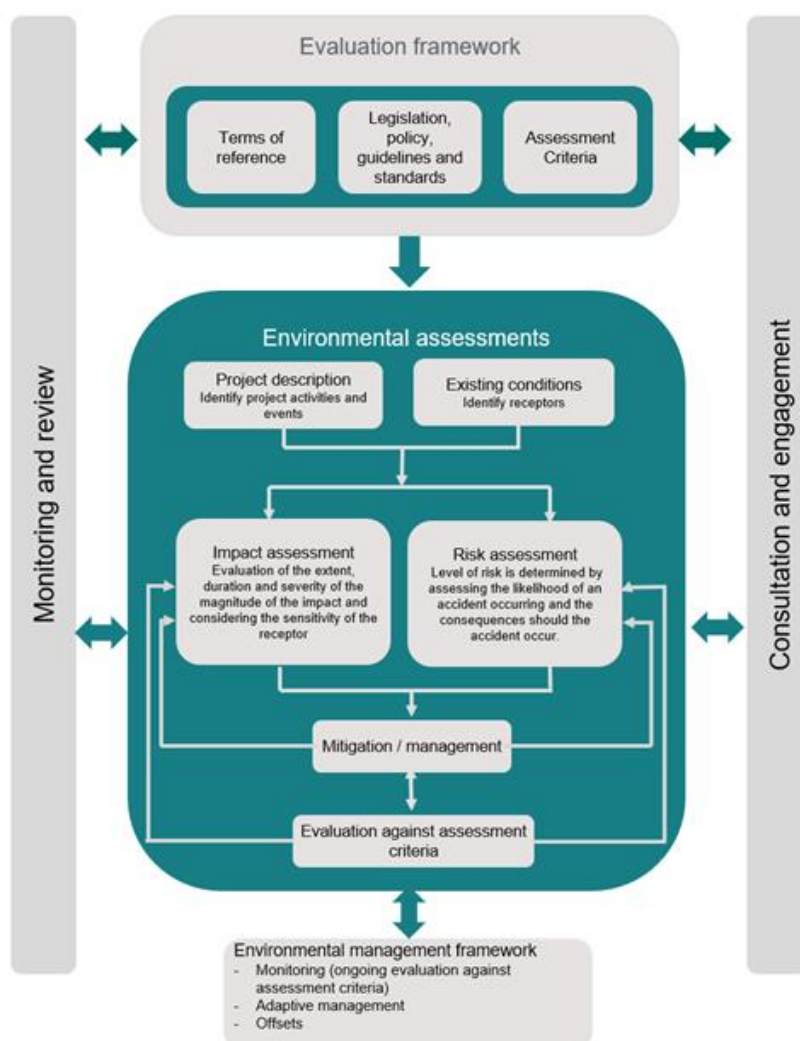


Figure 6-1 Overview of assessment framework

The environmental assessment in relation to onshore ecology was undertaken according to the following steps:

- **Existing conditions:** Characterisation of existing (baseline) environmental conditions and identification of sensitive assets, values and uses that may be affected by construction, operation and decommissioning of the project.
- **Project description:** Review of the key project components and proposed construction, operation and decommissioning activities to identify potential project interactions with sensitive receptors (i.e. events). This includes identification of the maximum design scenario for the purposes of impact and risk assessment, taking into account the parameter range within the project design envelope as outlined in Chapter 4 - Project description of the EIS for the whole of the project assessment across the Commonwealth jurisdiction and Chapter 4 - Victorian works project description for the Victorian jurisdiction, and selection of the parameter value with the potentially greatest impact or risk.
- **Impact assessment:** Assessment of consequences based on the predicted magnitude of the impacts and the sensitivity of potentially affected receptors, taking into account proposed mitigation measures and their likely effectiveness. The impact assessment methodology is described in Section 6.4.
- **Risk assessment:** Assessment of likelihood and consequences of accidents (i.e. events that are not certain to occur). The risk assessment methodology is described in Section 6.5.
- **Avoid, mitigate and manage:** Identification of mitigation measures to avoid, minimise and manage impacts or risks.
- **Evaluation against assessment criteria:** Evaluation of predicted residual impacts or risks against assessment criteria set out in Section 4.2. If the impact or risk assessment indicates that the criteria are not met, then changes to the project design are made or further mitigation measures are introduced. Residual impacts and risks are those that remain following the implementation of all mitigation measures committed to by the project, taking into account their expected effectiveness.
- **Monitoring and review:** Continual checking for changes to legislation, policy, guidelines and standards and the project description and subsequent refinement and updating of assessments as required.
- **Consultation and engagement:** Consideration of feedback from community, stakeholders and regulators to ensure that concerns and expectations are met. Stakeholder consultation and engagement will continue throughout the life of the project.

For impacts (expected events) the likelihood of the event is considered to be certain, therefore only an evaluation of consequence is required. For risks (accidental events) both likelihood and consequences need to be considered. The evaluation of consequences for both impacts and risks takes into consideration the nature and scale of the effects, the predicted extent, severity and duration, the likely effectiveness of mitigation measures to reduce consequences as well as the sensitivity of the receptor.

An example, 'project activity' is vegetation clearing, and in this case the 'event' is habitat removal, and the 'consequence' would be injury or displacement of terrestrial fauna. Habitat removal is an expected event as the clearing of vegetation is a planned part of construction that cannot be avoided as part of the activity. Vegetation clearing would occur within the immediate activity area. An example of an accidental event is where the 'project activity' is vehicle movement during construction, and in this case the 'event'

is collision with terrestrial fauna, and the 'consequence' would be injury or death of fauna. This event is unlikely to occur but is still possible.

6.2. Assessment area

6.2.1. Description

The two key project components that relate to the onshore ecology impact assessment are the shore crossing and the onshore transmission.

The shore crossing is the where the wind farm transmission system transitions from offshore to onshore, under the shoreline, to connect to the onshore transmission system. The shore crossing of the transmission system is proposed to be located at Reeves Beach, Woodside. Reeves Beach is a publicly accessible beach located at the southern end of the Ninety Mile Beach approximately three kilometres south-west of Woodside Beach. Reeves Beach is approximately ten kilometres to the closest part of the proposed Offshore Wind Farm Area.

The onshore transmission system is the onshore component of the Project and includes the infrastructure to connect the offshore wind farm to the VicGrid connection hub. The VicGrid connection hub will include provision for approach cable easements, substations and associated infrastructure required to connect any approved windfarms in Bass Strait to the national electricity market and is subject to a separate assessment and approval process. The onshore substation and associated infrastructure are therefore not assessed as a part of this EIS/EES.

The proposed project area for the onshore cable system encompasses approximately 30 kilometres of underground cable system contained in easements and associated temporary construction area. A 5 km tolerance is incorporated into the PDE to account for the connection to the VicGrid hub, the location of which is not currently public information. The underground cable system and associated temporary construction commences at the landward side of the shore crossing transition joints, behind Reeves Beach, Woodside and terminates at the proposed VicGrid Connection Hub at Giffard.

As the location of the proposed Connection Hub has yet to defined further than an indicative area in Giffard, the project has developed three alignment options that meet close to the centre of the connection hub area (see Figure 6-2). The alignment options are referred to as Option AB, Option C and Option D. All options share the same alignment from the shore crossing to Carstairs Road.

- Option AB is the southern most of the options. Option AB heads east at Carstairs Road for approximately 4 km crossing Sunville Creek. The alignment then heads north for approximately 3 km to cross Giffard West Road. The alignment then heads east for a further 1 km then north for 1.7 km following the boundary of a plantation area. This option is represented in red text in the report where the information pertaining to Option AB differs from the other two options.
- Option C is the central option and shares an alignment with Option D to a point approximately 900 m south of Giffard West Road. The Option C alignment then heads east for approximately 4 km, running parallel to and then crossing Giffard West Road where it joins the Option AB alignment along the southern and then eastern boundary of plantation. This option is represented in green text where information differs from the other two options.
- Option D is the northern option and shares an alignment with Option C to a point approximately 900 m south of Giffard West Road. Option D continues north from that point for approximately 2 km to a point near the southern edge of a large plantation. At that point the alignment heads east through crossing Giffard Road West then heading east for approximately 4.5 km where it meets

the end of the other two options at the approximate location for the VicGrid hub. This option is represented in blue text where information differs from the other two options.

Only one of these alignment options will be progressed.

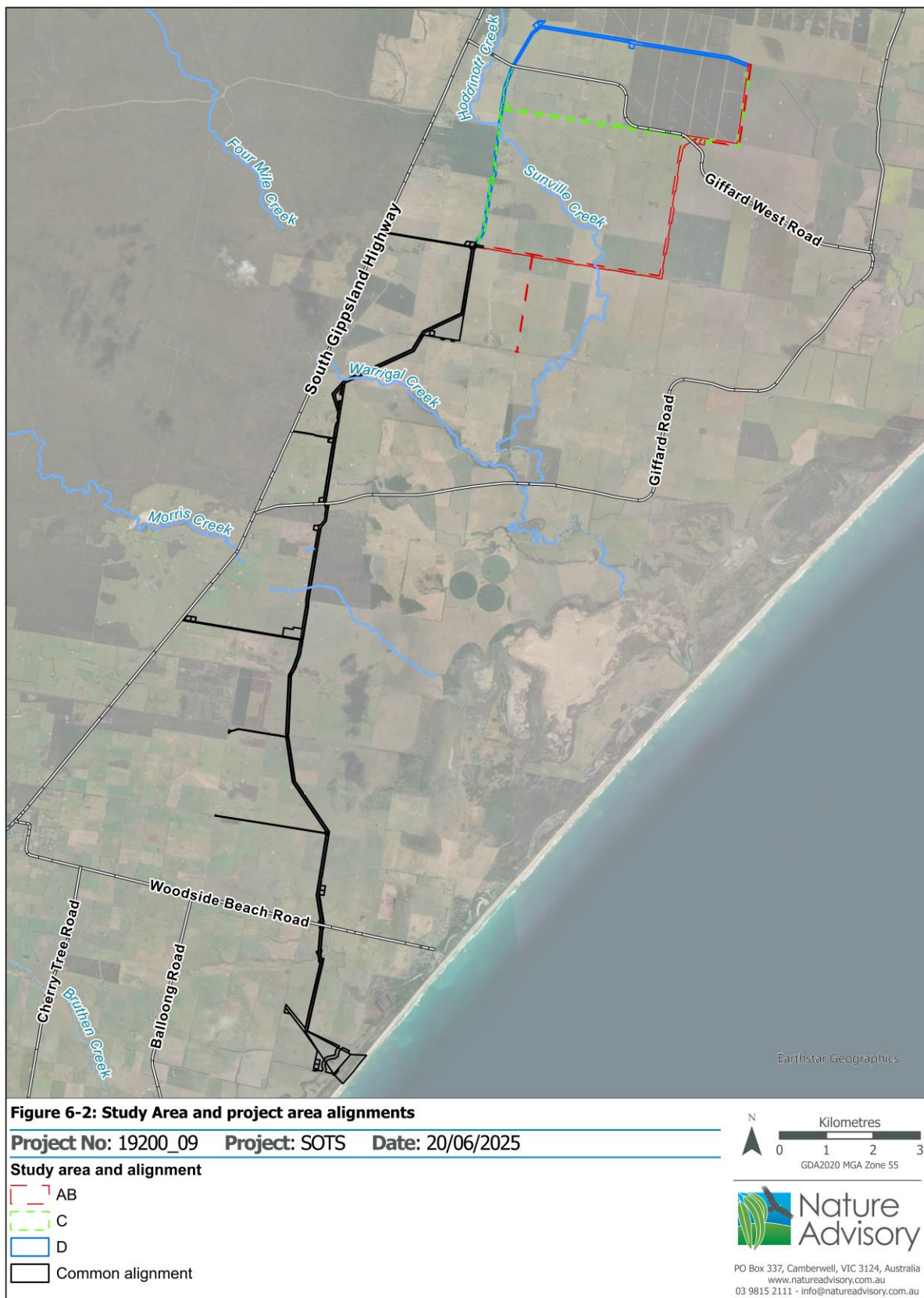


Figure 6-2 Onshore transmission system showing alignment options

6.2.2. Terms

Terms used in this report to describe assessment areas are:

- ‘Study area’ that is defined by the project area (the areas to be removed for the construction of the project) and a 15-metre buffer assigned to identify values adjacent to the project area that may be indirectly affected by the project.
- ‘Project area’ that is defined by the temporary construction footprint; that is, the area required for the construction of the project. The project area is broadly 60 m wide incorporating a 40 m wide cable easement.
- ‘Search area’ that is defined by a buffer area applied on the study area for collating and evaluating existing information from databases and other sources for this assessment. Buffer areas of 10 km and 20 km were applied for flora and fauna respectively. The larger distance for fauna was set due to the fauna having higher mobility.

The study area and project area diverge into 3 alignment options for connection to the proposed VicGrid connection hub at Giffard West. The onshore ecology assessment considers all three options separately as once a decision is made on the preferred option and the other two options will be discounted.

6.3. Methods to determine the existing environment

A comprehensive literature review and an extensive field program were undertaken to identify relevant receptor groups to inform the onshore ecology impact assessment of the project, including:

- Desktop review of relevant public biodiversity data sets and published documents for the study area and its surrounds;
- Field assessment of the study area and its surrounds;
- Consultation with relevant government agencies.

6.3.1. Desktop review

A comprehensive desktop assessment was undertaken to understand the existing environment of the study area. The onshore ecology existing conditions assessment considered a combination of previous studies and data, and the results of field surveys completed by Nature Advisory and AECOM. Details on the relevant methods and inputs are provided below.

For the purpose of the initial determination of the likelihood of occurrence of listed species and ecological communities, the 10 km search area was adopted for flora with a 20 km for fauna.

Existing reports and documentation

A review of previous studies completed for the Star of the South Offshore Wind Farm, as well as published reports and mapping data relevant to the study area, was completed to inform the current assessment. Previous reports and published data reviewed were:

- *Initial Biodiversity Assessment for Referrals: Star of the South Wind Farm* (Nature Advisory and AECOM, 2020), which included a desktop assessment and review of existing biodiversity information related to the three corridor options (the western, eastern and northern) and two ports area (Port of Hastings and Port Anthony/Barry’s Beach Marine Terminal). A 3 km-wide corridor footprint was assessed to allow flexibility in the design phase of the project. The desktop assessment was supplemented by a rapid 5-day reconnaissance survey to identify areas of high ecological value related to the corridors being investigated. The results of the preliminary

assessment informed the detailed ecology survey program in 2020, which included vegetation mapping (habitat hectare assessments), fauna habitat assessments, threatened ecological community mapping and targeted surveys for threatened flora and fauna.

- *Flora and Fauna Assessment of the Proposed Old Rosedale Road Alignment Option for Basslink*. (Biosis 2001), which included an initial broad-level ecological assessment of six alignment options for the Basslink Interconnector corridor followed by detailed ground surveys of the preferred corridor – Old Rosedale Road (the western corridor within the current study area). The report documents the flora and fauna values along Old Rosedale Road as well as the associated ecological impacts and mitigation measures.
- *Flora and Fauna Assessment of the SWOP/Merrimans/McGaurans Beach Alignment Option for Basslink* (Biosis 2001a), which provides a separate assessment of the flora and fauna values of the alternative Basslink alignment – the SWOP/Merrimans/McGaurans Beach alignment.

The review considered threatened flora and fauna species and Threatened Ecological Communities (TECs). The findings of this review informed the likelihood of occurrence assessments and the scope of the field assessments, targeted surveys and habitat assessments for 2020 and 2021.

Guidelines and other relevant documents were also considered, including:

- *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (DEECA 2025a).
- *Biodiversity Information Explanatory Document: Measuring Value when Removing or Offsetting Native Vegetation* (DELWP 2017a).
- *Assessor's Handbook: Applications to Remove, Destroy or Lop Native Vegetation* (DEECA 2025).
- Native vegetation removal regulations: Applicant's Guide (DEECA, 2023)
- Relevant sections of the *Wellington Planning Scheme*.

[Databases and other online sources](#)

Database searches were completed as part of the Initial Biodiversity Assessment (Nature Advisory and AECOM 2020). Databases reviewed included:

- EPBC Act *Protected Matters Search Tool* (PMST) administered by the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) to identify Matters of National Environmental Significance (MNES). The search area included the area within 10 km of the study area.
- Online tools administered by the Department of Energy, Environment and Climate Action (DEECA), including:
 - *Victorian Biodiversity Atlas* (VBA) for records of Victoria's threatened flora (10-km search area) and fauna species (20-km search area).
 - NatureKit and Native Vegetation Information Management (NVIM) for information on:
 - Ecological Vegetation Classes (EVCs)
 - Bioregions
 - Administrative boundaries
 - DEECA Mapped Wetlands
 - Maps used in the native vegetation removal regulations (native vegetation location map, native vegetation condition map, habitat value map (replaced the

strategic biodiversity value map in October 2024) and habitat importance maps for Victoria's rare or threatened species).

- EVC benchmarks to use in assessing native vegetation quality using the Vegetation Quality Assessment (VQA) method (<https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks>).
- *Planning Maps Online* (now *VicPlan Online*) for information on planning zones and environmental overlays.
- Native Vegetation Removal Regulations Map (NVR Map) for native vegetation databases and offset requirements.

Aerial imagery was used to identify trees in areas of the alignment that were inaccessible to be surveyed due to a lack of landowner consent. These areas are shown in Figure 7 3.

2019/2020 bushfire impacts

DELWP (2020) summarises the impacts of the 2019/2020 bushfires, which occurred across the whole of Victoria, particularly in eastern Victoria. The purpose of the report was to conduct an initial analysis of the impacts of the 2019/2021 bushfires on biodiversity within Victoria and to inform biodiversity response and recovery operations, and government decision-making priorities. This initial impact analysis provides this project assessment with additional contextual information to understand better the potential impacts of the project on ecological values at a landscape scale.

None of the vegetation assessed during this assessment was impacted by the 2019/2020 bushfires. Where relevant, this report considers the overlap at a regional level between the bushfire-affected areas in eastern Victoria and the loss of native vegetation and habitat associated with the project.

Impacts to fauna species were assessed based on the extent to which their range had potentially been burnt and their current conservation status, with consideration to species vulnerability to fire. A number of priority species were identified from this initial assessment, which was subsequently reviewed by an expert panel. Any fauna species found to be on the *Provisional List of Animals Requiring Urgent Management Intervention* (DAWE 2020) was assumed to have a higher susceptibility to potential impacts.

Incidental threatened species records from third parties

Throughout the impact assessment process, threatened species records have been provided by third parties. These records have been collated and included in the results sections where relevant.

Waterway assessment

All designated waterways (named and unnamed) that crossed the study area were initially assessed via desktop to identify their potential to support habitat for threatened aquatic species. Waterways were identified in the Victorian Government hydrology dataset (VicData).

Designated waterway refers to a waterway declared under the *Water Act 1989* (Vic) that is managed and controlled by the specified authority. According to Technical Report I: Surface water (AECOM 2025), nearly all key waterways in the study area are designated waterways, controlled by the West Gippsland CMA. All the waterways are ephemeral with seasonally episodic flow characteristics. Several waterways feature well defined channels or extensive riparian vegetation.

Records were used to determine what state or federally protected aquatic species (namely fish) had the potential to occur and whether habitat to support that species appeared to be present within or near the project area.

The assessment by Aquatica Environmental (Appendix 10) considered whether there was *high, medium* or *low* potential to support a species and whether further field-based assessment was required. Table 6- in Section 6.3.2 outlines the broad categories and criteria used to determine potential to support a threatened species.

The final output of the assessment was to determine, for each waterway crossing, whether there was sufficient evidence to warrant a survey of the target species, or whether an inspection was required to confirm the findings of the desktop assessment.

Most of the waterways with a high or medium likelihood of occurrence were subject of habitat assessments and targeted surveys in 2021 and 2022, with others being assessed based on desktop data.

6.3.2. Likelihood of occurrence assessment for threatened species and communities

Initial assessment (Nature Advisory and AECOM 2020)

A likelihood of occurrence assessment was completed during the initial stages of the project for threatened flora and fauna species (Nature Advisory and AECOM 2020). The likelihood of occurrence was based on the following four categories:

- **Likely:** It is more probable than not that the species or community could occur in any year and within the referral area (> 50%)
- **Possible:** It is equally probable that the species or community could or could not occur in any year and within the referral area (50%)
- **Unlikely:** It is less probable than not that the species or community could occur in any year and within the referral area (< 50%)
- **Rare:** It is improbable that the species or community could occur in any year and within the referral area (< 5%). The species or community is only theoretically possible or would require exceptional circumstances to occur.

Those species with a possible or higher likelihood of occurrence were the focus of habitat assessments and targeted surveys undertaken in 2020 by AECOM (flora) and Nature Advisory (fauna).

Refined assessment

The likelihood of occurrence assessment was refined following field assessments based on the results of surveys completed and the availability of habitat for threatened flora and fauna. Habitat suitability was determined with reference to sources that included recovery plans, conservation advice, Species Profile and Threats (SPRAT) database managed by DCCEEW, FFG Act action statements, field guides and other scientific literature as needed. The results of the likelihood assessment can be found in Appendix 1 (flora) and Appendix 2 (fauna).

Table 6-1 'Potential to support species' assessment criteria

Potential to support species	Criteria
High	- Species recorded in project area or within connected waterways within 5 km of project area within past 10 years - DEECA-mapped habitat present in or immediately abutting the project area - Photo evidence of suitable habitat present in project area - Aerial imagery indicates suitable habitat likely present in or immediately abutting the project area - Project area within species' natural distribution range
Medium	- Species not recorded in project area or within connected waterways within 5 km of project area within past 10 years - No evidence of surveys being undertaken in project area or within connected waterways within 5km of project area within past 10 years - DEECA-mapped habitat outside of but within 5 km of project area - Photo evidence of marginal suitable habitat present in project area (i.e. some aspects present) - Aerial imagery indicates marginal suitable habitat possibly present in or immediately abutting the project area - Project area within or on the margins of species' natural distribution range
Low	- Species not recorded but surveys undertaken in project area or within connected waterways within 5 km of project area within past 10 years which did not detect the species - Photo/aerial imagery evidence that suitable habitat is not present in or immediately abutting the project area - Habitat for aquatic species not present in connected waterbodies in proximity site (within 2 km) - Project area is located outside of species' natural range - Considered locally extinct

Threatened ecological communities

A likelihood assessment for TECs—those communities listed under the provisions of the EPBC Act or FFG Act—was completed. EVCs analogous with areas of potential TECs were mapped and assessed during detailed field surveys to determine the presence or absence of EPBC Act-listed TECs and FFG Act-listed communities. Native vegetation patches were assessed in the field and during post-field data processing against key diagnostic and condition criteria for the TECs that are present.

6.3.3. Field assessment

Native vegetation (Habitat Hectare assessment)

Field assessments to assess and map native vegetation were conducted between 2020 and 2025 and are summarised in Table 6-2. Field deployments between 2020 – 2023 included assessments of the study area from the coast to Giffard West. In 2024–2025, vegetation assessments focussed on options AB, C, and D and validation (or reassessment if required) of VQA information for grassland and wooded vegetation in accordance with the Guidelines that recommend a review after 3 years for treeless and 5 years for treed EVCs.

Table 6-2 Summary of field assessment dates – native vegetation assessment

Deployment Year	Deployment Date	DEECA accredited VQA assessor
2020	3 August – 11 September 2020	[REDACTED]
2021	7 – 24 June 2021	[REDACTED]
2022	5 – 8 September 2022	[REDACTED]
	15 – 16 September 2022	[REDACTED]
	7 – 9 December 2022	[REDACTED]
2023	16 – 20 October 2023	[REDACTED]
2024	14 – 18 October 2024	[REDACTED]
	16 – 20 December 2024	[REDACTED]
2025	3 – 6 February 2025	[REDACTED]

Native vegetation present within the study area was mapped and assessed in accordance with the Guidelines (DEECA 2025a). *Native vegetation* is defined in the Victorian Planning Provisions as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’. Under the Guidelines, native vegetation is defined as either a patch, scattered tree or large tree in a patch as defined in Table 6-3 based on (DEECA 2025a).

Table 6-3 Summary of native vegetation terms

Term	Definition (from DEECA 2025a)
Patch	A <i>patch of native vegetation</i> is: - an area of vegetation where at least 25% of the total perennial understorey plant cover is native, or - an area with three or more native canopy trees where the drip line of each tree touches the drop line of at least one other tree, forming a continuous canopy, or - any DEECA-mapped wetland included in the current wetlands map, available in DEECA systems and tools (DEECA 2025a, pg. 8).
Scattered trees	A <i>scattered tree</i> is a native canopy tree that does not form part of a patch (DEECA 2025a, pg.8).

Term	Definition (from DEECA 2025a)
	Scattered trees are a native canopy tree defined as a 'mature tree' > 3 m in height and normally found in the upper layer of the relevant vegetation type (DELWP 2017). Scattered trees are classified as either <i>large</i> or <i>small</i> . Large scattered trees are those with a DBH greater than or equal to the large tree benchmark for the relevant bioregional EVC (DEECA 2025a). Small, scattered trees are those trees > 3 m in height that have a DBH less than the EVC benchmark for a large tree.
Large tree in patch	A <i>large tree in a patch</i> is a native canopy tree with a DBH greater than or equal to the large tree benchmark for the relevant bioregional EVC' (DEECA 2025a, p. 11). If the large tree is located within the extent of a patch of native vegetation, it is considered to be a large tree in a patch.

The location of patches and scattered trees was mapped using an iPhone 10, iPhone SE and Samsung Galaxy with an attached Bad Elf GNSS Surveyor, which has a spatial accuracy of approximately ± 2.5 m depending on access to satellites.

The term *indigenous* is used throughout this report to refer to native plant species that naturally occur within the Gippsland Plain bioregion.

A VQA was completed for any patches of native vegetation identified using the Habitat Hectares method described in the *Vegetation Quality Assessment Manual – Guidelines for Applying the Habitat Hectare Scoring Method* (DSE 2004a). Individual patches were termed Habitat Zones (HZs) in accordance with DEECA terminology (Appendix 4).

Habitat Zones were assigned EVCs to determine the benchmarks against which a Habitat Hectare assessment could be conducted. EVCs were assigned based on a number of factors, including DEECA-modelled EVCs in the area of interest and surrounding area, EVC description, Character Species, and understanding of the local topography and physical environment.

DEECA-mapped wetlands within the study area were assessed to confirm their presence and determine whether they could be excluded from the assessment in accordance with DEECA's *Revised Mapped Wetland Policy* (DELWP 2021b).

The number, DBH and circumference (in cm measured at 1.3 m above ground level) of scattered trees and large trees in patches were also documented. The total extent of native vegetation was calculated for patches (including DEECA-mapped wetlands if relevant) in hectares. The 'extent' of scattered trees was expressed as the area of a circle with a 15-m radius for large trees and 10-m radius for small trees (DEECA 2025a).

Approximately 12% of the area of the combined Project Area was unavailable for survey as shown in Figure 6-3. In parts that were not accessible for survey modelled EVC data was used to identify patches of native vegetation. An assumption was made that all modelled EVCs are present and at the highest modelled condition rating for the purpose of calculating offsets. Analysis of aerial imagery suggests that much of the modelled EVCs in the unsurveyed area have been previously cleared therefore the adoption of modelled EVC extent is likely to be overstating extent of potential native vegetation.

The presence of potential large trees was identified based on aerial imagery. Treeless areas were also considered for potential to support grassland vegetation. Observations from vantages on public roadsides

and aerial imagery were used to confirm if areas were agricultural land uses / pasture and not likely to support native grassland.

The presence of native vegetation, including large trees in patches and scattered trees, will be determined for areas unable to be accessed on the final alignment option to the VicGrid connection hub prior to construction.

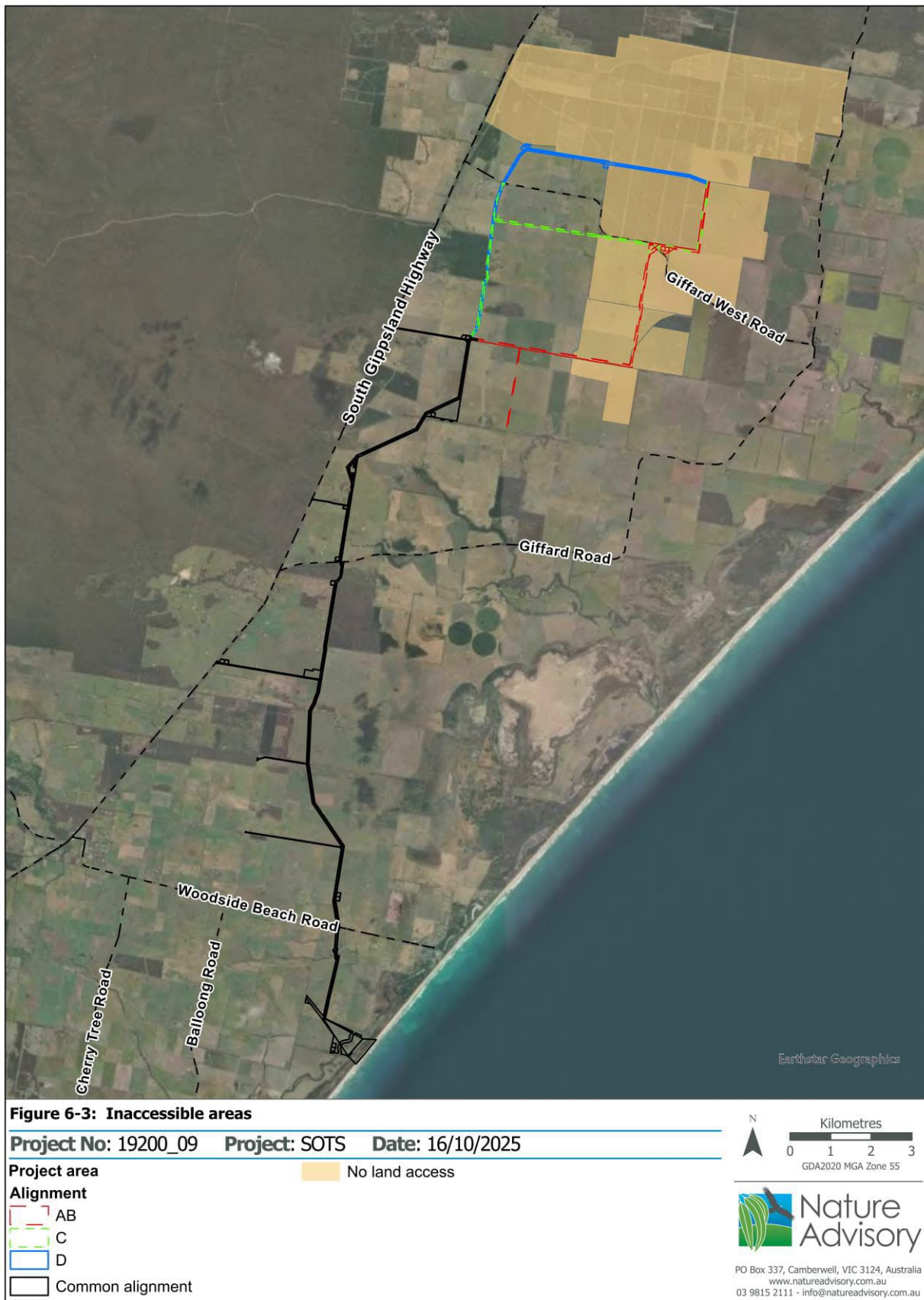


Figure 6-3: Inaccessible areas

Large trees in patches within the project area were mapped during surveys in 2021-2025 to inform potential impacts to Notional Root Zones (NRZs). NRZs were calculated using the formula provided in AS4970-2025 *Protection of Trees on Development Sites*, where NRZ = trunk diameter (DBH) multiplied by 12. It is noted that AS4970 stipulates that DBH (now referred to as Diameter at Standard Height in AS4970-2025) is measured at 1.4 m above ground level; however, DEECA’s VQA requirements state that 1.3 m is used for DBH; therefore, 1.3 m was used to calculate NRZs.

The location of large trees in a patch was mapped using a Trimble GeoExplorer GeoXH 6000 Series Digital Geographic Positioning System (DGPS), which has a spatial accuracy of < 1 m. All field data recorded on the GeoXH 6000 was post-processed to gain this spatial accuracy. This high-accuracy GPS was used to record large trees within a patch, as they are in close proximity. This is particularly useful when determining NRZ encroachments via GIS spatial analysis tools, as well as prescribing tree protection mitigation measures on a per-tree basis.

Habitat features were recorded opportunistically during the large tree assessment for the purpose of recording trees with important habitat value in the project area. Habitat features were assessed by rapid visual inspection from the ground.

Fauna habitat assessment

Terrestrial

Field assessments commenced in late January 2020. The study area was inspected initially by vehicle and on foot for potential threatened species habitat with possible or higher likelihood of occurrence. Criteria for defining areas of potential threatened species habitat, were first developed with reference to relevant statutory documents (i.e. Conservation Advice, Recovery Plans, Action Statements), SPRAT profiles and scientific literature (Table 6-4). These criteria were then used to identify areas of potential habitat and flag them for further investigation, particularly dense shrubby woodland/heath, low-lying waterways, permanent waterbodies and swamps, and areas of old-growth hollow-bearing trees. Characteristics of preferred habitat for threatened species also included soil type, landscape context and floristic composition. A review of existing information on threatened species occurrence within the proposed project area was also undertaken, primarily based on records in the DEECA VBA.

In 2024–2025, the footprints for the current options AB, C, and D were assessed for fauna habitat. Initially, a likelihood assessment was undertaken based on a 20-km VBA buffer, recent records in the area and aerial photography. This was followed by a field assessment on 14, 15 and 16 October 2024.

Table 6-4 Habitat criteria and statutory sources for fauna assessment

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
Australian Painted-Snipe	Naturally occurring, shallow terrestrial freshwater wetlands, with areas of bare wet mud, mixed heights of low vegetation, and the presence of dense, low cover. The above characteristics have been used to define suitable habitat for this species.	National Recovery Plan for the Australian Painted Snipe (<i>Rostratula australis</i>) (Commonwealth document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	No suitable habitat for this species was found. It is therefore not discussed further.	
Black Falcon	Woodland, shrubland and grassland, particularly near and along eucalypt-lined watercourses, with vacant stick-nests in the emergent layer and dead or dead-topped trees within approx. 100 m of them. Such areas were defined as habitat for the species in the study area.	Black Falcon Species Forecast Report (Victorian document)
Blue-winged Parrot	Foraging habitat only (study area is outside accepted breeding range): Grasslands, grassy woodlands, and wetlands, particularly saltmarsh and rough pasture. Such areas were defined as habitat for the species in the study area.	Conservation Advice for <i>Neophema chrysostoma</i> (blue-winged parrot) (Commonwealth document)
Chestnut-rumped Heathwren	Heathy woodland, wet heath or scrub with emergent eucalypts or banksias and an undisturbed ground layer. Also, stringybark and peppermint forest with scattered shrub layers and sparse tree cover. Such areas were defined as habitat for the species in the study area.	Threatened Species Assessment <i>Calamanthus pyrrhopygius</i> Chestnut-rumped Heathwren (Victorian document)
Gang-gang Cockatoo	A distinction is made between the broader habitats the species typically inhabits and uses for foraging, and the specific microhabitats required for breeding, in the statutory documents describing habitat for the species. These are defined as follows: General foraging habitat: Mature wet sclerophyll forests, dominated by eucalypts with dense, shrubby acacia and banksia understories. Also, more open eucalypt assemblages, dense coastal thickets of <i>Leptospermum</i> or <i>Casuarina</i>, and heathland. Breeding-specific microhabitat: Hollow-bearing trees with hollows 5-9.4 m above ground and with a sufficiently wide hollow entrance to permit access by this species. The above characteristics have been used to define suitable habitat for this species.	Conservation Advice for <i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo) (Commonwealth document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
Latham's Snipe	Shallow areas of open wetlands with low, dense vegetation (usually freshwater, but can be brackish or saline, including saltmarsh). Low, dense vegetation includes tussock grassland with rushes, reeds and sedges, and fringing aquatic vegetation. Also considered to potentially occur in periodically inundated areas within open forest. The above characteristics have been used to define suitable habitat for this species.	Conservation Advice for <i>Gallinago hardwickii</i> (Latham's snipe) (Commonwealth document)
Lewin's Rail	Densely vegetated wetlands ranging from fresh to saline, especially saltmarsh, and areas of low dense vegetation (particularly at ground level) surrounding or adjacent to water. Such areas were defined as habitat for the species in the study area. No suitable habitat for this species was found. It is therefore not discussed further.	Threatened Species Assessment <i>Lewinia pectoralis</i> Lewin's Rail (Victorian document)
Little Eagle	Open woodland and forest, particularly forest edges with wetlands and farmland. Such areas were defined as habitat for the species in the study area.	Threatened Species and Communities Risk Assessment Little Eagle Risk Assessment (Victorian document)
Orange-bellied Parrot	The species does not breed in the region. Foraging habitat for the species is described in statutory documents as follows: Foraging: Coastal saltmarsh, and adjacent pastures <500 m from saltmarsh and <200 m from a waterbody. Within saltmarsh, highest quality foraging habitat has a high cover of Beaded Glasswort, Austral Seablite and/or Shrubby Glasswort. The above characteristics have been used to define suitable habitat for this species.	National Recovery Plan for the Orange-bellied Parrot <i>Neophema chrysogaster</i> (Commonwealth document)
Powerful Owl	Mountain forests, gullies, coastal forest and forest margins, woodlands, and exotic pine plantations. Breeding habitat is mainly dense gullies, especially old forests with large tree hollows.	Powerful Owl Species Forecast Report (Victorian document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	As no old-growth forest occurred in the study area, breeding habitat was considered absent. All wooded habitats that were not isolated were considered potential foraging habitat for this species.	
Swift Parrot	Key foraging species (listed below) within eucalypt forest and woodland that are indigenous to the surrounding region according to VicFlora. Key foraging species: Yellow Box, Forest Red Gum.	National Recovery Plan for the Swift Parrot (<i>Lathamus discolor</i>) (Commonwealth document) VicFlora Flora of Victoria – Royal Botanic Gardens Victoria 2025 (plant distribution information only)
New Holland Mouse	Habitat for the species is described in statutory documents as follows: Open heathland, open woodland with a heath understory, dry sclerophyll forest with a heath understory, and vegetated sand dunes with required microhabitat characteristics (see paragraph below). The species is known to occur in grassy woodland or forest habitats, but these are considered more representative of inland rather than coastal habitats used by the species. Required microhabitat characteristics in heathland, heathy woodland and dry sclerophyll forest with a heath understory: dry, floristically diverse and even, on sandy soil, and with a high percentage of bare ground. Considering the above, the following combination of characteristics was used to define suitable habitat for this species: - Native vegetation with a dense shrub layer; and - Good connectivity to larger blocks of habitat in the surrounding landscape. All vegetated sand dunes were considered habitat.	Conservation Advice for <i>Pseudomys novaehollandiae</i> (New Holland mouse, Pookila) (Commonwealth document)
White-footed Dunnart	Habitat for the species is described in statutory documents as follows: Coastal tussock grassland and sedgeland, wet heath, and forest and	White-footed Dunnart Species Forecast Report – DEECA 2024c.

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	woodland with >50% cover of heathy understory or mid-storey vegetation. Within all these habitat types, uses areas of early to mid-successional stages of vegetation (4-16 years post-disturbance). Requires shelter structures in its habitat (strips of bark, small rotting logs, burrows in the ground, and/or tree hollows). Considering the above, the following combination of characteristics was used to define suitable habitat for this species: - Native vegetation with a dense shrub layer; and - Good connectivity to larger blocks of habitat in the surrounding landscape. All vegetated sand dunes were considered habitat.	
Grey-headed Flying-fox	No nationally important camps roost within or <20 km from the study area, so habitat defined by its proximity to or use by nationally important camps was not considered to occur. Important foraging habitat for the species was considered to consist of the following food plant species indigenous to the surrounding region: Forest Red Gum, Coast Banksia.	National Recovery Plan for the Grey-headed Flying-fox <i>Pteropus poliocephalus</i> (Commonwealth document)
Glossy Grass Skink	Habitat for the species is described in statutory documents as follows: Densely vegetated and moist microhabitats within the margins of creeks, swamps, lakes, or otherwise boggy areas. Wetland habitats for this species may be freshwater or brackish. Tall, dense vegetation (ideally with a high cover of matted vegetation) is necessary for maintaining the microhabitats required by this species. Considering the above, the following combination of characteristics was used to define suitable habitat for this species:	Draft Conservation Advice for <i>Pseudemoia rawlinsoni</i> (glossy grass skink) (Commonwealth document) - note, this document was not published at the time of habitat assessments, but it provided a useful summary of the same habitat information during reporting. Farquhar et al. (2024) was the main source of information on habitat preferences for the species during the habitat assessments. Threatened Species Assessment <i>Pseudemoia rawlinsoni</i> Glossy Grass Skink (Victorian document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	Wetlands and nearby low and dense, or sedgy or reedy, vegetation.	
Lace Monitor	Treed habitats within Damp Sclerophyll Forest, Dry Sclerophyll Forest, and Riparian Forest ecosystems. Known from other ecosystems in Victoria as well, but they are not considered indigenous to the surrounding region. All native treed habitats were considered habitat for this wide-ranging species.	Threatened Species Assessment <i>Varanus varius</i> Lace Monitor (Victorian document)
Swamp Skink	Habitat for the species is described in statutory documents as follows: Densely vegetated wetlands (may be freshwater, brackish, or saline) with natural hydrological regimes, including swamps and adjacent wet heaths (often dominated by <i>Melaleuca</i> or <i>Leptospermum</i> thickets), low-lying marshes, lagoon margins and sedgelands, and saltmarsh. It may also occur in swampy habitats within Damp Sclerophyll Forest and Riparian Forest ecosystems, particularly in South Gippsland. Areas with a canopy cover >2 m are generally not considered habitat. However, in South Gippsland, areas of open forest may also be habitat. Considering the above, the following combination of characteristics was used to define suitable habitat for this species: Permanent or semi-permanent wetlands (shown by the presence of emergent aquatic vegetation), with low, dense ground vegetation, typically not regularly grazed by stock; or Open native forest.	Conservation Advice for <i>Lissolepis coventryi</i> (swamp skink) (Commonwealth document) Threatened Species Assessment <i>Lissolepis coventryi</i> Swamp Skink (Victorian document)
Green and Golden Bell Frog	This species uses aquatic habitat to breed, and terrestrial habitat to forage. These are described in statutory documents on the species as follows: Aquatic habitat: Primarily stagnant lentic (still), shallow aquatic habitats, with emergent aquatic vegetation. Both	Approved Conservation Advice for <i>Litoria aurea</i> (green and golden bell frog) (Commonwealth document) Significant impact guidelines for the vulnerable green and golden

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	natural and artificial aquatic habitats may be used. Examples of natural habitat include coastal swamps, marshes, dune swales, lagoons, lakes and other estuary wetlands, riverine floodplain wetlands and billabongs. Examples of artificial habitat include stormwater detention basins, farm dams, bunded areas, drains, ditches, and excavations capable of capturing water like quarries or brick pits. Terrestrial habitat: Grassy/cleared areas or low vegetation with diurnal and over-wintering shelter sites <200 m from occupied aquatic habitat. Vegetation in used areas is generally no taller than woodland. Considering the above, the following combination of characteristics was used to define suitable wetlands for this species: - Water in wetlands appeared dark on aeriels, indicating higher water quality; and - Wetlands appeared capable of holding water from September-February, as shown by the presence of emergent aquatic vegetation. Terrestrial habitat was considered to occur <200 m from any occupied aquatic habitat, provided it was not forest.	bell frog (<i>Litoria aurea</i>) (Commonwealth document)
Growling Grass Frog	This species uses aquatic habitat to breed, and terrestrial habitat to forage. These are described in statutory documents on the species as follows: Aquatic habitat: Slow-flowing or still areas with deep water (>1.5 m) with a dense cover (30-40%) of submerged and floating aquatic vegetation, as well as extensive vegetated (emergent or fringing) and/or rocky margins in the shallows. Water must be likely to be available from September-February and have shallow areas free from tall shading vegetation. Aquatic habitat can be natural (e.g. slow-flowing streams, swamps, lagoons and lakes) or artificial	Conservation Advice for <i>Litoria raniformis</i> (southern bell frog) (Commonwealth document) Growling Grass Frog Species Forecast Report (Victorian document) National Recovery Plan for the Southern Bell Frog <i>Litoria raniformis</i> (Commonwealth document) Significant impact guidelines for the vulnerable growling grass frog (<i>Litoria raniformis</i>) (Commonwealth document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	(e.g. farm dams, irrigated channels, disused quarries). Riverbanks, wetlands, drainage lines, swales, and other periodically damp areas, as well as grassy open areas, are considered important if they connected nearby occupied waterbodies (<700 m apart). Terrestrial habitat not providing connectivity: Areas <200 m from occupied aquatic habitat, open, containing flowering plants, tussocks, grasses and foliage, as well as logs and ground debris. Rank growth is considered to impede movement and foraging and therefore was not considered habitat. Considering the above, the following combination of characteristics was used to define suitable wetlands for this species: - Water in wetlands appeared dark on aerials, indicating higher water quality; and - Wetlands appeared permanent, as shown by the presence of emergent aquatic vegetation. Terrestrial habitat was considered to occur <200 m from any occupied aquatic habitat, provided a tall, dense canopy of trees was not present.	
Martin's Toadlet	Primarily moderately-sized, still, permanent or semipermanent wetlands surrounded by woodland (including dry sclerophyll forest) or coastal scrub (including shrublands, coastal heath, and <i>Melaleuca</i> thickets). Areas where woodland or coastal scrub extends directly to the edge of wetlands are heavily favoured. However, some records from dams, flooded grasslands (including sedgeland), and paddocks some distance from intact native vegetation. Therefore, the combination of the following characteristics were used to define suitable wetlands for this species:	Conservation Advice for <i>Uperoleia martini</i> (Martin's Toadlet) (Commonwealth document) Action statement No. 265 <i>Flora and Fauna Guarantee Act 1988</i> Martin's Toadlet <i>Uperoleia martini</i> (Victorian document)

Species (Listing)	Habitat Criteria	Statutory Information Sources (all publicly accessible online)
	- Water in wetlands appeared dark on aerials, indicating higher water quality; - Wetlands were lentic (still), rather than forming a flowing part of a watercourse; - Wetlands appeared permanent, as shown by the presence of emergent aquatic vegetation; and - Wetlands were <200 m from woodland or coastal scrub. Growling Grass Frog is substantially larger and likely more mobile than Martin's Toadlet, and the former typically uses terrestrial habitats <200 m from aquatic habitat. Therefore, 200 m was considered a conservative upper estimate for the distance Martin's Toadlet may travel between terrestrial woodland or scrub habitat, and aquatic wetland habitat. Woodland, coastal scrub, and sedgeland and flooded grasslands were considered terrestrial habitat if they were <200 m from any occupied wetlands.	
Southern Toadlet	Aquatic habitat: Breeds in seasonal watercourses, swamps and low-lying areas flooded by autumn and winter rains. Terrestrial habitat: Includes open forest, woodland, grassland, and heath vegetation communities. Given the potentially wide range of habitats this species can use in the project area, it was not subjected to targeted surveys and is assumed present in areas of potential habitat in the project area. Areas of potential habitat were assumed present in forest, woodland, grassland and heath vegetation EVCs (see Fig. 811).	Threatened Species Assessment <i>Pseudophryne semimarmorata</i> Southern Toadlet (Victorian document)

Aquatic

Habitat assessments for threatened aquatic species were undertaken by Aquatica Environmental on 30 August–2 September 2021 and 27–28 September 2022. Assessments were undertaken for those waterways identified during the desktop assessment as having a medium or high potential to support threatened species. Unnamed waterway assessed in the study area were unnamed UFI:42824679, UFI:18401649 and UFI 4280633.

Inspections were undertaken on-foot within the alignment and/or where access had been obtained for upstream and/or downstream reaches to within 250 m of the alignment. All waterways (i.e., those identified for inspection and/or survey) were initially inspected. Where suitable habitat was present, surveys for target aquatic species were conducted.

- For each inspected or surveyed waterway, details of the waterway type and habitat were noted, including (where able to be determined):
 - Waterway type (e.g. permanent, ephemeral, floodplain, channel, etc.)
 - Aquatic habitat / vegetation types
 - Emergent vegetation
 - Riparian vegetation
 - Any other relevant observations or notes

An additional targeted survey of Burrowing Crayfish (*Engaeus spp.*) was undertaken within a small section of the project area (HZ10) near Woodside on 28–29 January 2025, after burrows were observed there by Nature Advisory staff during other targeted surveys.

Targeted fauna surveys

Targeted fauna surveys were carried out between October 2024 and January 2025, as detailed in Table 6-5.

Table 6-5 EPBC Act and FFG Act listed species that were included in the targeted fauna surveys

Scientific name	Common name	EPBC status	FFG status	Survey Method	Survey Guidelines	Dates of targeted surveys
<i>Lissolepis coventryi</i>	Swamp Skink	EN	en	Tile Surveys	Biodiversity Precinct Structure Planning Kit (DSE 2010) Forest Protection Survey Program: Survey Guideline – Reptile Survey (V 5.0) (Chick et al. 2023)	Tile Laydowns: 29-31/10/2024 Tile Checks: 3/12/24, 9/12/24, 18-19/12/24, 15/01/24, 22/01/24. Final Tile Check and Tile Collection: 29/01/24

Scientific name	Common name	EPBC status	FFG status	Survey Method	Survey Guidelines	Dates of targeted surveys
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink		vu	Tile Surveys	Biodiversity Precinct Structure Planning Kit (DSE 2010)	Tile Laydowns: 29-31/10/2024 Tile Checks: 3/12/24, 9/12/24, 18-19/12/24, 15/01/24, 22/01/24. Final Tile Check and Tile Collection: 29/01/24
<i>Varanus varius</i>	Lace Monitor		en	Assumed present. Observed incidentally in the surrounding region.		
<i>Litoria aurea</i>	Green and Golden Bell Frog	VU		Call-playback and spotlighting	Significant impact guidelines for the vulnerable green and golden bell frog (<i>Litoria aurea</i>) – DEWHA 2009a.	25/11/24, 30/11/24, 3/12/24, 9/12/24, 17/12/24
<i>Litoria raniformis</i>	Growling Grass Frog	VU	vu	Call-playback and spotlighting	Significant impact guidelines for the vulnerable growling grass frog (<i>Litoria raniformis</i>) – DEWHA 2009b.	25/11/24, 30/11/24, 3/12/24, 9/12/24, 17/12/24
<i>Uperoleia martini</i>	Martin's Toadlet	EN	en	Call-playback and spotlighting	Forest Protection Survey Program: Survey Guideline Frog Survey (V 5.0) (Durkin et al. 2023)	29-31/10/2024

Scientific name	Common name	EPBC status	FFG status	Survey Method	Survey Guidelines	Dates of targeted surveys
<i>Pseudophryne semimarmorata</i>	Southern Toadlet		en	Assumed present; other surveys completed outside the study area previously detected the species in the surrounding region.		
<i>Sminthopsis leucopus</i>	White-footed Dunnart		vu	Assumed present.		
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	VU	en	Assumed present, although other surveys completed outside the study area did not detect the species in the surrounding region.		
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	vu	Assumed present.		
<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped Heathwren		vu	Assumed present; other surveys completed outside the study area previously detected the species in the surrounding region.		
<i>Falco subniger</i>	Black Falcon		cr	Assumed present.		
<i>Neophema chrysostoma</i>	Blue-winged Parrot	VU	vu	Assumed present. Observed incidentally in the		

Scientific name	Common name	EPBC status	FFG status	Survey Method	Survey Guidelines	Dates of targeted surveys
				surrounding region.		
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	EN	en	Assumed present. Observed incidentally in the surrounding region.		
<i>Gallinago hardwickii</i>	Latham's Snipe	VU	vu	Assumed present.		
<i>Hieraeetus morphnoides</i>	Little Eagle		vu	Assumed present.		
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CR	cr	Assumed present.		
<i>Ninox strenua</i>	Powerful Owl		vu	Assumed present; other surveys completed outside the study area previously detected the species in the surrounding region.		
<i>Lathamus discolor</i>	Swift Parrot	CR	cr	Assumed present. Observed incidentally in the surrounding region.		

Detailed survey methods

Survey methods for reptiles and frogs are described below. The location of these surveys are shown in Figure 6-4.

Tile Surveys:

Swamp Skink *Lissolepis coventryi* (Endangered: FFG; Endangered: EPBC post-referral decision) and Glossy Grass Skink *Pseudemoia rawlinsoni* (Endangered: FFG) were surveyed using tile surveys. This

entailed mapping areas of potential habitat within the project footprint (using the relevant criteria from Table 6-4), then laying tiles in those areas (as shown in Figure 6-3), and then checking under the tiles for the presence of this species. Tiles were laid as tile grids, with 1 tile grid/ha of habitat (or part thereof), 50 tiles per tile grid in a 5 x 10 formation, and with 5 m spacing between all tiles within and between rows, to comply with Victorian survey guidelines on the species (DSE 2010). Where areas of potential habitat were too linear to allow for this, tiles were arranged in alternative, transect-based configurations (involving fewer but longer rows of tiles), maintaining the 5 m spacing between all tiles within and between rows. For habitat patches that were too small to fit 50 tiles within them whilst maintaining a 5 m spacing between tiles, fewer tiles were used (but as many as possible whilst maintaining the 5 m spacing).

After >1 month, all of the tiles were checked for the presence of the target species under the tiles. All vertebrate fauna found were recorded. 6 rounds of checks were conducted at each tile survey site in total, with each tile check >5 days apart. On the 6th and final tile check, the tiles were removed.

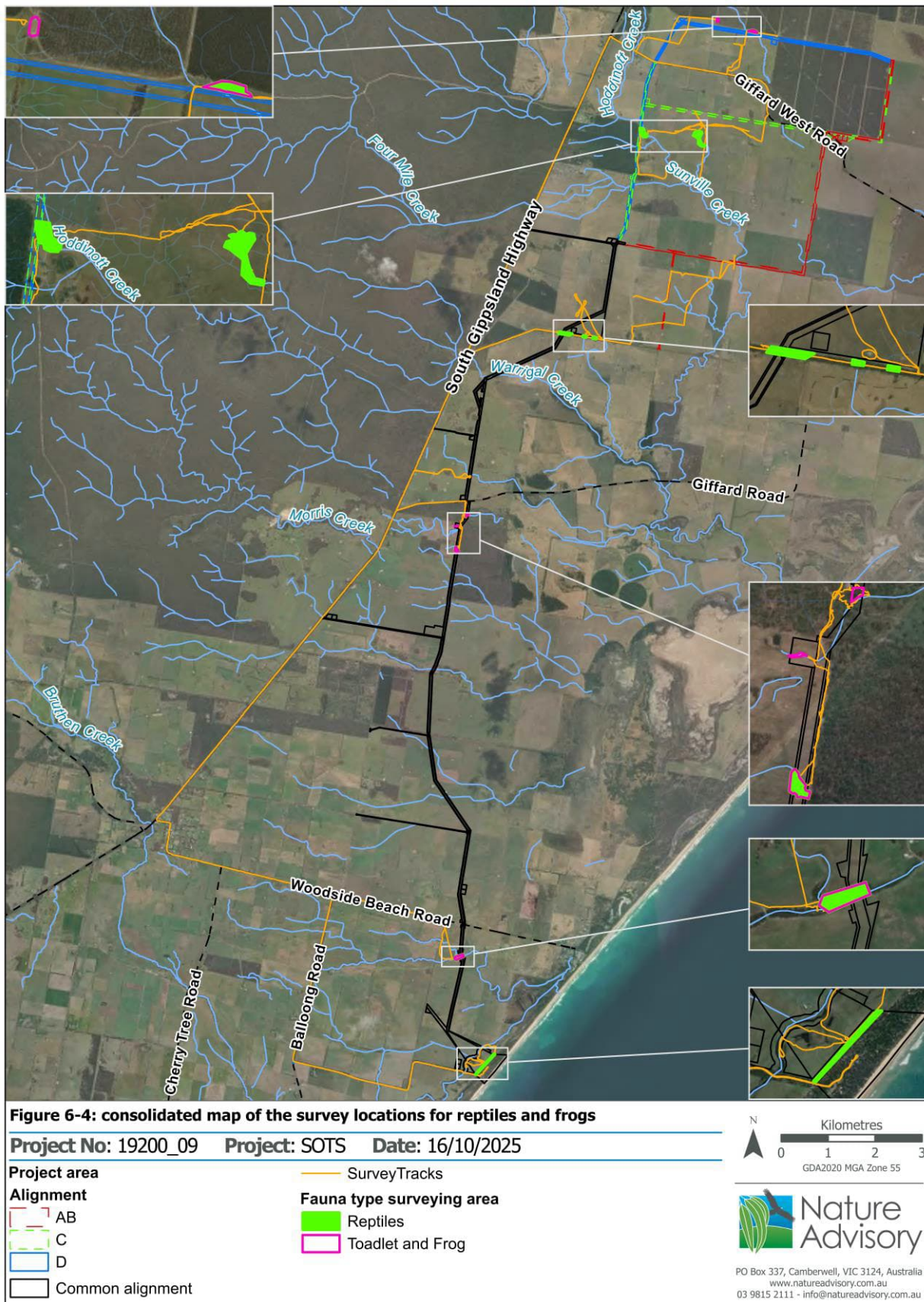
Call-playback and spotlighting surveys:

Green and Golden Bell Frog *Litoria aurea* (Vulnerable: EPBC), Growling Grass Frog *Litoria raniformis* (Vulnerable: FFG; Vulnerable: EPBC) and Martin's Toadlet *Uperoleia martini* were surveyed using call-playback and spotlighting. This entailed mapping areas of potential habitat within the project footprint (using the relevant criteria from Table 6-4 and as shown in Figure 6-4 below), then returning at night during the calling seasons for these species, listening for calls (including trying to stimulate calling using call-playback), and spotlighting for any active individuals. Each species had different survey requirements according to their relevant survey guidelines, as shown in Table 6-6 below. Surveys were conducted in accordance with those guidelines.

Table 6-6: Frog field survey methods

Species	Survey Season	Survey-nights	Required environmental conditions	Call-playback effort per survey site per survey-night	Spotlighting effort per survey site per survey-night	Survey Guidelines
Green and Golden Bell Frog	September-March	4	Warm, windless weather following rainfall	Not specified; therefore did the following: 1 min call-playback; 4 mins passive listening; and Repeated 3 times for a 15 min period.	1 hr per 50 m of wetland; as wetlands were <50 m long, 1 hr was used.	Significant impact guidelines for the vulnerable green and golden bell frog (<i>Litoria aurea</i>) – DEWHA 2010.
Growling Grass Frog	November-March	2	Daytime air temperatures >15°C, moderate-no wind; and Nighttime air temperatures >12°C, moderate-no wind.	Not specified; therefore did the following: 1 min call-playback; 4 mins passive listening; and	1 hr per 50 m of wetland; as wetlands were <50 m long, 1 hr was used.	Significant impact guidelines for the vulnerable growling grass frog

Species	Survey Season	Survey-nights	Required environmental conditions	Call-playback effort per survey site per survey-night	Spotlighting effort per survey site per survey-night	Survey Guidelines
				Repeated 3 times for a 15 min period.		(<i>Litoria raniformis</i>) – DEWHA 2009.
Martin's Toadlet	September-October	3	Conditions favourable for detecting frogs, e.g. after rainfall, low wind and high humidity and temperature. Surveys were completed at the end of the survey season, and windy conditions were encountered on 2/3 nights – as such, the species was later assumed present despite lack of detections.	5 mins passive listening; 1 min call-playback; 2 mins passive listening; 1 min call-playback; and 2 mins passive listening.	30 mins	Forest Protection Survey Program: Survey Guideline Frog Survey (V 5.0) (Durkin et al. 2023)



19200_09 Figure 6-4: consolidated map of the survey locations for reptiles and frogs - Created by: [redacted] - X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 6-4: Locations of reptile and frog targeted field surveys

Targeted flora surveys

Targeted surveys for threatened flora were determined through a review of:

- VBA records and a determination of the likelihood of occurrence for each flora species
- PMST results for MNES
- Habitat type, quality and suitability to support threatened flora species recorded during preliminary field assessments (Nature Advisory and AECOM 2020) and detailed vegetation assessments in August–September 2020–2021 and 2023–2024.

A targeted flora survey was undertaken in 2020. Additional targeted surveys occurred in 2023 and 2024 due to changes in the alignment and project area. Targeted flora surveys were undertaken by two qualified botanists.

Targeted flora surveys were undertaken for all EPBC Act or FFG Act listed species that had a possible or likely status in the likelihood of occurrence assessment undertaken based on desktop information and field-based habitat assessments. Table 6-7 summarises the listed species that were included in the targeted flora surveys.

Habitat that was deemed appropriate for target species was surveyed using methods that aligned with or exceeded the Survey Guidelines for Australia's Threatened Orchids (DoE 2013). This comprised conducting transect surveys in areas of suitable habitat. Transects were walked at approximately 5 m apart, searching 3 m on either side of the transect line. DoE (2013) orchid survey guideline methods were applied in areas with suitable orchid microhabitats, or where any orchids were found.

In areas without an understorey, surveys were spaced approximately 10m apart. Highly disturbed areas were not intensively surveyed, with only a walkthrough completed and images captured.

Flowering time was determined based on a review of information available sources including VicFlora (managed by the Royal Botanic Gardens Victoria), EPBC Act Species Profile and Threats database (managed by the Department of Climate Change, Energy, the Environment and Water) and, if information was not available from those sources, National Recovery Plans, Action Statements and guidance documents.

Table 6-7 EPBC Act and FFG Act listed species that were included in the targeted flora surveys

Scientific name	Common name	EPBC status	FFG status	Flowering period	Dates of targeted surveys
<i>Acacia howittii</i>	Sticky Wattle	-	Vu	Oct	16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	Vu	-	Nov-Mar	9/11/2020, 10/11/2020, 11/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Austrostipa rudis</i> subsp. <i>australis</i>	Veined Spear-grass	-	En	Nov-Jan	3/09/2020, 10/11/2020, 23/11/2020 24/11/2020, 26/11/2020, 27/11/2020, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024

Scientific name	Common name	EPBC status	FFG status	Flowering period	Dates of targeted surveys
<i>Caladenia aurantiaca</i>	Orange-tip Finger-orchid	-	En	Sep-Oct	04/10/2021, 27/10/2021, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024
<i>Caladenia tessellata</i>	Thick-lip Spider-orchid	Vu	-	Sep-Oct	04/10/2021, 27/10/2021, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024
<i>Caladenia vulgaris</i>	Slender Pink-fingers	-	Vu	Oct-Jan	9/11/2020, 11/11/2020, 24/11/2020, 27/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024
<i>Commersonia prostrata</i>	Dwarf Kerrawang	En	En	Sep-Nov	9/11/2020, 10/11/2020, 11/11/2020, 24/11/2020, 25/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024
<i>Coronidium gunnianum</i>	Pale Swamp Everlasting	-	Cr	Nov-Jun	14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Corybas fimbriatus</i>	Fringed Helmet-orchid	-	En	May-Sep	04/10/2021, 27/10/2021, 21-25/08/2023, 29-30/08/2023, 14-18/10/2024
<i>Cymbonotus lawsonianus</i>	Bear's-ear	-	En	Year-round	9/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Dianella amoena</i>	Matted Flax-lily	En	Cr	Oct-Apr	12/11/2020, 23/11/2020, 26/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Dianella longifolia</i> var. <i>grandis</i> s.l.	Pale Flax-lily	-	Cr	Nov-Dec	9-13/12/2024, 16-20/12/2024
<i>Eucalyptus arenicola</i>	Gippsland Lakes Peppermint	-	En	Jun-Aug (Detectable year-round)	VQA (Aug-Sep 2020), 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Eucalyptus bosistoana</i>	Coast Grey-box	-	En	Nov-Mar (Detectable year-round)	VQA (Aug-Sep 2020), 24/11/2020, 25/11/2020, 27/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Eucalyptus fulgens</i>	Green Scentbark	-	En	Mar-May (Detectable year-round)	VQA (Aug-Sep 2020), 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Eucalyptus kitsoniana</i>	Bog Gum	-	Cr	Aug. – Mar (Detectable year-round)	VQA (Aug-Sep 2020 and 2023), 14-18/10/2024, 9-13/12/2024, 16-20/12/2024

Scientific name	Common name	EPBC status	FFG status	Flowering period	Dates of targeted surveys
<i>Juncus revolutus</i>	Creeping Rush	-	En	Oct-Jan	9/11/2020, 10/11/2020, 11/11/2020, 25/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Lachnagrostis robusta</i>	Salt Blown-grass	-	En	N/A	9/11/2020, 10/11/2020, 11/11/2020, 25/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Lachnagrostis semibarbata</i> var. <i>semibarbata</i>	Purple Blown-grass	-	En	Oct-Jan	9/11/2020, 10/11/2020, 11/11/2020, 25/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Leptorhynchos elongatus</i>	Lanky Buttons	-	En	Year-round	23/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Oxalis rubens</i>	Dune Wood-sorrel	-	En	Year-round	11/11/2020, 16-20/10/2023, 13-14/11/2023, 16-20/12/2024
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	Vu	En	Jun-Aug	6/08/2020, 7/08/2020, 10/08/2020, 11/08/2020, 27/08/2020, 3/9/2020, 9/9/2020, 21-25/08/2023, 29-30/08/2023, 14-18/10/2024
<i>Pterostylis grandiflora</i>	Cobra Greenhood	-	En	May-Aug	6/08/2020, 7/08/2020, 10/08/2020, 11/08/2020, 27/08/2020, 3/9/2020, 9/9/2020, 21-25/08/2023, 29-30/08/2023, 14-18/10/2024
<i>Sowerbaea juncea</i>	Rush Lily	-	Vu	Aug-Dec	10/11/2020, 16-20/10/2023, 13-14/11/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024
<i>Thelymitra matthewsii</i>	Spiral-leaved Sun-orchid	Vu	En	Aug-Sep	20/08/2020, 31/08/2020, 3/9/2020, 21-25/08/2023, 29-30/08/2023, 14-18/10/2024, 9-13/12/2024
<i>Triglochin minutissima</i>	Tiny Arrowgrass	-	En	Aug-Oct	9/11/2020, 10/11/2020, 11/11/2020, 25/11/2020, 21-25/08/2023, 29-30/08/2023, 14-18/10/2024, 9-13/12/2024, 16-20/12/2024

6.4. Impact assessment method

An *impact* is where a project activity or activities, in any of the project phases (construction, operation or decommissioning), results in a change in the existing environment.

The impact assessment has been based on a maximum design scenario, which enables a realistic and conservative approach to considering possible impacts that could occur due to the construction, operation or decommissioning of the project. Impacts can be positive or negative, direct or indirect. Impacts are described following the application of mitigation measures (residual impact).

Whether an impact results in a consequence to environmental receptors depends on the sensitivity of the receptors and the magnitude of the impact.

- Sensitivity: the intolerance of a species or habitat to damage from an external factor and the time taken for its subsequent recovery
- Magnitude: the severity, extent and duration of an impact.

As environmental assets, values and uses are interconnected, sometimes an impact will give rise to a follow-on (secondary or indirect) impact which has also been considered as part of the assessment.

The impact assessments have involved identifying the magnitude of changes to the environment, positive or negative, that the project may have on the existing conditions. The method used has been specific to each individual technical study in accordance with relevant guidelines and standards. The technical reports each contain a section that describes their impact assessment method in detail, in particular the modelling or analysis that has been undertaken to predict the changes that may occur due to the implementation of the project.

The factors that have been considered when assessing the consequences of the project are as follows:

- Severity, extent, and duration
- Sensitivity of the affected receptors
- Assessment criteria
- The principles of ecologically sustainable development as defined in the *Ministerial Guidelines for Assessment of Environmental Effects* (DTP 2023) and in section 3A of the EPBC Act
- Feedback from relevant agencies through the Technical Reference Group process
- The likely effectiveness of measures to avoid, minimise and manage impacts
- Assumptions and uncertainties associated with the assessment.

The impact assessments have considered the potential for combined impacts generated by the project on the one receptor but resulting from different actions. For example, shorebirds and seabirds are potentially affected by the loss of habitat within the project area, together with bird strike associated with the operation of the wind farm (referred to as inter-related impacts in the technical reports). The combined impact of these changes is assessed within the shorebird and seabird assessment.

For the purposes of the impact assessment the project description defined a project design envelope (PDE). The PDE comprises ranges for certain design parameters (for example, an upper and lower limit for the width of the cable easement). This allows for flexibility in the eventual design for the project that is necessary within an evolving industry where technology is rapidly changing. The impact and risk assessment has been based on a Maximum Design Scenario (MDS), which enables a realistic and conservative approach to considering possible impacts and risks that could occur due to the construction,

operation or decommissioning of the project. The MDS consists of a defined set of project parameters from within the PDE that represent the greatest potential impact to an identified sensitive receptor or receptor group. As the MDS is defined based on specific impacts, the MDS assessed will vary between the impacts and risks assessed. See Sections 10, 11 and 12 for the MDS used for this assessment.

6.4.1. Assigning a sensitivity level

To assign a sensitivity level, the existing environment is described and 'receptors' are identified. For example, receptors in the onshore environment include native vegetation.

A sensitivity level of *high*, *medium* or *low* is assigned to the receptors based on specific criteria developed by the specialist undertaking the assessment.

A sensitivity level is assigned to the receptors that have been identified in the baseline characterisation presented in Sections 7 and 8. The sensitivity of each of the receptors has been determined to be either high, medium or low according to the descriptions relevant to onshore ecology presented in Section 6.4. Assigning receptor sensitivity includes consideration of the following factors:

- Adaptability
- Tolerance to disturbance of reproduction and survival rates
- Recoverability from impact on reproduction and survival rates
- Protection status

Table 6-8 Receptor sensitivity

Sensitivity (to impact)	Description
High	Species has complex and very limited habitat that is confined to limited areas including those in or near the project area. the species is neither adaptable nor mobile. Therefore, within the context of this project, the species will be affected. Native vegetation is a threatened ecological community or endangered in the bioregion.
Medium	Species is slow to recover from changes to its environment or species has complex and very specific habitat requirements. Species is neither adaptable nor mobile. Species is limited to Gippsland and there is limited available habitat. Therefore, within the context of this project the species will be affected but with limited impacts. Native vegetation is not a threatened ecological community or endangered in the bioregion.
Low	Species is mobile, widespread and adaptable and therefore will not be affected.

6.4.2. Assigning a magnitude level

The magnitude of the impact on the environment includes consideration of the following factors:

- **Extent** – site, local, regional or widespread
- **Duration** – short, medium or long term (also considering frequency and permanence)
- **Severity** – degree of change from existing condition

The magnitude of a specific impact is based on clear criteria determined by the specialist undertaking the assessment, which are defined in relation to onshore ecology in Table 6-9. Magnitude is assigned for the maximum credible consequence with consideration of mitigation and management measures according to the levels presented in Table 6-10.

Table 6-9 Magnitude criteria

Term	Scale	Description
Extent	Localised	Within the project area
	Medium scale	Within 5 km of the project area
	Large scale	Within 50 km of the project area
	Regional	Within the IBRA bioregion
Duration	Short term	Days to weeks
	Medium term	Less than 5 years
	Long term	Greater than 5 years
Severity	Unlikely to be detectable	Changes are within natural variability
	Reversible	Changes are reversible once the activity has ceased
	Permanent	Irreversible change, substantial change to the value

Table 6-10 Magnitude description

Magnitude	Description
Negligible	The impact is localised, short-term, and changes to the receptor are unlikely to be detectable above natural conditions or noticeable effect beyond the immediate occurrence or expression of the hazard. Having negligible effect on the known population or range of the receptor.
Low	The impact is medium-scale, medium-term, and results in reversible changes to the receptor once the activity has ceased. Impact that results in reversible changes that affects ecological features but does not kill individuals or disrupt breeding or other important ecological processes. Having a minor effect on the known population or range of a receptor.
Medium	The impact is large-scale, medium-term, and results in reversible changes to the receptor once the activity has ceased. Loss of a moderate proportion of the known population or range of a receptor.
High	The impact extends to the project area (large scale/regional) and/or is long-term, and results in irreversible changes to the receptor once the activity has ceased or take years to recover from. Kills individuals or disrupts breeding or other important ecological processes. Loss of a high proportion of the known population or range of the receptor.

Very High	The impact is regional (or up to international) and/or long-term, and results in substantial and possibly irreversible change (permanent), or total loss, to the receptor. Deaths of hundreds or at least than 5% of the population of a (or more) of flora or fauna species. Loss of a significant proportion of the known population or range of a flora or fauna species Contamination or other environmental damage leading to deaths many individuals or disrupt breeding or other important ecological processes for many individuals.
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6.4.3. Assigning a consequence level

Consequence is the potential outcome of an event affecting a receptor. It is determined by combining the magnitude of the impact and the sensitivity of the receptor. The consequence level is assigned based on the receptor sensitivity level and magnitude level using the matrix in Table 6-11.

Consequences are assigned based on the maximum credible impact for each pathway. Where uncertainty exists, a conservative approach to assessing consequence is adopted.

Table 6-11 Consequence level matrix

Magnitude	Sensitivity		
	Low	Medium	High
Negligible	Negligible (E)	Negligible (E)	Minor (D)
Low	Negligible (E)	Minor (D)	Moderate (C)
Medium	Minor (D)	Moderate (C)	Major (B)
High	Moderate (C)	Major (B)	Severe (A)
Very high	Major (B)	Severe (A)	Severe (A)

6.4.4. Residual impacts

While there are clear steps in the assessment process, it may not always follow a linear progression. Typically, assessment requires multiple iterations of impact evaluation considering the assessment criteria and application of mitigation measures as the technical studies progress and additional information becomes available. The completed impact assessments are based on the mitigation measures that will be implemented and, therefore, describe the currently known residual impacts. The residual impacts constitute the consequences predicted to occur following the implementation of mitigation measures. They take into account the expected effectiveness of these measures. It is likely that through the design and construction processes, residual impacts will be reduced further. As the design process is not finalised it can be assumed that the current impact assessment is a conservative one (i.e. more likely to over-estimate than under-estimate impacts).

6.5. Risk assessment

A *risk* is where a project activity or activities could result in an unexpected (accidental) event in any of the project phases (construction, operation or decommissioning) that causes a change to the existing environment.

The level of risk is determined by combining the likelihood of an accident occurring and the consequences should the accident occur. The assignment of consequence level follows the process outlined above.

The following steps were undertaken to identify, analyse and evaluate risks:

- Develop a risk matrix based on the likelihood of an accident occurring and the consequences, should the accident occur
- Identify controls and requirements to mitigate identified risks
- Assign likelihood and consequence ratings for each risk to determine risk ratings considering design, proposed activities and mitigation.

6.5.1. Assigning a likelihood level

Likelihood is the probability of an unexpected (accidental) event occurring. The likelihood criteria range from 'rare'—where the event may occur only in exceptional circumstances—to 'almost certain', where the event is expected to occur in most circumstances.

Likelihoods are assigned with consideration of mitigation and management measures according to the levels presented in Table 6-12.

Table 6-12 Guide to likelihood levels

Level	Description
Rare	The event may occur only in exceptional circumstances
Unlikely	The event could occur but is not expected
Possible	The event could occur
Likely	The event will probably occur in most circumstances
Almost Certain	The event is expected to occur in most circumstances

6.5.2. Risk matrix

Risk is defined as combination of the likelihood of an event occurring (using Table 6-12) and the consequence of that event occurring (using Table 6-11).

A risk rating is then determined by these factors using the risk matrix in Table 6-13.

The level of detail of the assessment undertaken for each risk pathway is proportionate to the identified level of risk (i.e. risk ranking).

Table 6-13 Risk matrix

Likelihood rating	Consequence				
	Negligible	Minor	Moderate	Major	Severe
Rare	Very low	Very low	Low	Medium	Medium
Unlikely	Very low	Low	Low	Medium	High
Possible	Low	Low	Medium	High	High
Likely	Low	Medium	Medium	High	Very high
Almost certain	Low	Medium	High	Very high	Very high

6.6. Avoidance and minimisation through design

The impact assessment process is iterative and the design of the transmission alignment has been informed by earlier versions of environmental assessments in order to avoid and minimise potential impacts, including during:

- Pre-referral corridor selection
- Post-referral corridor selection
- Post feasibility licence award
- Post VicGrid establishment corridor selection.

At each decision point, the project, where reasonably practicable has sought to avoid and minimise impacts to a suite of environmental, heritage, socio-economic and landholder values. Avoid and minimise principles have materialised through reduced construction footprints and re-routing where sensitive values have been identified. These strategic considerations, informed by site validation have resulted in the footprint under which the onshore project is being assessed. Furthermore, modifications were made to a penultimate project area by altering its route to avoid and minimise impacts on remnant native vegetation and fauna habitat, including threatened ecological communities.

6.7. Avoidance, mitigation and management

Once avoidance and minimisation measures have been exhausted, the next step is management of the residual impacts and risks. In the case of risks, the mitigation measures can be applied prior to the event occurring and/or after the event. The residual impacts and risks are evaluated against the assessment criteria to ensure impacts and risk are of an acceptable level.

The assessments describe the impacts and risks with all the mitigation measures implemented i.e. with both initial and final mitigations. Initial mitigation measures are defined as the standard suite of mitigation measures that will be implemented by the project such as measures required under legislation, national or international standards and standard measures implemented on similar projects. Final mitigation measures are any additional mitigation measures adopted to address the findings of impact/risk assessments to further reduce impacts and risks to acceptable levels. The completed impact and risk registers for this technical report are presented in Appendix 5 and show the reduction in impact/

risk that occurs between the initial rating and final rating due to the application of final mitigation measures.

6.8. Cumulative impact assessment

Cumulative impacts arise when the effects of a single project on a single receptor are considered alongside the effect of other projects on the same receptor. The project has considered the potential for cumulative impacts associated with other proposed projects. It is noted that projects that are operational are considered as part of the baseline environment, and the cumulative impact assessment focuses on proposed or future actions.

A staged approach to cumulative impact assessment has been adopted. This approach is split into four stages:

- Stage 1 Identifying potentially cumulative projects or actions
- Stage 2 Shortlisting identified projects or actions
- Stage 3 Gathering information
- Stage 4 Assessment

This approach is focused on the assessment of potential adverse cumulative effects on receptors or similar groups of receptors, as relevant. The availability of information necessary to conduct a cumulative impact assessment depends on the status of the proposed project or action within the planning and approval regulatory steps. Therefore, a level of certainty reflecting the availability of detail and information necessary for the assessment is assigned to each proposal:

- Tier 1 High certainty – Project planning application/EIS/EES has been submitted to regulators, or the project has been approved, or the project is under construction.
- Tier 2 Medium certainty – Project referrals have been submitted to the regulators.
- Tier 3 Low certainty – Project is in the proposal stage and little information is publicly available.

The cumulative impact assessment has followed a staged approach as shown in Figure 6-5 described in detail in EIS Chapter 6 - Assessment Framework and EES Chapter 6 - Assessment Framework).

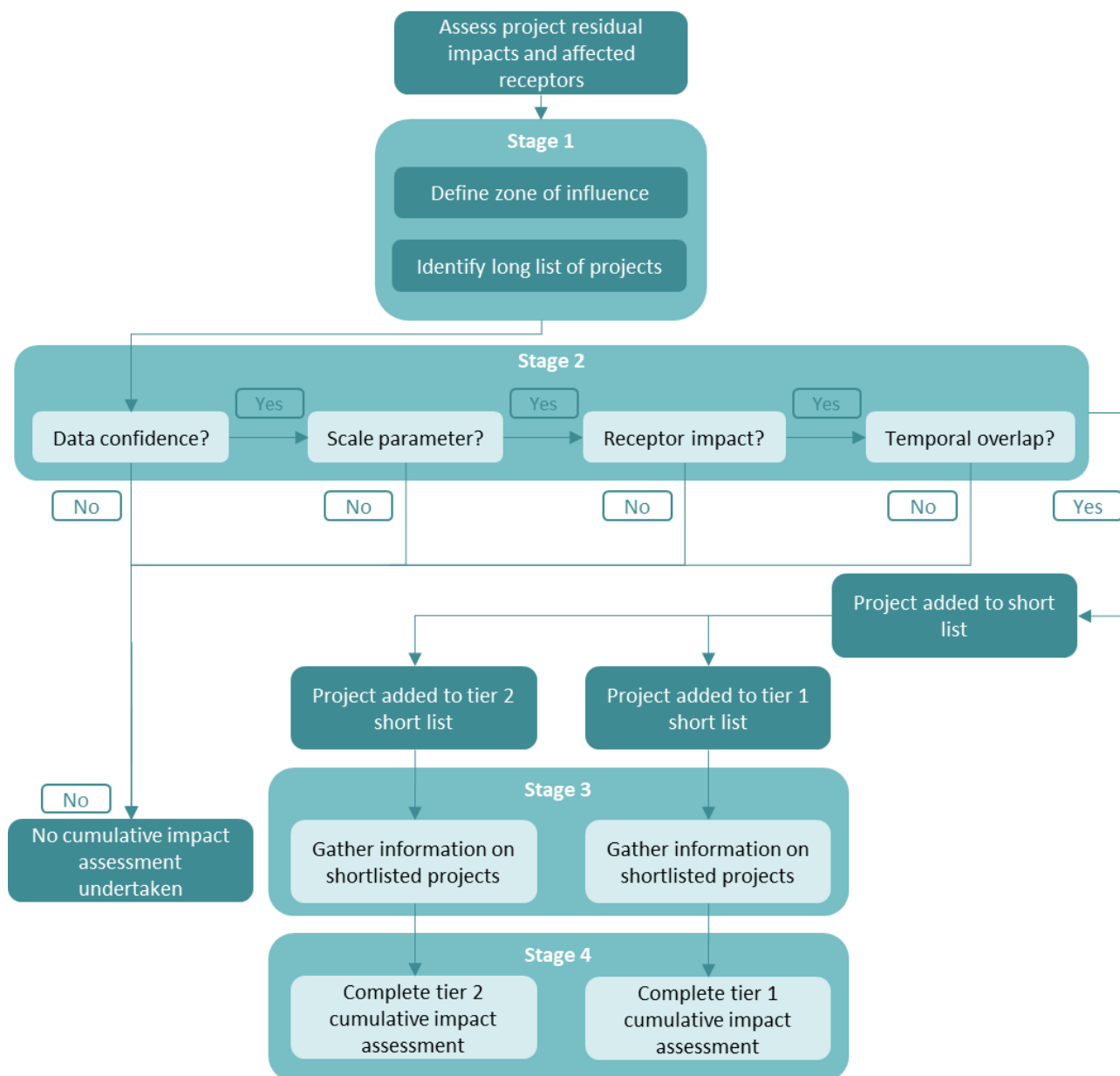


Figure 6-5 Cumulative impact assessment process

The EIS scoping guidelines for the project states that the assessment should ‘address the potential cumulative impact of the proposed action on ecosystem resilience’. Both the EIS and EES scoping guidelines state that climate change impacts must also be considered. Ecological resilience is generally defined as “the ability of ecosystems to resist permanent structural change and maintain ecosystem functions” (DAWE, 2016). An assessment of ecosystem resilience including an assessment of climate change is addressed in the assessment of Ecosystem Resilience contained within the EIS Chapter 24 - EIS Summary and conclusions.

6.9. Limitations, uncertainties and assumptions

The limitations, uncertainties and assumptions that apply to this assessment are set out below.

- Available databases generally contain mostly presence data, not often an indication of the population sizes observed – notwithstanding this, if a record of a species occurred, it was assumed that a population occurred at the site.

- Contributors to the databases and their records used are vetted by the database administrator/owner, and it is assumed that the occurrences are confirmed from *bona fide* observers.
- The suitability of habitat for species found to occur in databases was tested through field surveys of the project area by personnel familiar with the habitat preferences of the species concerned. The conclusions in relation to species' occurrences are therefore considered reliable.
- The assessment assumes indirect loss of native vegetation within 15 m of the project area where trees occur due to potential impacts on NRZs (treed patches or scattered trees)

As no field survey was undertaken specifically to document hollow trees in the project area, it has been assumed that any tree that met the large tree benchmark diameter at breast height contained hollows. Hollow tree surveys were undertaken in areas assessed as potential fauna habitat by Nature Advisory. In some cases, Nature Advisory mapped additional hollow trees that were not assessed as large trees. These are presented in Figure 7-3.

Some areas of the alignment were inaccessible to be surveyed due to a lack of landowner consent. These areas are shown in Figure 6-3. As outlined in Section 6.3.3, areas of DEECA modelled vegetation were adopted as patches of native vegetation for the impact assessment in areas that were inaccessible and assigned the highest modelled condition score for calculating native vegetation offsets. Potential remnant trees were identified from aerial imagery and those trees assigned the large category for calculation of native vegetation impacts and offsets in line with a precautionary approach. The presence of native vegetation will be determined for areas unable to be accessed on the final alignment option to the VicGrid connection hub prior to construction.

6.10. Linkages to other technical reports

This report has interdependencies with the report in relation to the assessment of impacts associated with:

- Technical report H: Groundwater
- Technical report I: Surface water

The specialists undertaking this assessment worked collaboratively to evaluate these potential impacts and design suitable mitigation measures to be adopted by the project.

7. Existing environment: Flora

This section describes the native vegetation, listed flora species and listed threatened ecological communities of the study area.

7.1. General description - Vegetation communities

Landscape characterisation

The study area extends from Reeves Beach on the west Gippsland coast, north to Giffard where it will connect to Vic Grid. The study area spans two landforms, including coastal and near-coastal areas and lowland plains.

Coastal and near-coastal areas (KP 0.0 – 0.50):

Within the coastal and near-coastal areas, the project narrowly intersects the secondary dune vegetation including degraded Coastal Dune Scrub (EVC 1), Coast Banksia Woodland (EVC 2) and Damp Sands Herb-rich Woodland (EVC 3). Occurrences of these vegetation types occur along the fringe of the McLoughlins Beach–Seaspray Coastal Reserve and Reeves Beach Road. The back-beach area behind the coastal dunes includes ephemeral drainage lines and mud flats that support Estuarine Wetland (EVC 10), which is in a degraded state due to historical agricultural land use.

Lowland plains (KP 0.50 – 29.80)

Through the lowland plains, the project traverses land predominantly used for agriculture and commercial forestry interspersed by remnant modified EVCs, scattered trees and moderate to high-quality native vegetation within roadside reserves and flora and fauna reserves. Within agricultural land, modified remnants of Plains Grassy Forest (EVC 151), Riparian Scrub (EVC 191), Swamp Scrub (EVC 53), Lowland Forest (EVC 16), and Heathy Woodland (EVC 48) are present, with the latter two EVCs forming a mosaic across much of the area near Giffard. These modified EVCs typically contain canopy trees with only scattered occurrences of understorey life forms or small, degraded patches of understorey vegetation only. Roadside reserves including Stringy Bark Lane (KP 7.70) and flora and fauna reserves including Woodside H28 Bushland Reserve (KP 10.65-12.80) represent the highest quality examples of native vegetation including Plains Grassy Forest EVC, Heathy Woodland (EVC 48).

Land use

Land use across the study area largely falls into one of three categories – primary industry (agriculture), commercial forestry, and areas set aside for biodiversity conservation (state forests and conservation reserves, respectively). Commercial forestry across the region includes Radiata Pine *Pinus radiata* and Blue Gum *Eucalyptus globulus* ssp. *globulus* plantations.

Vegetation

Remnant native vegetation within the study area ranges from low to high condition (Appendix 3).

High-quality and extensive areas of remnant forest and woodland vegetation communities are represented in Woodside H28 Bushland Reserve. These areas support a continuous cover of native vegetation and lifeforms characteristic of the EVCs documented in Table 7-1. In addition, they also contain a number of large trees, which are likely to provide important habitat for fauna.

Outside these areas, moderate-to-high-quality remnant woodland and forest communities are also present in smaller reserves, private land, linear roadside verges and streamside reserves. These smaller areas generally contain at least two vegetation strata and large trees. Remnant vegetation within roadside

reserves and private land generally contain a high cover of introduced species as well as WoNS and CaLP-Act listed weeds. Whilst they support a high cover of weeds, many patches still contain at least two vegetation strata and large trees; however, a small number of patches contain the canopy and large tree component of the EVC only.

7.2. Native vegetation

7.2.1. Ecological Vegetation Classes (EVCs)

Patches of native vegetation representing 10 Ecological Vegetation Classes (EVCs) plus DEECA Mapped Wetlands (represented as Wetland Formation EVC 74 in NVR Map) were recorded across the study area. Those EVCs were:

- EVC 2 - Coast Banksia Woodland
- EVC 3 - Damp Sands Herb-rich Woodland
- EVC 10 - Estuarine Wetland
- EVC 16 - Lowland Forest
- EVC 48 - Heathy Woodland
- EVC 53 - Swamp Scrub
- EVC 151 - Plains Grassy Forest
- EVC 160 - Coastal Dune Scrub
- EVC 191 - Riparian Scrub
- EVC 698 - Lowland Forest/Heathy Woodland Mosaic.

The EVCs recorded within the study area are described below, along with their location (in KP), condition, a representative photo, and the number of habitat zones they occur in. EVC 698 Lowland Forest/Heathy Woodland Mosaic is not described below as occurrence of this EVC is based on DEECA modelled vegetation in areas that were inaccessible. An overview figure of existing native vegetation patches along the proposed alignment is shown in Figure 7-2, a more detailed, high resolution version of this figure can be found in Appendix 9.

The results of VQA assessments undertaken for each patch are provided in Appendix 3.

Ecological Vegetation Class descriptions

Table 7-1 Description of EVCs, including location in the study area

EVC Name	Coast Banksia Woodland	
EVC Number	2	
Bioregional Conservation Status	Vulnerable	
EVC Description	Restricted to near coastal localities on secondary or tertiary dunes behind Coastal Dune Scrub. Usually dominated by a woodland overstorey of Coast Banksia <i>integrifolia</i> to 15 m tall over a medium shrub layer. The understorey consists of a number of herbs and sedges, including scramblers.	
General site description and condition	All Coast Banksia Woodland recorded within the study area was located in the backdunes of McLoughlins Beach – Seaspray Coastal Reserve. The community was of moderate condition, characterised by a moderate diversity of understorey species including Coastal Tea Tree <i>Leptospermum laevigatum</i> and Seaberry Saltbush <i>Chenopodium candolleanum</i> , and lacking large trees. Woody species present, included Coast Everlasting <i>Ozothamnus turbinatus</i> , and Coastal Tea Tree. Some herbs were present in the understorey including <i>Carpobrotus rossii</i> , and Bower Spinach <i>Tetragonia implexicoma</i> , and there were relatively high covers of Austral Bracken <i>Pteridium esculentum</i> and Blady Grass <i>Imperata cylindrica</i> . Limited recruitment, relatively low weed cover, and no logs were observed.	
Habitat Zones	1 (HZ1)	
KP where EVC was recorded	0.0 – 0.01	
Conservation area	McLoughlins Beach–Seaspray Coastal Reserve	

VC Name	Damp Sands Herb-rich Woodland	
EVC Number	3	
Bioregional Conservation Status	Vulnerable	
EVC Description	A low, grassy, or bracken-dominated eucalypt forest or open woodland to 15 m tall with a large shrub layer and ground layer rich in herbs, grasses, and orchids. Occurs mainly on flat or undulating areas on moderately fertile, relatively well-drained, deep sandy or loamy topsoils over heavier subsoils (duplex soils).	
General site description and condition	Damp Sands Herb-rich Woodland was typically characterised by a canopy of Rough-barked Manna Gum <i>Eucalyptus viminalis</i> subsp. <i>pyroriana</i> and Narrow-leaved Peppermint <i>E. radiata</i> and included large trees. Moderate-quality patches were characterised by moderate mid-to-understorey diversity, including Forest Burgan <i>Kunzea</i> sp. (Upright form), Spiny Bursaria <i>Bursaria spinosa</i> subsp. <i>spinosa</i> and Weeping Grass <i>Microlaena stipoides</i> var. <i>stipoides</i> , with some evidence of recruitment. Most patches contained large Rough-barked Manna Gum trees; and canopy cover, when present, was generally healthy. Poor quality areas were very degraded, lacking large trees and understorey diversity, with a moderate to high proportion of weed cover.	
Habitat zones	4, (HZ 8, 11, 12, 13)	
KPs where EVC was recorded	0.39 - 0.42, 3.38 - 3.41, 3.38 – 3.39, 3.35 – 3.38	

EVC Name	Estuarine Wetland	
EVC Number	10	
Bioregional Conservation Status	Least concern	
EVC Description	Grows on anaerobic peat-rich muds on the edges of estuarine waterbodies such as creeks, rivers and lagoons with intermediate salinity conditions. Vegetation is determined by fluctuating salinity, which varies in time from occasionally fresh to brackish or occasionally saline according to river flood and marine tide events. Dominated by graminoids and halophytic herbs and often fringed by a tall scrub layer of Swamp Paperbark at the landward edge.	
General site description and condition	Moderate-quality Estuarine Wetland was characterised by a low-diversity understorey comprised of occurrences Grey Tussock-grass <i>Poa sieberiana</i> , Beaded Glasswort <i>Sarcocornia quinqueflora</i> , Pale Rush <i>Juncus pallidus</i> and Australian Salt-grass <i>Distichlis distichophylla</i> . Weed cover was relatively low.	
Habitat zone	1 (HZ5)	
KP where EVC was recorded	0.22 – 0.36	

EVC Name	Lowland Forest	
EVC Number	16	
Bioregional Conservation Status	Vulnerable	
EVC Description	Eucalypt forest to 20 m tall on relatively fertile, moderately well-drained soils in areas of relatively high rainfall. Characterised by the diversity of life forms and species in the understorey including a range of shrubs, grasses and herbs.	
General site description and condition	Lowland Forest typically consisted of an overstorey consisted of a mix of Eucalyptus species such as Silver-leaf Stringybark <i>Eucalyptus cephalocarpa</i> , Yertchuk <i>E. consideniana</i> , Manna Gum <i>E. viminalis</i> , and Silver Swamp Stringybark <i>E. conspicua</i> . The understorey typically included shrub species such as Prickly Broom-heath <i>Monotoca scoparia</i> , Forest Burgan, Acacias <i>Acacia</i> spp., and Common Correa <i>Correa reflexa</i> ; herbaceous species such as Red Beaks <i>Pyrorchis nigricans</i> , Kidney Weed <i>Dichondra repens</i> , and Trailing Speedwell <i>Veronica plebeia</i> ; and graminoids such as Wallaby Grasses <i>Rytidosperma</i> spp., Mat-rushes <i>Lomandra</i> spp., and Thatch Saw-sedge <i>Gahnia radula</i> .	
Habitat zones	15, (HZ 300, 302, 303, 323324, 325, 326, 327, 333, 334, 336, 359, 360, 361)	
KP where EVC was recorded	26.37 – 27.30, 26.50 – 26.57, 26.55 – 26.57, 26.99 – 27.30, 26.40 – 26.465, 26.18 – 26.38, 26.09 – 26.16, 25.96 – 26.057, 25.92 – 25.95, 26.99 – 27.03, 25.645 – 25.90, 25.588 – 25.626, 26.99 – 27.06, 27.74 – 27.82, 28.49 – 28.52	

EVC Name	Heathy Woodland	
EVC Number	48	
Bioregional Conservation Status	Least Concern	
EVC Description	Spans a variety of geologies but is generally associated with nutrient-poor soils including deep uniform sands (aeolian or outwash) and Tertiary sand/clay which has been altered to form quartzite gravel. Eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of bracken. Geophytes and annuals can be quite common, but the ground cover is normally fairly sparse.	
General site description and condition	Heathy Woodland was typically characterised by a canopy dominated by Narrow-leaf Peppermint <i>Eucalyptus radiata</i> subsp. <i>radiata</i>, interspersed with other canopy species such as Yertchuk <i>Eucalyptus consideniana</i>, Saw Banksia <i>Banksia serrata</i> and Silver-leaf Stringybark <i>E. cephalocarpa</i>. Moderate-quality areas were absent of large trees, with lower recruitment of woody species. Low-quality areas were represented by managed strips of the EVC with no overstorey or logs and low understorey diversity. Understorey throughout the study area included relatively high cover of shrubs such as Prickly Broom-heath <i>Monotoca scoparia</i>, Common Heath <i>Epacris impressa</i>, and Common Beard-heath <i>Leucopogon virgatus</i>; lower covers of herbs such as Red Beaks <i>Pyrorchis nigricans</i>, Variable Stinkweed <i>Opercularia varia</i>, and Sundews <i>Drosera</i> spp.; and graminoids such as Grass Triggerplant <i>Stylidium graminifolium</i> s.l. and Wallaby-grasses <i>Rytidosperma</i> spp. Austral Bracken <i>Pteridium esculentum</i> was also generally present throughout the Heathy Woodland.	
Habitat zones	7 (HZ 304, 308, 310, 311, 312, 321, 335)	
KPs where EVC was recorded	25.34 – 25.36, 25.24 – 25.36, 24.64 – 24.82, 24.65 – 24.66, 24.67 – 24.68, 24.31 – 24.34, 25.60 – 25.71	

EVC Name	Swamp Scrub	
EVC Number	53	
Bioregional Conservation Status	Endangered	
EVC Description	Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark <i>Melaleuca ericifolia</i> or sometimes Woolly Tea-tree <i>Leptospermum lanigerum</i> which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer.	
General site description and condition	Swamp Scrub was characterised by a moderate diversity of woody and understorey species and typically included Swamp Paperbark.	
Habitat zones	13, (HZ 10, 14, 15, 16, 17, 18, 19, 43, 44, 46, 295, 347, 348)	
KP where EVC was recorded	2.66 – 2.73, 5.36 – 5.42, 5.44 – 5.52, 5.37 – 5.44, 5.44 – 5.51, 5.51 – 5.57, 5.71 – 5.83, 15.62 – 15.63, 15.63 – 15.64, 16.09 – 16.13, 20.33 – 20.34, 5.61 – 5.68, 5.35 – 5.57	

EVC Name	Plains Grassy Forest	
EVC Number	151	
Bioregional Conservation Status	Vulnerable	
EVC Description	Open forest to 20 m tall often above a heathy shrub layer and a diverse grassy, sedgy and herbaceous ground layer. Occurs on lowland plains and old river terraces made up of gravelly sandy clays.	
General site description and condition	Plains Grassy Forest of varying quality was widespread across the study area and was characterised by a canopy of mixed Eucalypt species such as Yellow Stringybark <i>Eucalyptus muelleriana</i>, Coast Grey-box <i>Eucalyptus bosistoana</i>, But But <i>E. bridgesiana</i>, Yellow Box <i>E. melliodora</i>, and Red Box <i>E. polyanthemos</i>, among others. Examples of the community were characterised by paddock trees with a degraded understorey through to intact patches of native vegetation with a high density of large trees. High-quality Plains Grassy Forest was generally characterised by greater densities/lengths of large trees and logs, while poorer quality examples of the EVC generally lacked these features. Other factors such as weed cover, organic litter cover, recruitment, etc, varied widely across the study area. The understorey was generally diverse where patches remained relatively intact and contained shrub species such as Nodding Saltbush <i>Einadia nutans</i>, Forest Burgan, Acacias <i>Acacia</i> spp., and Common Correa <i>Correa reflexa</i>; herbaceous species such as Common Woodruff <i>Asperula conferta</i>, Bidgee-widgee <i>acaena novae-zelandiae</i>, and Onion-orchid <i>Microtis</i> sp.; and graminoids such as Wallaby Grasses <i>Rytidosperma</i> spp., Weeping Grass <i>Microlaena stipoides</i> subsp. <i>stipoides</i>, and Spear Grasses <i>Austrostipa</i> spp. Austral Bracken <i>Pteridium esculentum</i> was also common throughout.	
Habitat zones	40 (HZ 20, 21, 24, 25, 26, 27, 28, 29, 30, 31, 33, 35, 37, 38, 39, 40, 41, 42, 45, 47, 49, 50, 51, 52, 53, 296, 317, 318, 319, 320, 337, 338, 339, 341, 342, 343, 345, 349, 350, 358)	
KPs where EVC was recorded	5.85 – 5.88, 6.01 – 6.13, 6.99 – 7.02, 7.44 – 7.46, 7.50 – 7.77, 7.70 – 7.71, 7.67 – 7.72, 8.97 – 9.02, 9.17 – 9.22, 9.42 – 9.44, 11.48 – 11.51, 12.23 – 12.28, 12.25 – 12.37, 12.43 – 12.60, 12.78 – 12.81, 12.72 – 12.80, 14.15 – 14.25, 14.51 – 14.59, 15.77 – 15.95, 17.38 – 18.22, 20.73 – 21.18, 21.43 – 21.18, 23.92 – 23.95, 23.95 – 23.96, 23.95 – 23.97, 20.08 – 20.10, 21.73 – 21.74, 21.85 – 21.89, 22.06 – 22.15, 22.23 –	
Conservation area	Woodside H28 Bushland Reserve	

EVC Name	Coastal Dune Scrub	
EVC Number	160	
Bioregional Conservation Status	Depleted	
EVC Description	Closed scrub to 5 m tall with occasional emergents occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of salt spray and continuous disturbance from onshore winds.	
General site description and condition	High-quality Coastal Dune Scrub was located within the study area in the backdunes adjacent McLoughlins Beach–Seaspray Coastal Reserve. It was characterised by a high diversity of native herb species, including Bower spinach <i>Tetragonia implexicoma</i> , Bidgee-widgee <i>Acaena novae-zelandiae</i> and Small-leaved Clematis <i>microphylla</i> , and graminoid species such as Blady Grass <i>Imperata cylindrica</i> and Black-anther Flax-lily <i>Dianella revoluta</i> s.l. For patches of more moderate quality there was generally lower native herb diversity and cover of recruitment area.	
Habitat Zones	5 (HZ 2, 3, 4, 6, 7)	
KPs where EVC was recorded	0.008 – 0.011, 0.008 – 0.021, 0.018 – 0.038, 0.338 – 0.351, 0.357 – 0.402	
Conservation area	McLoughlins Beach - Seaspray Coastal Reserve	

EVC Name	Riparian Scrub	
EVC Number	191	
Bioregional Conservation Status	Vulnerable	
EVC Description	A dense shrubland to 6 m tall with occasional eucalypt emergents growing on waterlogged substrates often with a peaty surface horizon. Emergent eucalypts may be occasionally present. The understorey is often species-poor and consists typically of sedges tolerant of seasonal waterlogging. Occurs along creeks and minor stream tributaries of the lowland plains.	
General site description and condition	Patches of Riparian Scrub were generally dominated by Forest Burgan, Acacias <i>Acacia</i> spp., and Paperbarks <i>Melaleuca</i> spp. In some areas, emergent eucalypts were also present including Yellow Box <i>Eucalyptus melliodora</i> . Weed cover varied; however, understorey was relatively diverse and included species such as Common Heath <i>Epacris impressa</i> , Pennyworts <i>Hydrocotyle</i> spp., Annual Fireweed <i>Senecio glomeratus</i> , and Weeping Grass <i>Microlaena stipoides</i> subsp. <i>stipoides</i> .	
Habitat zones	3 (HZ 34, 36, 369)	
KPs where EVC was recorded	12.18 – 12.28, 12.28 – 12.49, 24.23 – 24.45	
Conservation area	Woodside H28 Bushland Reserve	

EVCs impacted by recent bushfires

Of the EVCs recorded in the study area, Coast Banksia Woodland, Lowland Forest and Riparian Scrub (as a Riparian Scrub/Swampy Riparian Forest Mosaic) were impacted by recent (2019/2020) bushfires in south-eastern Australia that significantly altered the extent and quality of native vegetation and habitat for a range of listed species. These changes are mentioned here as context for the impact assessment.

DELWP's (2020) impact analysis of the 2019/2020 bushfires identified a total fire extent in Victoria of approximately 1,511,000 ha, with the majority occurring in eastern Victoria. This has resulted in short-term changes to the relative importance of the remaining vegetation within Victoria. While the resolution of the maps makes it difficult to determine exact locations, they indicate that the study area contains habitat ranging from 'no change' in value to areas with a potentially 'large increase in value'. Fauna habitat tends to contain a greater proportion of areas with a larger increase in value, while flora habitat

ranges from *no change* to *minor* or *moderate* increases in value. DELWP (2020), however, notes that '*an increase in the value of habitat in a particular location does not necessarily indicate the area is now high value*' and that consideration should be given to the species impacted and its range extent.

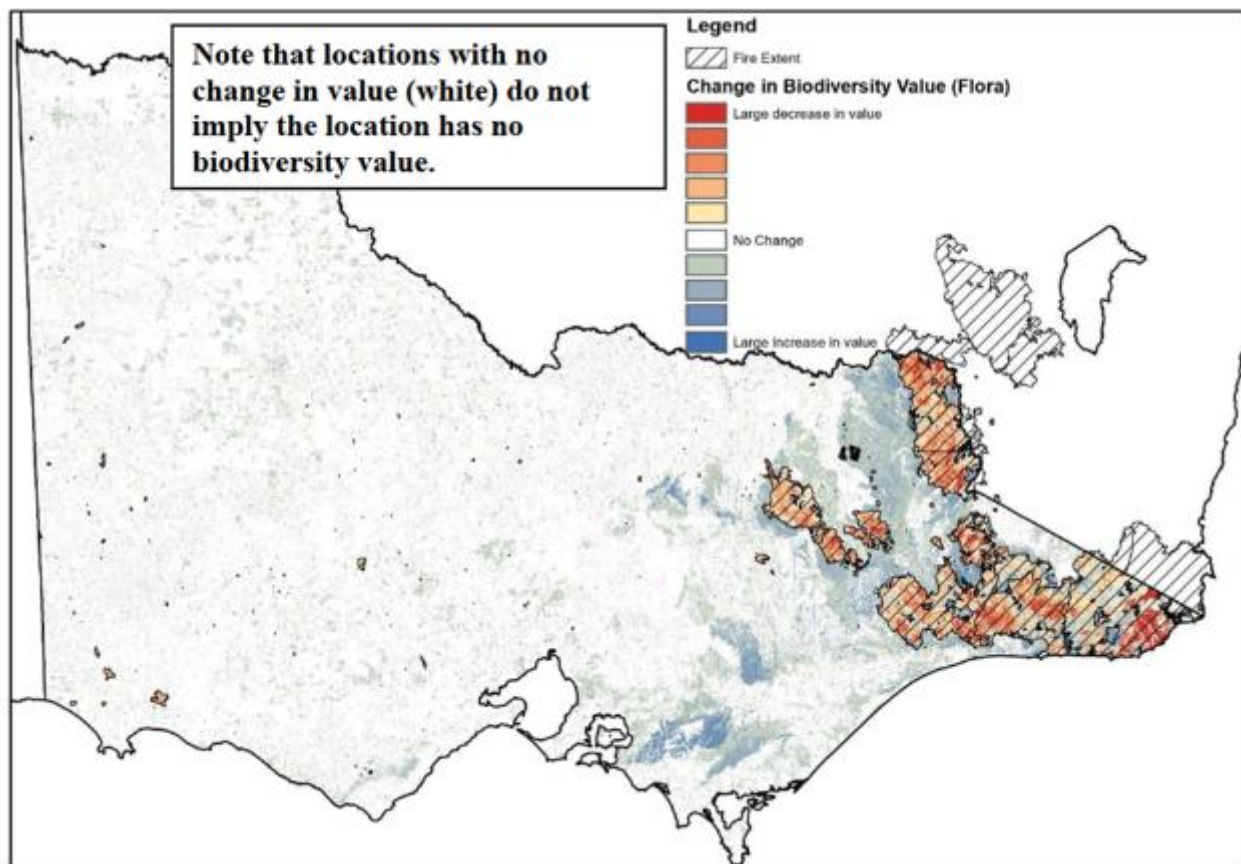


Figure 7-1 Indicative change in biodiversity values for rare and threatened flora species following the 2019/2020 bushfires (Source: Figure 5 in *Victoria's bushfire emergency: biodiversity response and recovery* (DELWP, 2020))

Table 7-2 Summary of the bushfire-impacted EVCs relevant to the project area (Source: DELWP 2020)

EVC	Bioregional Conservation Status	Total extent of EVC in Victoria (ha)	Area within current fire extent (ha)	Total remaining in Victoria (ha)	Percentage total EVC area within current fire extent
Coast Banksia Woodland (2)	Vulnerable	6,473	1,554	4,919	24%
Lowland Forest (16)	Vulnerable	541,094	216,438	324,656	40%
Riparian Scrub (191) *	Vulnerable	29,582	12,720	16,682	43%

*For Riparian Scrub, the extents for Riparian Scrub/Swampy Riparian Forest Mosaic (DELWP 2020) are used as an indication.

7.2.2. Native Trees

Native canopy trees were recorded within the study area as both scattered trees and large trees in patches. Tree species within the study area are:

- Apple-top Box *Eucalyptus angophoroides*
- Coast Grey-box *Eucalyptus bosistoana* (FFG Act listed)
- But But *Eucalyptus bridgesiana* s.s.
- Yertchuk *Eucalyptus consideniana*
- Gippsland Peppermint *Eucalyptus croajingolensis*
- Red Stringybark *Eucalyptus macrorhyncha*
- Yellow Box *Eucalyptus melliodora*
- Yellow Stringybark *Eucalyptus muelleriana*
- Swamp Gum *Eucalyptus ovata*
- Manna Gum *Eucalyptus viminalis*
- Gippsland Manna Gum *Eucalyptus viminalis* subsp. *pryoriana*
- Coast Manna Gum *Eucalyptus viminalis* subsp. *viminalis*
- *Eucalyptus* sp.

The occurrence of dead trees (stags) was also recorded. Stags provide habitat resources for a range of fauna. No specific searches for hollow-bearing trees were undertaken so it has been assumed that any large tree supports hollows. An overview figure of existing large trees along the proposed alignment is shown in Figure 7-3, a more detailed, high resolution version of this figure can be found in Appendix 9.

7.2.3. DEECA Mapped Wetlands

The Current Wetlands Map from NVIM identified one DEECA Mapped Wetland within the study area: DEECA mapped wetland ID 83488 associated with Habitat Zone 9 (HZ9).

7.2.4. Endangered EVCs

EVCs with an Endangered BCS are recognised as threatened within their respective bioregion and represent important patches of vegetation within a landscape context. Two endangered EVCs were recorded, Swamp Scrub EVC 53 and Wetland Formation EVC 74 (which relates to the DEECA Mapped Wetland area).

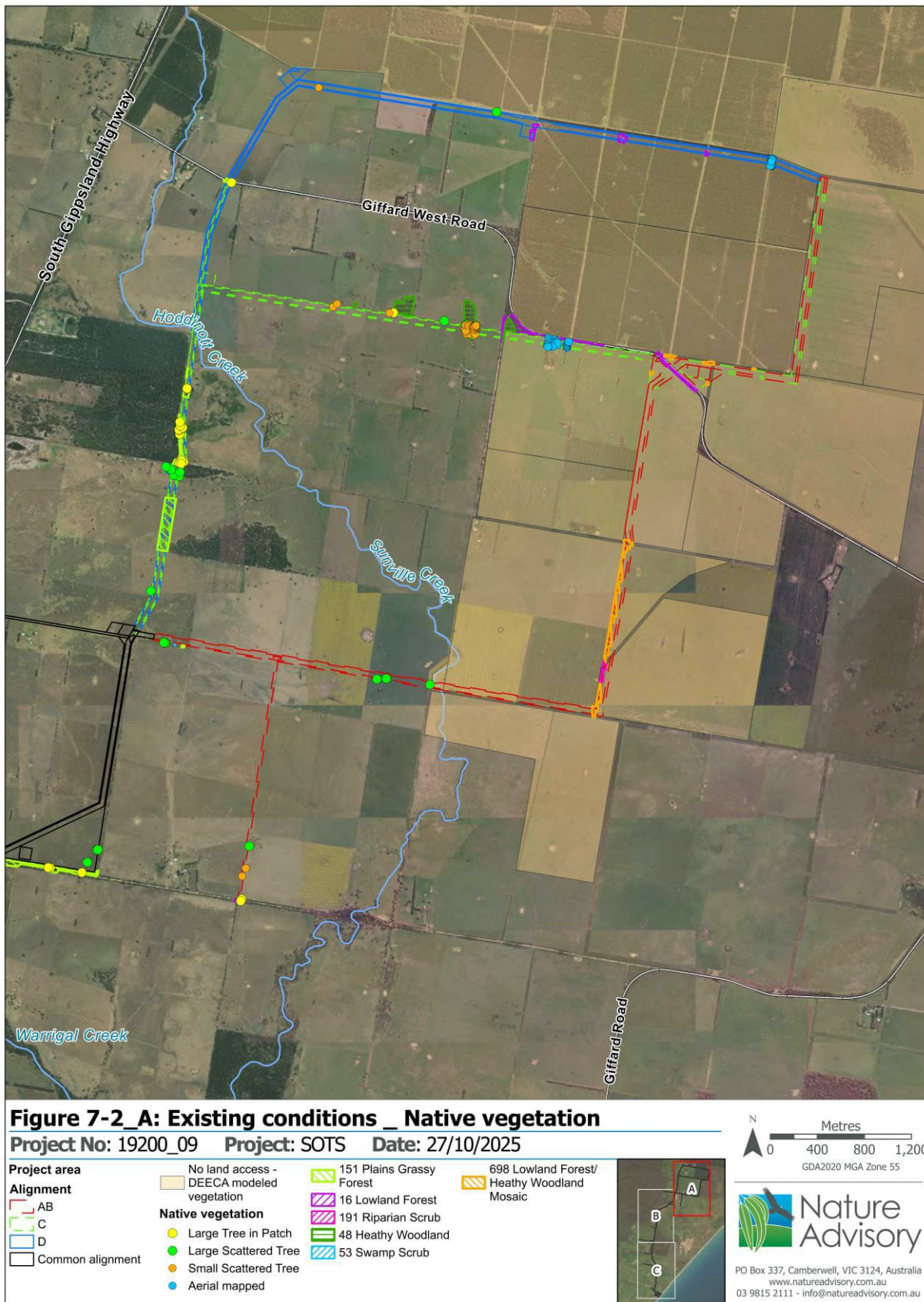


Figure 7-2_A Existing conditions - Native vegetation

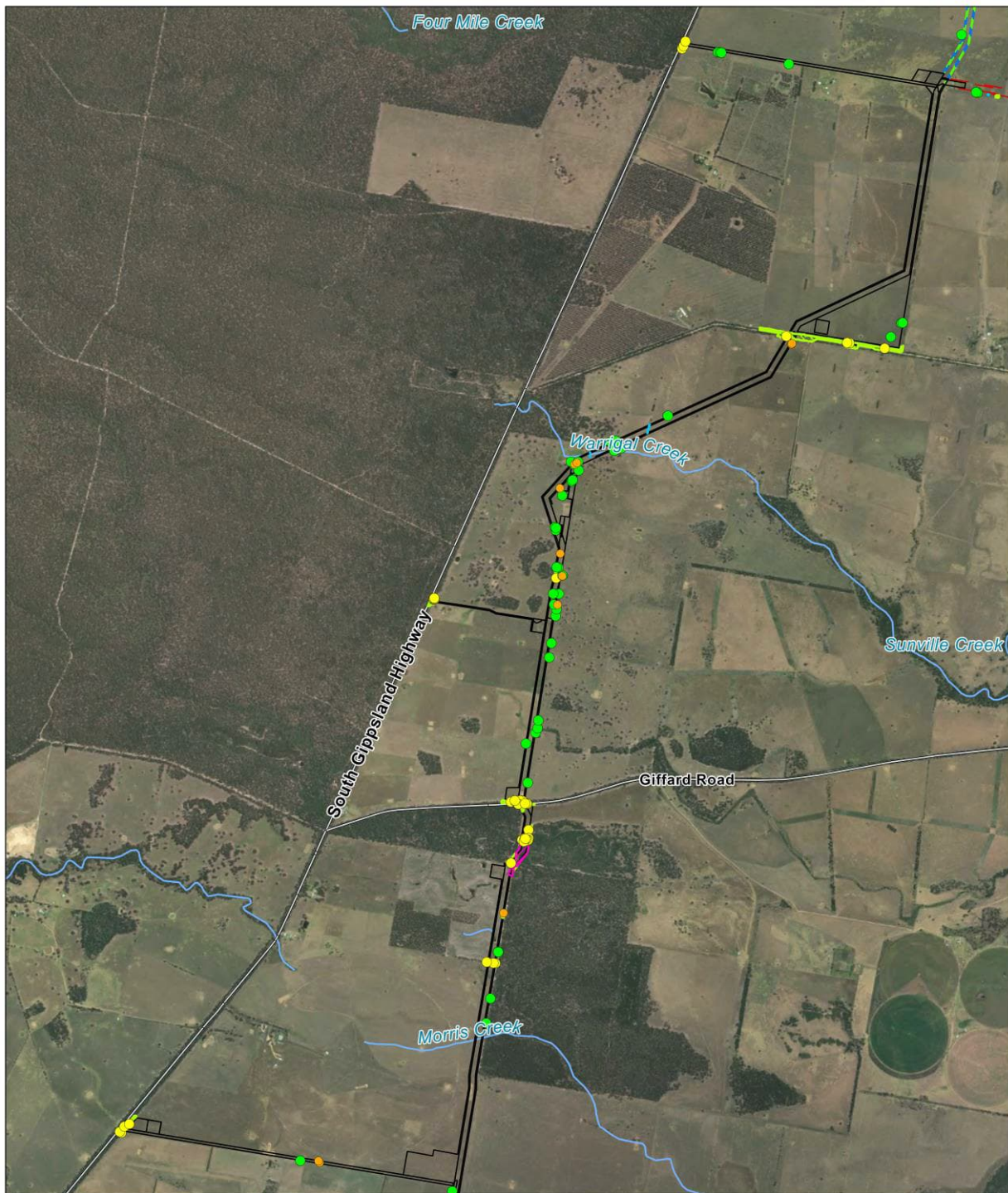
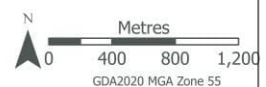


Figure 7-2_B: Existing conditions _ Native vegetation

Project No: 19200_09 Project: SOTS Date: 27/10/2025

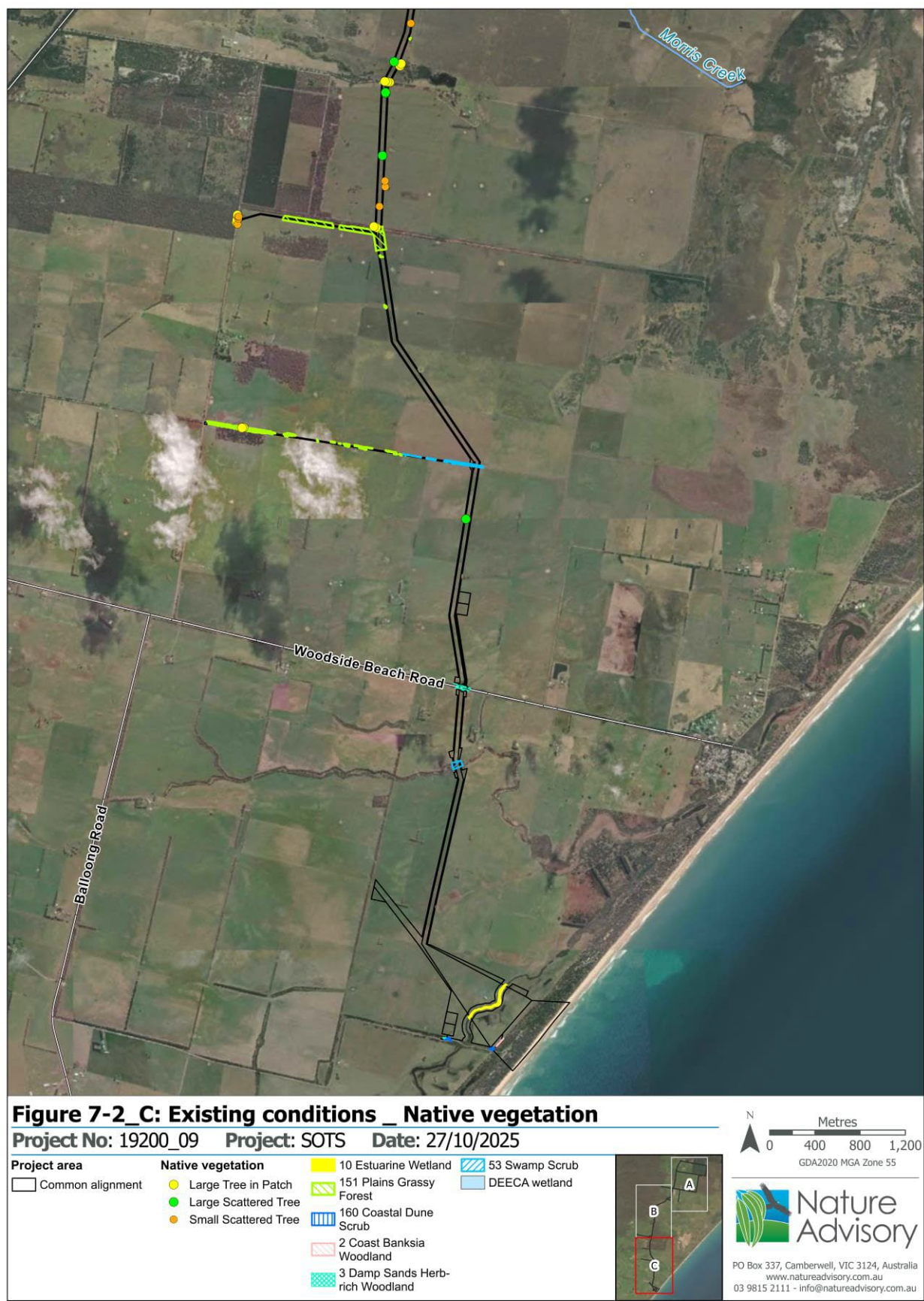
Project area	Native vegetation	151 Plains Grassy Forest
Alignment	- Large Tree in Patch - Large Scattered Tree - Small Scattered Tree	16 Lowland Forest 191 Riparian Scrub 53 Swamp Scrub
- AB - C - D - Common alignment		



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19200_09 Figure 7-2: Existing conditions _ Native vegetation (3Page) - Created by [redacted] X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-2_B Existing conditions - Native vegetation



19200_09 Figure 7-2: Existing conditions _ Native vegetation (3Page) - Created by: X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-2_C Existing conditions - Native vegetation

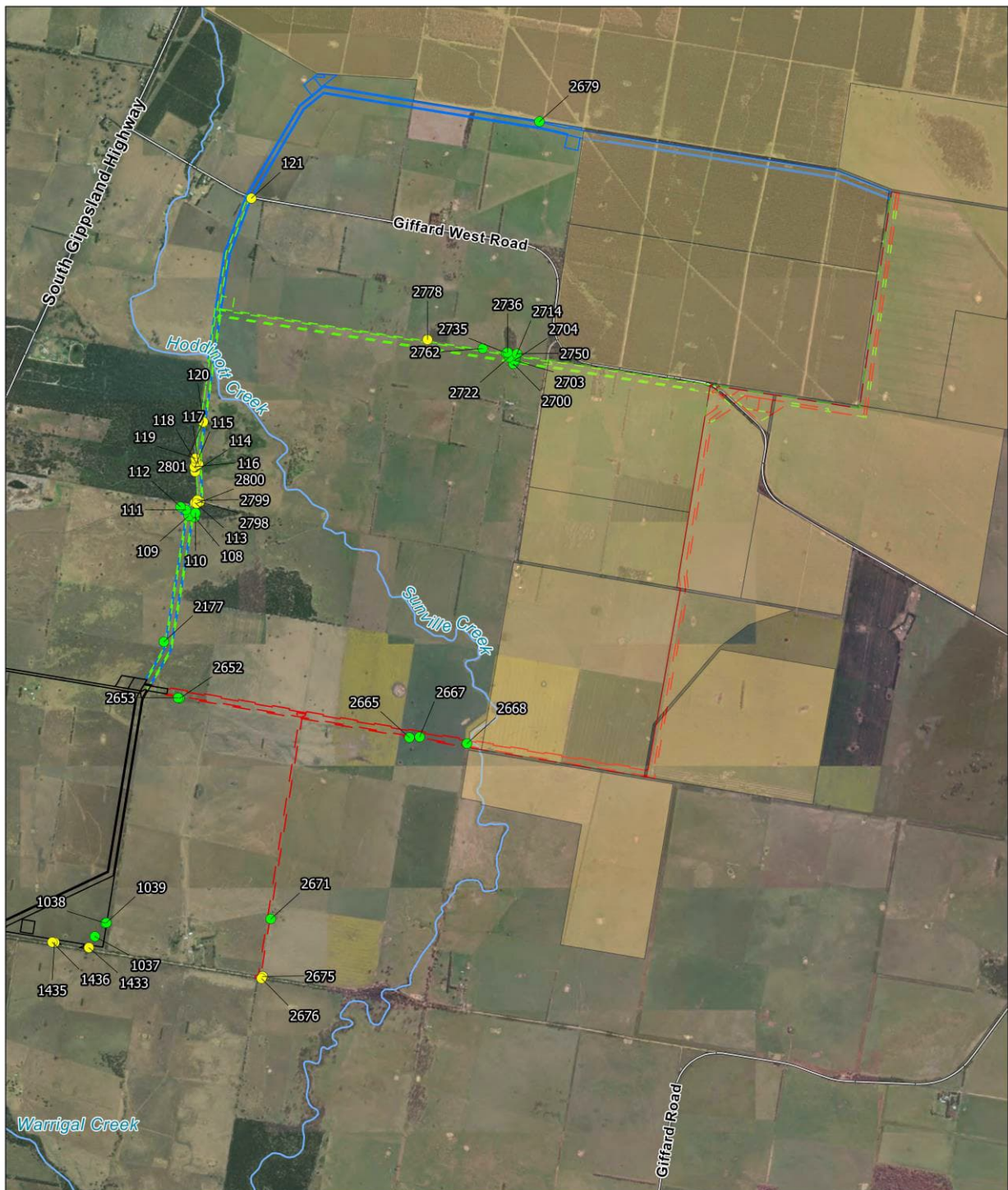


Figure 7-3_A: Existing conditions _ Large trees (Hollow)

Project No: 19200_09 Project: SOTS Date: 27/10/2025

Project area

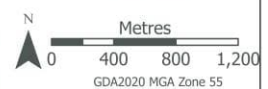
Alignment

- AB
- C
- D
- Common alignment

No land access - DEECA modeled vegetation

Large tree (hollow)

- Large Tree in Patch
- Large Scattered Tree



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19200_09 Figure 7-3: Existing conditions _ Large trees (Hollow) (3Page) - Created by: [redacted] X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-3_A Existing conditions - Large trees (hollow)

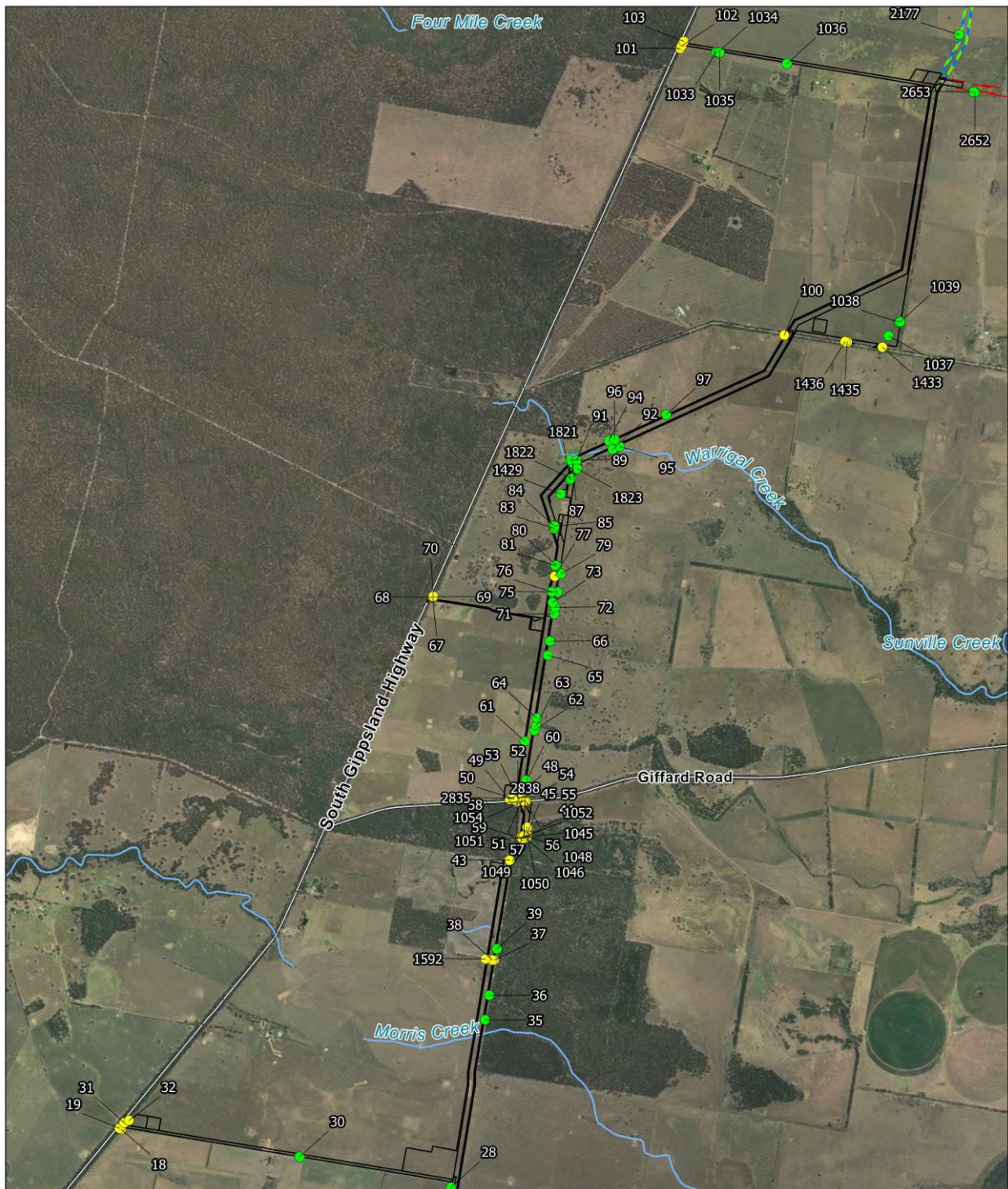


Figure 7-3_B: Existing conditions _ Large trees (Hollow)

Project No: 19200_09 Project: SOTS Date: 27/10/2025

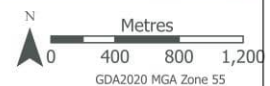
Project area

Alignment

- AB
- C
- D
- Common alignment

Large tree (hollow)

- Large Tree in Patch
- Large Scattered Tree



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19200_09 Figure 7-3: Existing conditions _ Large trees (Hollow) (3Page) - Created by: [redacted] - X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-3_B Existing conditions - Large trees (hollow)



Figure 7-3_C: Existing conditions _ Large trees (Hollow)

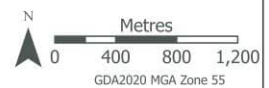
Project No: 19200_09 **Project:** SOTS **Date:** 27/10/2025

Project area

Common alignment

Large tree (hollow)

- Large Tree in Patch
- Large Scattered Tree



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19200_09 Figure 7-3: Existing conditions _ Large trees (Hollow) (3Page) - Created by [redacted] - X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-3_C Existing conditions - Large trees (hollow)

7.3. Threatened ecological communities

7.3.1. EPBC Act

One EPBC Act-listed threatened ecological community (TEC), Subtropical and Temperate Coastal Saltmarsh (hereafter Coastal Saltmarsh, listed as Vulnerable under the EPBC Act) was recorded within the study area during detailed assessments

Subtropical and Temperate Coastal Saltmarsh

Coastal Saltmarsh is listed as Vulnerable under the EPBC Act. The community consists mainly of salt-tolerant vegetation (halophytes) including grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate, and vegetation is generally of < 0.5 m high (with the exception of some reeds and sedges). In Victoria, the lower saltmarsh zone is often dominated by succulent shrubs of the genera *Tecticornia* and *Sarcocornia*, while herbs and grasses are more commonly found in the landward, upper-intertidal zones. Key diagnostics characteristics for the ecological community published under the EPBC Act conservation advice (DSEWPac 2013) were referred to in assessing the condition of this feature.

One patch of Estuarine Wetland EVC (EVC 10) was considered against the Coastal Saltmarsh key diagnostic characteristics; an assessment of this is provided below in Table 7-3.

Table 7-3 Key diagnostic criteria for Subtropical and Temperate Coastal Saltmarsh

Key diagnostic characteristics	Criteria met?	Notes
Occurs south of 23° 37' S latitude - from the central Mackay coast on the east coast of Australia, southerly around to Shark Bay on the west coast of Australia (26° S latitude), and including the Tasmanian coast and islands within the above range	Yes	The habitat zone is within this area
Occurs on the coastal margin, along estuaries and coastal embayments and on low- wave- energy coasts	Yes	The habitat zone is situated along an estuaries system approximately 500 m from the shoreline.
Occurs on places with at least some tidal connection, including rarely inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences, but not areas receiving only aerosol spray	Likely	There may to be some tidal connection through the estuary system connected to the ocean at the mouth of the Bruthen Creek estuary approximately 5km to the south-west of the study area, mostly likely during higher storm tides. Groundwater investigations of the shore crossing area detected a minor 10 cm sinusoidal tidal influence on the water level in a monitoring well (Technical report H: Groundwater).
Occurs on sandy or muddy substrate and may include coastal clay pans (and the like)	Yes	Occurs on sandy and muddy substrate

Key diagnostic characteristics	Criteria met?	Notes
Consists of dense to patchy areas of characteristic coastal saltmarsh plant species (i.e. salt tolerant herbs, succulent shrubs, or grasses, that may also include bare sediment as part of the mosaic) and	Yes	Vegetation is typical of coastal saltmarsh TEC, dominated by succulent shrubs of the genera <i>Tecticornia</i> and <i>Sarcocornia</i> .
Proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas is not greater than 50%, nor is proportional ground cover by seagrass greater than 50%.	Yes	The habitat zone contains no tree canopy cover, therefore, meets the key diagnostic criteria as tree canopy cover is not greater than 50%.

While the patch (HZ5) does form the community as it meets the key diagnostic criteria, the patch is considered a degraded form given its limited floristic diversity, and is immediately adjacent land has been “...permanently replaced with crops/pasture/plantations...” (Page 13, DSEWPac 2013) As such, HZ5 does not meet the condition thresholds to retain sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under the EPBC Act: “...*degraded or modified patches may not be protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values. Therefore, these patches should not be excluded from recovery and other management actions (also see ‘Surrounding environment and landscape context’)*” (Page 13, DSEWPac 2013). This means that the patch is not considered further as a MNES.

7.3.2. FFG Act

No threshold criteria are available to determine the presence of an FFG Act-listed community. Native vegetation recorded during VQA surveys by DEECA accredited assessors was compared against the community descriptions outlined in the *Flora and Fauna Guarantee Act 1988 – Threatened List: Characteristics of Threatened Communities* (DEECA n.d.) to determine whether the location and vegetation/flora characteristics present are analogous with a FFG Act listed community.

Plains Grassland (South Gippsland)

The Plains Grassland (South Gippsland) community is generally described as a structurally closed tussock grassland to open woodland. The original vegetation structure likely consisted of an open woodland, incorporating regions of tussock grassland with occasionally emergent trees and interspersed with shrubby zones linked to drainage lines (DELWP n.d.). Grass swards are dominated by Kangaroo Grass and Mat Grass *Hemarthria uncinata* on drier sites and Common Tussock Grass *Poa labillardieri* on wetter sites. Where trees occur the include a sparse cover of species that include Manna Gum, Blackwood, Black Wattle and shrubs include Swamp Paperbark and Prickly Tree. The community occurs on the Gippsland plains between Yarram region (between Seaspray and Welshpool) to Western Port Bay (DELWP n.d.).

Small areas of swampy-grassland type vegetation are present where the project area intersects with native vegetation patches on Lyons Road between KP 5.3–5.5. Significant regrowth of woody vegetation, primarily Swamp Paperbark, is a dominant feature of the native vegetation on Lyons Road. Whilst there are patches of Kangaroo Grass and Coastal Tussock Grass *Poa poiformis* amongst stands of thick Swamp Paperbark in the alignment intersection area, these grass patches are small (< 0.04 ha) and likely to represent small areas of grassland-type vegetation within a swamp scrub mosaic. As such, the vegetation is considered more closely aligned with Swamp Scrub and not Plains Grassland. While the area shows

affinity to the FFG Act-listed Plains Grassland (South Gippsland) community, given the condition and fragmentation of the vegetation, it is no longer afforded this classification. This means that the area is not considered to represent an area of FFG Act listed threatened ecological community. The area was assessed on two separate occasions by different VQA accredited assessors and both assessors reached the same conclusion.



Plate 1. View looking east along Lyons Road showing high cover of Swamp Paperbark to the left, Bulbous canary grass mid-frame and some Coastal Tussock Grass in the bottom right of frame.



Plate 2. View looking west along Lyons Road showing high cover of Swamp paperbark and Bulbous canary grass. Coastal Tussock Grass is in view to the right of frame.



Plate 3. View Looking west along Lyons Road showing high cover of Bulbous canary grass and woody vegetation in the background.



Plate 4. View of native vegetation along Lyons Road showing dominant Coastal Tussock Grass and Swamp paperbark

7.4. Conservation Reserves

The study area intersects two conservation reserves: McLoughlins Beach-Seaspray Coastal Reserve and Woodside H28 Bushland Reserve. Table 7-4 summarises the EVCs present in each reserve within the study area.

Table 7-4 Conservation reserves within the study area

Conservation area	EVC
McLoughlins Beach–Seaspray Coastal Reserve	Coast Banksia Woodland (2)
Woodside H28 Bushland Reserve	Riparian Scrub (191)
	Plains Grassy Forest (151)

7.5. Environmental overlays

Planning overlays form part of municipal planning schemes and are applied over areas of land to guide and control development. Overlays may be applied to protect areas from adverse impacts or to allow easy identification of constraints in developments on that area. For the purpose of this report, consideration of planning overlays is limited to those of particular relevance to flora and fauna values, which include:

- **Environmental Significance Overlays (ESOs):** The broad intent of an ESO is to identify areas where the development of land may be affected by environmental constraints, and to ensure that if development does happen, it is compatible with the values that are highlighted in any schedule to the identified ESO.
- **Vegetation Protection Overlays (VPOs):** A VPO is specific to the removal of vegetation that has been deemed to be significant and protects this vegetation against inappropriate development.
- **Salinity Management Overlay (SMOs):** A SMO identifies areas subject to saline ground water discharge or high ground water recharge and facilitates the stabilisation of areas affected by salinity.

A schedule to these overlays contains a statement of the significance of the environmental, vegetation or landscape value that is protected by the overlay, and the objective to be achieved. Approval is typically required to remove most vegetation within an ESO, SLO or VPO, and the application for an approval to remove vegetation must demonstrate that the applicant has considered the intent of each overlay.

The project encompasses private and public land within Wellington Shire Council. Environmental overlays relevant to the project area are:

- **ES01 (Coastal and Gippsland Lakes Environs)**

Field assessments within the project area recorded and mapped the location of all relevant ecological values that intersect the overlay ().

Table 7-5 summarises the relevant environmental overlays present within the project area, identifies the habitat zone, location and extent of vegetation, and provides a general description of representative vegetation identified.

Table 7-5 Environmental Overlays within the study area

Overlay	Environmental objective to be achieved	Permit requirement	Hab Zone	General description of native vegetation present	Photo of vegetation present
Environmental Significance Overlay 1 <i>(Coastal and Gippsland Lakes Environs)</i> Wellington Planning Scheme	To ensure that the development of land is compatible with the environmentally sensitive coastal area, including the Gippsland Lakes. To conserve and enhance the environmental quality of the coastal area. To protect and enhance the natural beauty of the coastal landscape. To protect and enhance the visual amenity and landscape of the coastal area. To minimise the risk of erosion, pollution, and destruction by fire. To minimise the impact of human activities on the ecological values of the coastal and lakes environments.	In accordance with ES01, a permit is required to: Remove, destroy or lop any vegetation, including dead vegetation	HZ1, HZ5	The area covered by ES01 is cleared farmland (Farming Zone) and does not include the coastal reserve which is Public Conservation Zone Native vegetation in the ES01 area is limited to the Estuarine Wetland that occurs along unnamed waterway UFI 42824679	 

7.6. Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are important elements in the landscape that require access to groundwater to maintain their health and vigour. They are defined in the *National Framework for assessing Groundwater Dependent Ecosystems* (Doody, Hancock and Pritchard 2019) as *natural ecosystems that require access to groundwater to meet some or all of the water requirements to sustain species and ecological processes*. GDEs are important because of their conservation, biodiversity, ecological, social and economic value (Eamus 2009).

GDEs are classified into terrestrial, aquatic, and subterranean types based on how they interact with groundwater. Terrestrial GDEs include vegetation communities that rely on groundwater accessed through their root systems, especially during dry periods. Aquatic GDEs are the ecosystems associated with surface water bodies including springs, streams, and lakes that receive groundwater discharge. Subterranean GDEs exist entirely below ground, including in aquifer pore space, and support specialised organisms adapted to life in groundwater environments. The three classes of GDEs are discussed in sections below. Although subterranean GDEs are fauna, they are discussed in this section for ease of reading.

7.6.1. Terrestrial GDEs

To identify potential terrestrial GDEs within the project area, the Australian Government online tool – the *Groundwater Dependent Ecosystems Atlas* (BOM 2021) - was queried to identify those locations where GDEs were likely to occur. This information was used as a starting point and guide for further investigations into GDEs within the project area.

Jacobs (2015) identified a number of EVCs within the Gippsland Plain bioregion and assigned a ranking of High, Medium and Low for their likely potential to rely on groundwater. Those EVCs recorded in the project area were compared against Jacobs (2015) to determine their GDE ranking (Table 7-6). Further commentary on each EVC and potential impacts to GDEs is provided in Section 10.3.5.

Table 7-6 EVCs in the project area and GDE rankings

EVC type	GDE ranking		
	High	Medium	Low
Coast Banksia Woodland (2)	X		
Damp Sands Herb-rich Woodland (3)			X
Estuarine Wetland (10)	X		
Heathy Woodland (48)		X	
Lowland Forest (16)			X
Plains Grassy Forest (151)			X
Riparian Scrub (191)	X		
Swamp Scrub (53)	X		
Coastal Dune Scrub (160)	X		
Lowland Forest/Heathy Woodland Mosaic (698)			X

7.6.1. Aquatic GDEs

There are four waterways in the study area listed as potential aquatic GDEs in the GDE Atlas, meaning that they may receive groundwater discharge that helps to sustain the ecosystems associated with the waterways. These waterways are Morris Creek, Warrigal Creek, Hoddinott Creek, and Sunville Creek, as shown on Figure 7-4. Morris Creek and Warrigal Creek are classed as 'high' potential GDEs. Hoddinott Creek and Sunville Creek are classed as 'moderate' potential GDEs.

As discussed in Technical report H: Groundwater, the unnamed waterway in the shore crossing area is likely to be in connection with groundwater given the shallow depth to water table in this area. There is no evidence available on the nature of this connection. However, waterways in shallow groundwater environments can fluctuate between being losing (following a large rainfall event) to gaining (at other times). This waterway forms a connection between Freshwater Swamp, approximately 1.2 kilometres north of the site, and the Corner Inlet Ramsar Site located approximately three kilometres to the south of the site at the mouth of Bruthen Creek estuary.

Further details on these waterways are included in Technical report I: Surface water.

7.6.2. Subterranean GDEs

Stygofauna are small, often microscopic aquatic organisms that inhabit groundwater systems including alluvial sediments. Stygofauna are adapted to life in dark, nutrient-poor, and oxygen-limited environments. Their distribution is influenced by factors such as sediment size, hydraulic connectivity, groundwater quality, and water table depth.

A regional baseline stygofauna survey undertaken across the Gippsland Basin found stygofauna in one out of two wells sampled from the Quaternary Aquifer (Bold et al., 2020). The report concluded that 'the abundance of stygofauna taxa was low compared to other state surveys', which was attributed to the fine-grained sediments of the aquifers tested in the regional baseline survey. Stygofauna are more likely to be present in coarse grained sediments such as sand and gravel.

No site-specific stygofauna sampling has been undertaken for the project. However, based on the geology and water table depth, it is possible that stygofauna exist within the study area.

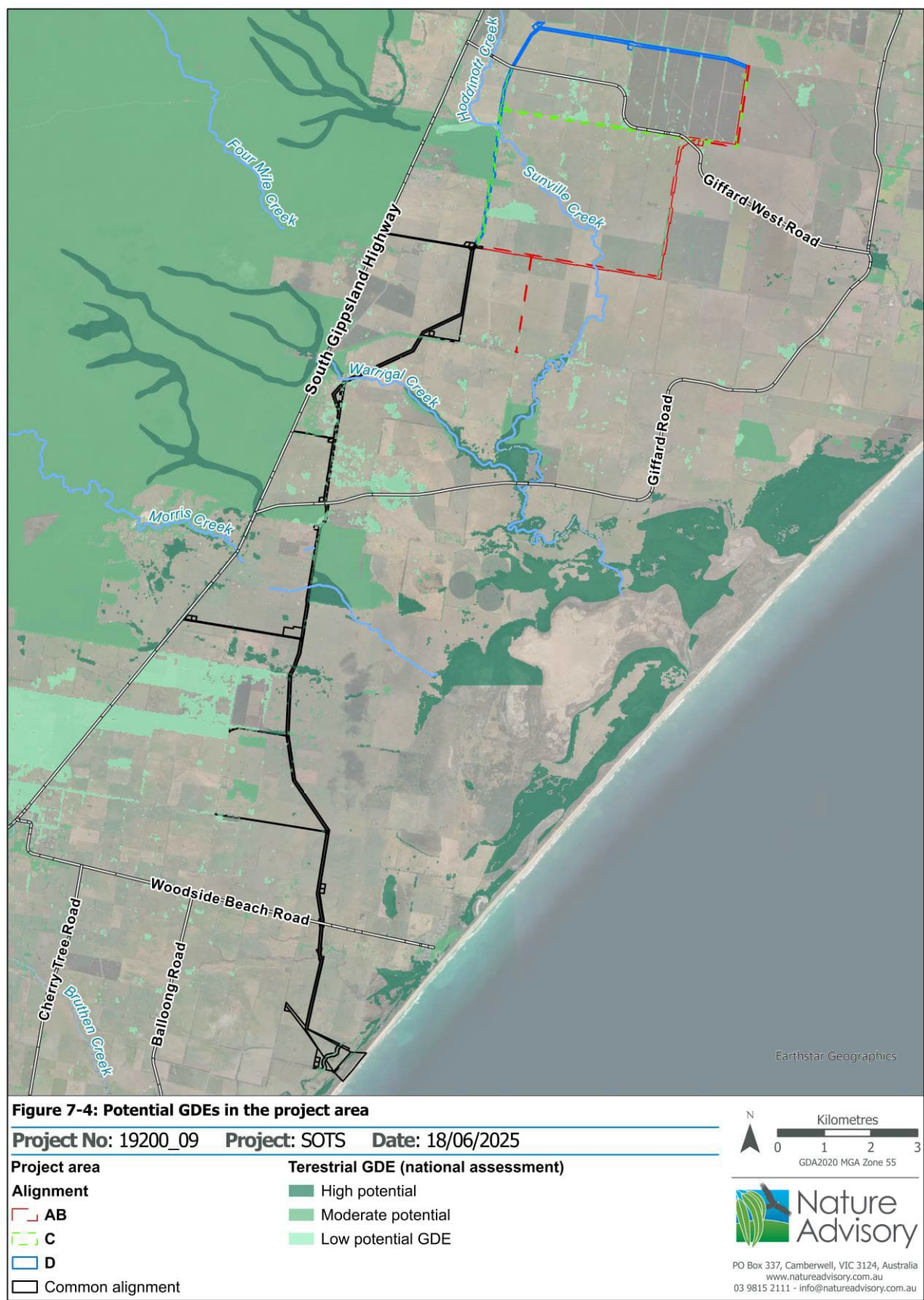


Figure 7-4 Potential GDEs in the project area

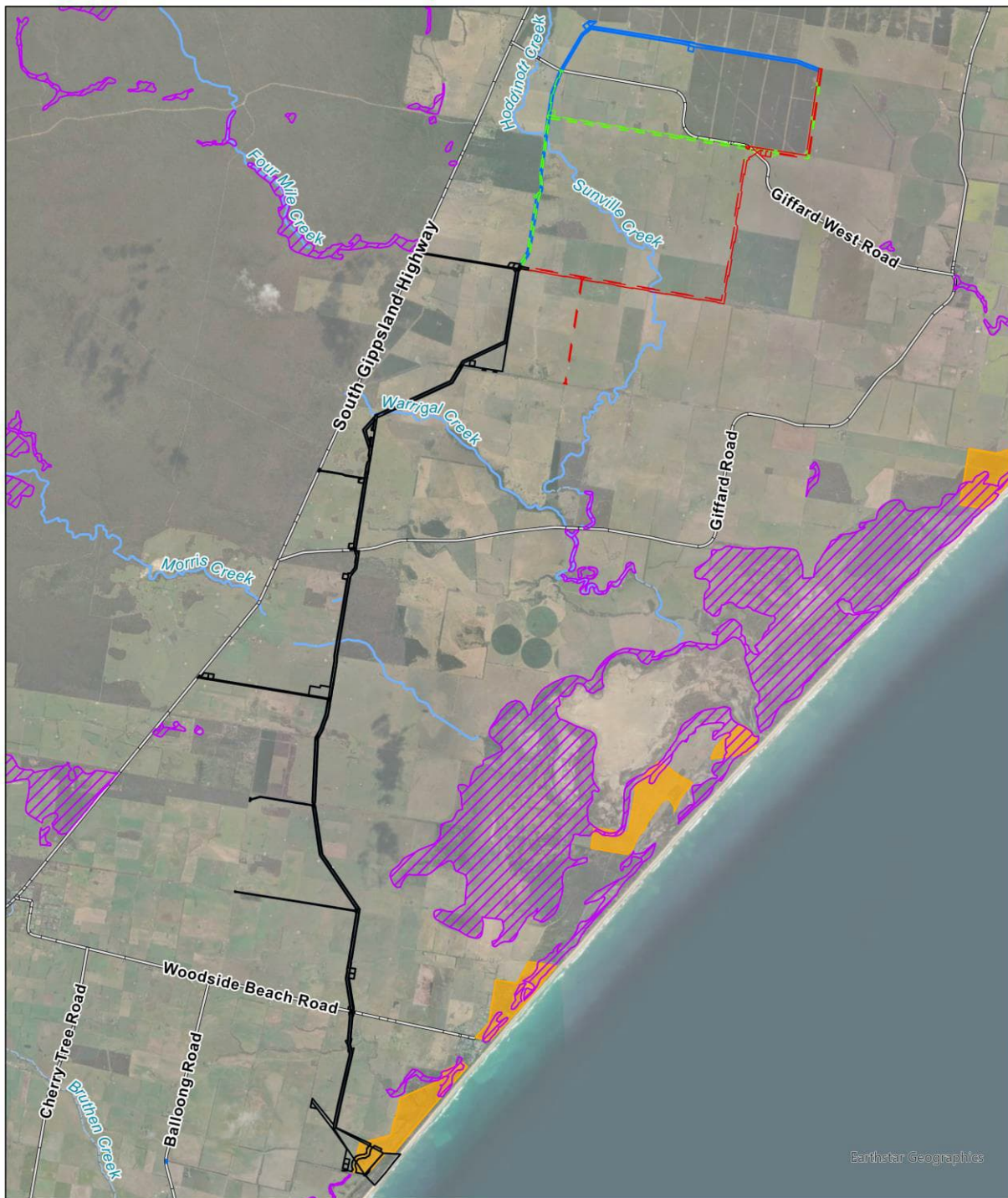


Figure 7-5: Environmental significant overlays

Project No: 19200_09 **Project:** SOTS **Date:** 18/06/2025

Project area

Alignment

- AB
- C
- D
- Common alignment

Environmental significant overlays (Zone)

- ESO1
- ESO2



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19200_09 Figure 7-4: Environmental significant overlays - Created by [redacted] E:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 7-5 Environmental Significant Overlays

7.7. Planted vegetation

An area of planted vegetation was recorded within HZ 9 along an unnamed waterway identified as UFI:42806331. The planting has likely been established to address erosion issues and stabilise the bank of the unnamed tributary. Native species planted were inconsistent with the EVC that extends along the creek outside of the project area (Swamp Scrub EVC 53); however, a suite of understorey species has recolonised the ground layer underneath this planting.

An amenity planting comprised of native tree and shrub overstorey and some native ground layer species occurs on Giffard West Road roadside associated with Option AB.

An area of planted Blackwood and other Acacias occurs in the study area for Option D.

Shelterbelts mostly comprised of single row of planted trees or shrubs along fence lines occur in various other locations along the alignment.

7.8. Listed flora species

Listed flora species refers to plant species listed as threatened under the EPBC Act or FFG Act.

A list of the flora species that were assigned a 'possible' or 'likely' likelihood of occurrence based on desktop information and field-based habitat assessments is presented in Table 7-7. The table indicates the habitat-based likelihood of occurrence rating, and the updated likelihood of occurrence rating that was assigned for each species based on the results of targeted surveys.

The locations of confirmed threatened flora populations are shown in **Figure 7-6**.

Potential impacts to species recorded or with possible likelihood of occurrence are discussed in Section 10.2.4.

Table 7-7 Threatened flora species identified as possible, likely or known to occur with revised likelihood following targeted survey

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
<i>Acacia howittii</i>	Sticky Wattle	-	Vu	Possible	Unlikely	The species was searched for while completing VQAs in the area in 2023 and again in 2024. However, no plants were found within the project area. The species is a large tree or shrub (approximately 3-9 metres) tall and would have been detected during the VQA's if present onsite. As this species has not been recorded during recent surveys and there are no records for this species south of the South Gippsland Highway where the project area occurs, it is unlikely that this species occurs onsite.
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	Vu	-	Possible	Unlikely	River Swamp Wallaby-grass was not recorded during targeted surveys in 2020 and 2024 which focussed on key habitat for the species, including Riparian Scrub EVC, as well as dams within private property and fire dams within plantation forestry land. The species is unlikely to occur within the project area.
<i>Austrostipa rudis</i> subsp. <i>australis</i>	Veined Spear-grass	-	En	Possible	Unlikely	One VBA record exists within 5 km of the alignment near Giffard in an area that consists of open-forest and sandy soils that appear suitable for the species. Targeted surveys of suitable roadsides and grassy woodland occurred in 2023 and 2024, but the species was not recorded.

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						The species is unlikely to occur within the project area.
<i>Caladenia aurantiaca</i>	Orange-tip Finger-orchid	-	En	Possible	Unlikely	Targeted surveys were completed within woodland and forest EVCs identified during the native vegetation assessments. The species was not identified during the targeted surveys and is unlikely to occur within the project area.
<i>Caladenia tessellata</i>	Thick-lip Spider-orchid	Vu	-	Possible	Possible	There are no records for the species within 5 km of the project area. However, there is a citizen science (iNaturalist) record located along the South Gippsland Highway on the edge of Mullungdung State Forest. Although the species was not identified during the targeted surveys there remains a possibility that individuals may occupy high quality habitat Plains Grassy Forest habitat in H28 Woodside Bushland Reserve, private land (KP 21.3 – KP 22.5) and most higher quality roadsides between Stringybark Lane (KP 7.65) and Giffard West Road (KP 23.0) in the north. The species is also known to occur in coastal associated scrub and remains possibly present in the McLoughlins Beach – Seaspray Coastal Reserve.
<i>Caladenia vulgaris</i>	Slender Pink-fingers	-	Vu	Possible	Unlikely	The species was not identified during targeted surveys and is unlikely to occur within the study area.

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
<i>Commersonia prostrata</i>	Dwarf Kerrawang	En	En	Possible	Unlikely	No Dwarf Kerrawang were identified in targeted surveys and the species is unlikely to occur within the study area.
<i>Coronidium gunnianum</i>	Pale Swamp Everlasting	-	Cr	Likely	Recorded	The species was recorded on targeted surveys in 2024 growing beside drainage lines in a Swamp Scrub EVC habitat on Lyons Road.
<i>Corybas fimbriatus</i>	Fringed Helmet-orchid	-	En	Possible	Unlikely	The species wasn't recorded during field surveys and while there are some larger extents of Heathy Woodland. Lowland Forest, Damp Sands Herb-rich Woodland, and Heathy Woodland EVCs within the project area, the study area lacks the high quality, undisturbed habitat to support this species. This species is unlikely to occur within the study area.
<i>Cymbonotus lawsonianus</i>	Bear's-ear	-	En	Possible	Unlikely	While there is potential suitable habitat onsite in woodland EVCs, no plants were recorded within the study area and there are no nearby VBA records. The species is unlikely to occur in the study area.
<i>Dianella amoena</i>	Matted Flax-lily	En	Cr	Possible	Unlikely	Not recorded in the project area and limited suitable habitat for the species in the project area. A population of Matted Flax-lily consisting of 31 individual plants recorded within Plains Grassland (South Gippsland) EVC during extended surveys along Stringy Bark Lane is located over 1 km outside of the project area.

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						No further Matted Flax-lily were identified in targeted surveys and the species is unlikely to occur within the study area.
<i>Dianella longifolia</i> var. <i>grandis</i> s.l.	Pale Flax-lily	-	Cr	Possible	Unlikely	Pale Flax-lily grows in lowland grasslands and grassy woodlands, and it has been historically recorded on Giffard Road within modelled Plains Grassy Forest habitat which is within 5km of the alignment. While some areas of high-quality roadside vegetation contain suitable habitat for this species, targeted surveys did not detect this species within the project area. The species is unlikely to occur.
<i>Diuris punctata</i>	Purple Donkey Orchid	-	En	Possible	Unlikely	While remnant grassy woodlands are present within the alignment and could support this species, targeted surveys did not detect this species. Therefore, it is unlikely that the species occurs within the project area.
<i>Dodonaea procumbens</i>	Trailing Hop Bush	Vu	-	Possible	Unlikely	The species is considered exceedingly rare in the area and no records are known closer to the alignment. However, due to the wide variety of habitats suitable to the species it was included in targeted surveys. Targeted surveys between 2020 and 2025 for the species along heathy roadside reserves that contained seasonally wet depressions therefore, it is considered unlikely that this species would occur within the project area.

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
<i>Eucalyptus arenicola</i>	Gippsland Lakes Peppermint	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area. Gippsland Lakes Peppermint is a large tree and would have been detected during surveys if present.
<i>Eucalyptus bosistoana</i>	Coast Grey-box	-	En	Likely	Recorded	Coast Grey-box (36 individuals) was recorded during detailed surveys within the study area. The species was recorded growing on the top of ridges within the Woodside H28 Bushland Reserve and Giffard Road roadside.
<i>Eucalyptus fulgens</i>	Green Scentbark	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area. Green Scentbark is a large tree and would have been detected during surveys if present.
<i>Eucalyptus kitsoniana</i>	Bog Gum	-	Cr	Possible	Unlikely	The species is a Victorian endemic and prefers to occur on vegetation within the coastal lowlands. Apparently rare in the area east of the Strzelecki ranges, one record occurred within the Woodside H28 Bushland Reserve adjacent to the study area. However, between 2023-2024 the single nearby record on the VBA from nearby Foster ~50 km to the west was corrected and no longer represents the species. No known records of the species occur near the alignment. The species was surveyed for in 2023, but it was not found

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						within the project area. Bog Gum is a large tree and would have been detected during surveys if present.
<i>Juncus revolutus</i>	Creeping Rush	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area.
<i>Lachnagrostis robusta</i>	Salt Blown-grass	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area.
<i>Lachnagrostis semibarbata</i> var. <i>semibarbata</i>	Purple Blown-grass	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area.
<i>Leptorhynchus elongatus</i>	Lanky Buttons	-	En	Possible	Unlikely	The species was not identified during the targeted surveys and is unlikely to occur within the study area.
<i>Oxalis rubens</i>	Dune Wood-sorrel	-	En	Recorded	Recorded	The species was recorded growing on stabilised dunes under <i>B. integrifolia</i> at Reeves Beach Campground in 2023, and 20 individuals were recorded growing on open patches of sand along the roadside of Reeves Beach Road in 2024.
<i>Prasophyllum spicatum</i>	Dense Leek-orchid	Vu	Cr	Possible	Possible	There are no records of this species within 5km of the project area on the VBA. The nearest extant population is in Longford over 15km to the north. However, due to the presence of coastal and near-coastal heathy woodland

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						vegetation within the alignment targeted surveys were conducted. Targeted surveys did not detect the species, but due to the temporal nature of flowering within the species, the likelihood that this species occurs within the project area is still considered possible at locations including McLoughlins Beach – Seaspray Coastal Reserve and on higher quality roadside Heathy Woodland habitat around Giffard West Road (KP 23 ~ KP 28).
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	Vu	En	Possible	Unlikely	While there are many recent and local records of this species within relatively undisturbed Mullungdung State Forest on the western side of the South Gippsland Highway, the habitat within the alignment is highly modified and is unlikely to support this species. The species was not recorded in any targeted surveys within the project area.
<i>Pterostylis grandiflora</i>	Cobra Greenhood	-	En	Possible	Possible	The species is known from numerous records across Plains Grassy Forest in the Mullungdung State Forest to the west. Records for the species also exist further south around Woodside in the lowland areas of Plains Grassy Forest. Suitable Plains Grassy Forest habitat occurs chiefly within Woodside H28 Bushland Reserve on private land located at KP 21.35 – KP 22.5 and some roadside reserves. Targeted surveys for the species did not record any individuals or colonies. Although the lack of records reduces the likelihood

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						of occurrence, the possibility of the species occurring cannot be fully discounted.
<i>Sowerbaea juncea</i>	Rush Lily	-	Vu	Possible	Unlikely	The species was not recorded in the project area but suitable habitat in the form of high-quality Heathy Woodland and Lowland Forest EVCs may support for the species. Targeted surveys for the species did not record any individuals and most suitable EVCs for the species appear to be unsuitably dry. It is unlikely this species occurs within the project area.
<i>Thelymitra matthewsii</i>	Spiral-leaved Sun-orchid	Vu#	En	Possible	Possible	Locally to the alignment it has been historically recorded in Mullungdung Nature Conservation Reserve in Giffard with the most recent record being in 1979. While this species can occur in disturbed sites, there have been no recent records of this species, and the species was not recorded during any targeted surveys. Although the species was not recorded and the likelihood of occurrence is therefore reduced, potential undisturbed Plains Grassy Forest habitat occurs in the project area and the possible occurrence of the species cannot be discounted.
<i>Triglochin minutissima</i>	Tiny Arrowgrass	-	En	Possible	Unlikely	The species could possibly occur within wet areas in proximity to the coast. Targeted surveys were conducted but

Scientific name	Common name	Conservation status		Likelihood of occurrence		Rationale
		EPBC Act	FFG Act	Habitat assessment	After targeted survey	
						no individuals of the species were identified. The species is unlikely to occur in the project area.
<i>Xerochrysum palustre</i>	Swamp Everlasting	Vu	Cr	Possible	Unlikely	The species prefers lowland swamps, often on black cracking clay soils. There are several records of the species throughout the region surrounding the alignment, but the species is rare due to habitat depletion. The species was not recorded during targeted surveys but was observed flowering at a reference site on the edge of a Gilgai habitat. The condition of similar habitat within the project area was heavily deteriorated by agricultural land. As such, the species is considered unlikely to occur.

Legend: Vu = Vulnerable; En = Endangered; Cr = Critically Endangered; #- Species listed as threatened under the EPBC Act after the referral decision was made (2 June 2020) therefore not required to be assessed as a MNES in accordance with Section 158A(4) of the EPBC Act.

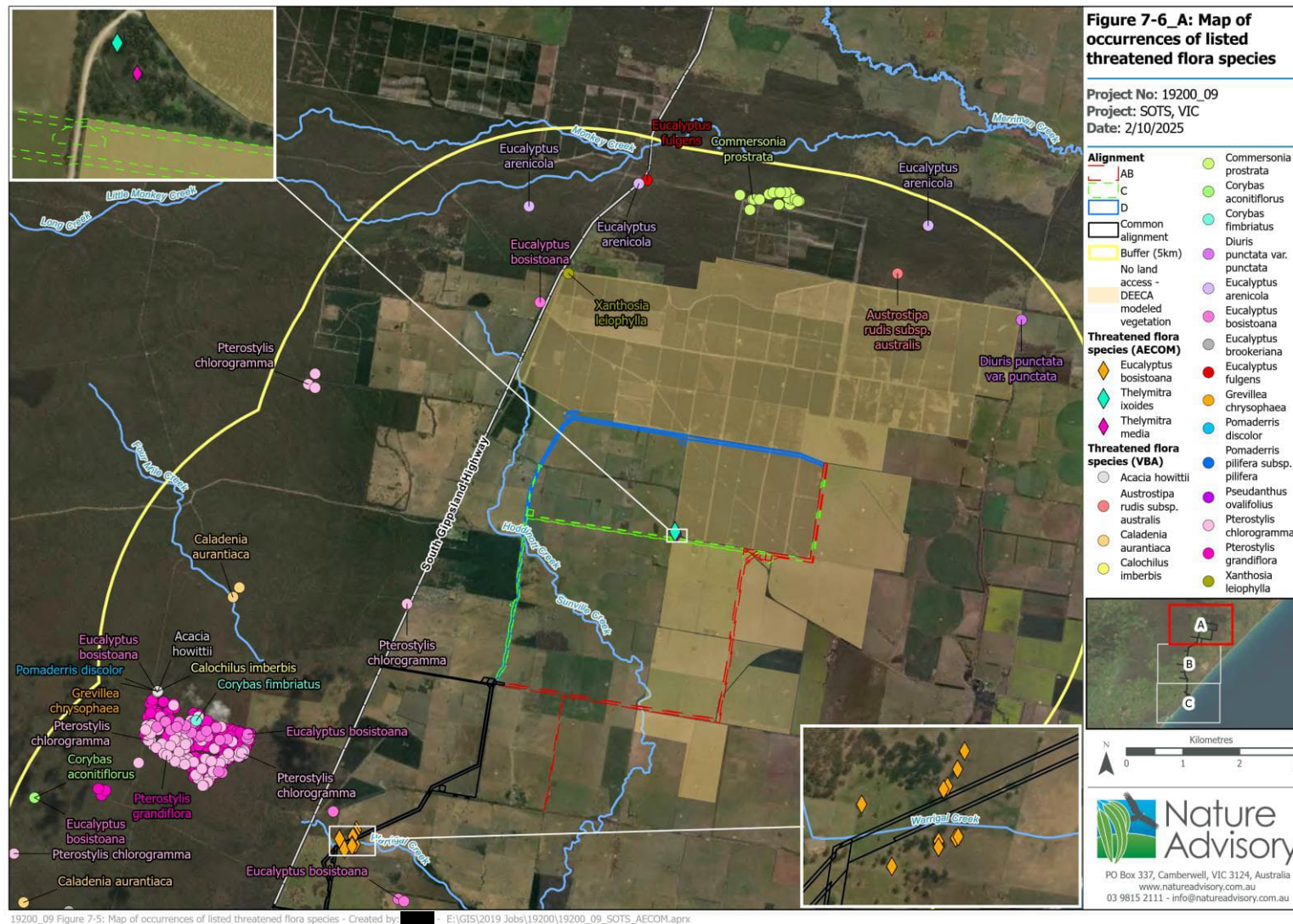


Figure 7-6_A: Map of occurrences of listed threatened flora species.

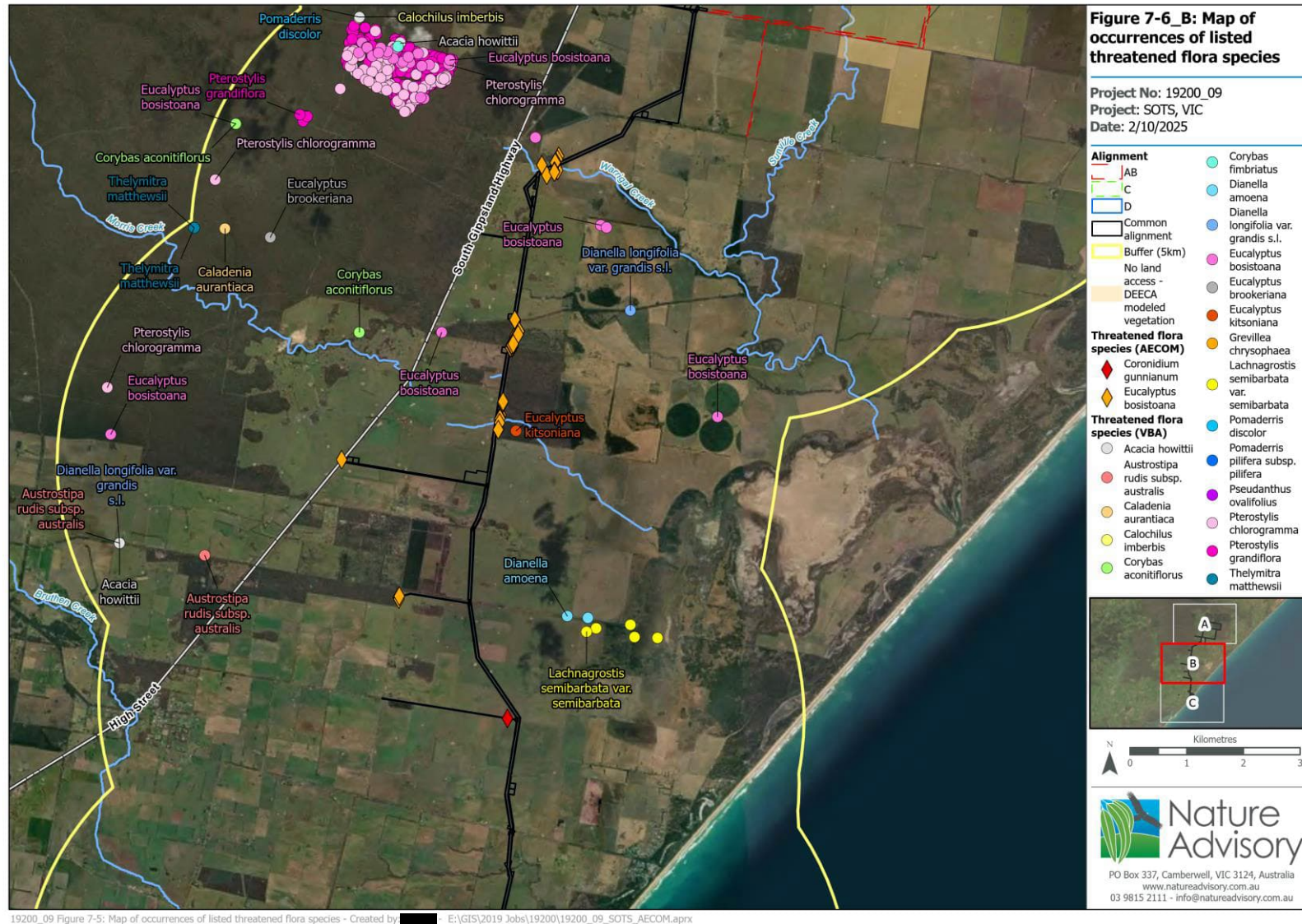


Figure 7-6_B: Map of occurrences of listed threatened flora species.



Figure 7-6_C: Map of occurrences of listed threatened flora species.

7.9. Protected flora

Protected flora includes plants that are listed as threatened under the FFG Act (Section 7.7), plants that belong to FFG Act-listed TECs, and plants that have been declared to be 'protected' under the FFG Act; the latter being referred to as 'protected flora'. This section relates to 'declared protected flora' which are not listed as threatened under the FFG Act or plants that belong to a listed community.

The two categories of declared flora are defined by DEECA (2024a) as:

- 'Restricted use protected flora' are those flora that are exclusively impacted by take for commercial or personal use (e.g., not at risk from other activities). Take for other reasons (e.g., take incidental to track maintenance etc.) isn't restricted as long as reasonable care is taken not to impact the taxon (.
- 'Generally protected flora' refers to all other protected flora that are impacted by take for all other reasons (e.g., development, infrastructure maintenance works, etc.) and can include those species at risk of both commercial/personal take and incidental take.

It is an offence to take generally protected flora from public land without a permit. It is an offence to take restricted use protected flora from public land for the purposes of sale or personal use (without a permit), but incidental take is not an offence and does not require a permit. Incidental take is where plants are taken to make space for something else, such as for clearing for construction (DEECA 2024a).

Protected flora controls do not apply on private land, unless the land is identified as critical habitat for the species. There are currently no critical habitat determinations under the FFG Act.

Table 7-8 lists several species of Orchidaceae declared as generally protected flora under the FFG Act that were observed during field assessments. Restricted use protected flora species are not listed as a permit would not be required for their 'take' for the project.

Table 7-8 FFG Act generally protected flora within the study area

Scientific name	Common name
<i>Caladenia carnea</i>	Pink Lady Fingers
<i>Caladenia latifolia</i>	Pink Fingers
<i>Chiloglottis valida</i>	Common Bird-orchid
<i>Corybas incurvus</i>	Slaty Helmet-orchid
<i>Microtis unifolia</i>	Common Onion-orchid
<i>Diuris pardina</i>	Leopard Orchid
<i>Pterostylis nutans</i>	Nodding Greenhood
<i>Thelymitra ixioides</i>	Dotted Sun-orchid
<i>Thelymitra media</i>	Tall Sun-orchid

7.10. Weeds

The presence of weed species was incidentally noted during the vegetation and habitat assessments. Eight declared noxious weeds were recorded within the study area. Wellington Shire Council also advised of populations of African Love-grass *Eragrostis curvula* in the project area and surrounds, in roadsides and adjacent private land.

Table 7-9 presents the declared noxious weeds observed and their status under the *Catchment and Land Protection Act 1994* (CaLP Act) and WoNS. Other weed species may be present as a detailed survey for weeds has not been undertaken. Presence of other weed species will be determined during weed mapping to be undertaken prior to construction (Section 14.2).

Table 7-9 Declared noxious weeds recorded within the study area

Scientific name	Common name	CaLP Act status (West Gippsland CMA)	Weeds of National Significance (WoNS) status
<i>Asparagus asparagoides</i>	Bridal Creeper	RR	Listed
<i>Cirsium vulgare</i>	Spear Thistle	RC	-
<i>Eragrostis curvula</i>	African Love-grass	RC	-
<i>Lycium ferocissimum</i>	African Boxthorn	RC	Listed
<i>Oxalis pes-caprae</i>	Soursob	RR	-
<i>Rosa rubiginosa</i>	Briar Rose	RC	-
<i>Rubus fruticosus</i> spp. agg.	Blackberry	RC	Listed
<i>Senecio jacobaea</i>	Ragwort	RC	-
<i>Ulex europaeus</i>	Gorse	RC	Listed

Legend: RC = Regionally Controlled; RR = Regionally Restricted; Listed = WoNS listed

8. Existing environment: Fauna

This section provides information on fauna habitats in the project area, threatened species considered to have potential to occur in the project area and their likelihood of occurrence, and the results of targeted surveys of threatened fauna species with a moderate or high likelihood of occurrence.

8.1. Fauna habitats

The study area supported four main fauna habitat types: grazing paddocks, woodlands, riparian vegetation and aquatic habitats.

Grazing paddocks

Grazing paddocks are the most abundant habitat within the project area. This habitat is relatively uniform, consisting of exotic and native pasture. These habitats are mostly contiguous, fragmented by the above habitat types. Poor- to moderate-quality habitat for threatened fauna species occurs in grazing paddocks.

Forest and woodland

Forest and woodland habitat is found only in good quality along Stringy Bark Lane roadside and in the Woodside Reserve H28 and contains many large hollow-bearing trees, fallen timber and other structures. Patches of forest and woodland habitat also occur along other roadsides and a patch on private land between KP 21.45 and KP 21.55. Native vegetation is described in Section 7.2.

Much of this forest and woodland habitat is considered very good-, good- or moderate-quality habitat for threatened fauna species.

Riparian vegetation:

Riparian vegetation This habitat is in patches connected along the creek lines that cross the study area. This habitat is of low to moderate quality for riparian-dependent threatened fauna species.

Aquatic habitat

Aquatic habitats are found scattered across the project area, with the alignment crossing several ephemeral waterways and farm dams.

Designated waterways associated with the project area are outlined in Technical report I: Surface water (AECOM 2025) and summarised in Table 8-1.

Table 8-1 Waterways within the study area (from AECOM 2025)

Option	Named waterways	Unnamed waterways
Option AB	Morris Creek Warrigal Creek Sunville Creek	Shore crossing project area: Unnamed waterway UFI 42824679: connection between Freshwater Swamp approximately 1.2 km north of the site and the Corner Inlet Ramsar Site approximately 6 km to the south (downstream) at the mouth of the Bruthen Creek estuary Onshore transmission project area: Unnamed waterway UFI:42824679 Unnamed waterway UFI:18401649 Unnamed waterway UFI:42806331

Option	Named waterways	Unnamed waterways
		Unnamed waterway UFI:3598071 Unnamed waterway UFI:3596727 Unnamed waterway UFI:3593740 Unnamed waterway UFI:43045959 Unnamed waterway UFI:3588292 Unnamed waterway UFI:3585299
Option C	Morris Creek Warrigal Creek Hoddinott Creek	Shore crossing project area: Unnamed waterway UFI 42824679: connection between Freshwater Swamp approximately 1.2 km north of the site and the Corner Inlet Ramsar Site approximately 6 km to the south (downstream) at the mouth of the Bruthen Creek estuary Onshore transmission project area: Unnamed waterway UFI:42824679 Unnamed waterway UFI:18401649 Unnamed waterway UFI:42806331 Unnamed waterway UFI:3598071 Unnamed waterway UFI:3596727 Unnamed waterway UFI:3593740 Unnamed waterway UFI:43045959 Unnamed waterway UFI:3588292 Unnamed waterway UFI:3582535 Unnamed waterway UFI:3581253
Option D	Morris Creek Warrigal Creek Hoddinott Creek	Shore crossing project area: Unnamed waterway UFI 42824679: connection between Freshwater Swamp approximately 1.2 km north of the site and the Corner Inlet Ramsar Site approximately 6 km to the south (downstream) at the mouth of the Bruthen Creek estuary Onshore transmission project area: Unnamed waterway UFI:42824679 Unnamed waterway UFI:18401649 Unnamed waterway UFI:42806331 Unnamed waterway UFI:3598071 Unnamed waterway UFI:3596727 Unnamed waterway UFI:3593740 Unnamed waterway UFI:43045959

Option	Named waterways	Unnamed waterways
		Unnamed waterway UFI:3588292 Unnamed waterway UFI:3582535 Unnamed waterway UFI:43042004

The majority of the waterways were found to be ephemeral, with aquatic habitat mostly being represented by inundated terrestrial grasses and vegetation. More complex habitat structures and dense aquatic vegetation were mostly absent.

The key receptors for the waterways are Bruthen Creek estuary, Freshwater Swamp, Jack Smith Lake and McLoughlins Beach – Seaspray Reserve (Technical report I: Surface water). These receptors indicate that the waterways flow towards the coast and are not connected to the waterways north of the project areas such as Monkey Creek or Merriman Creek.

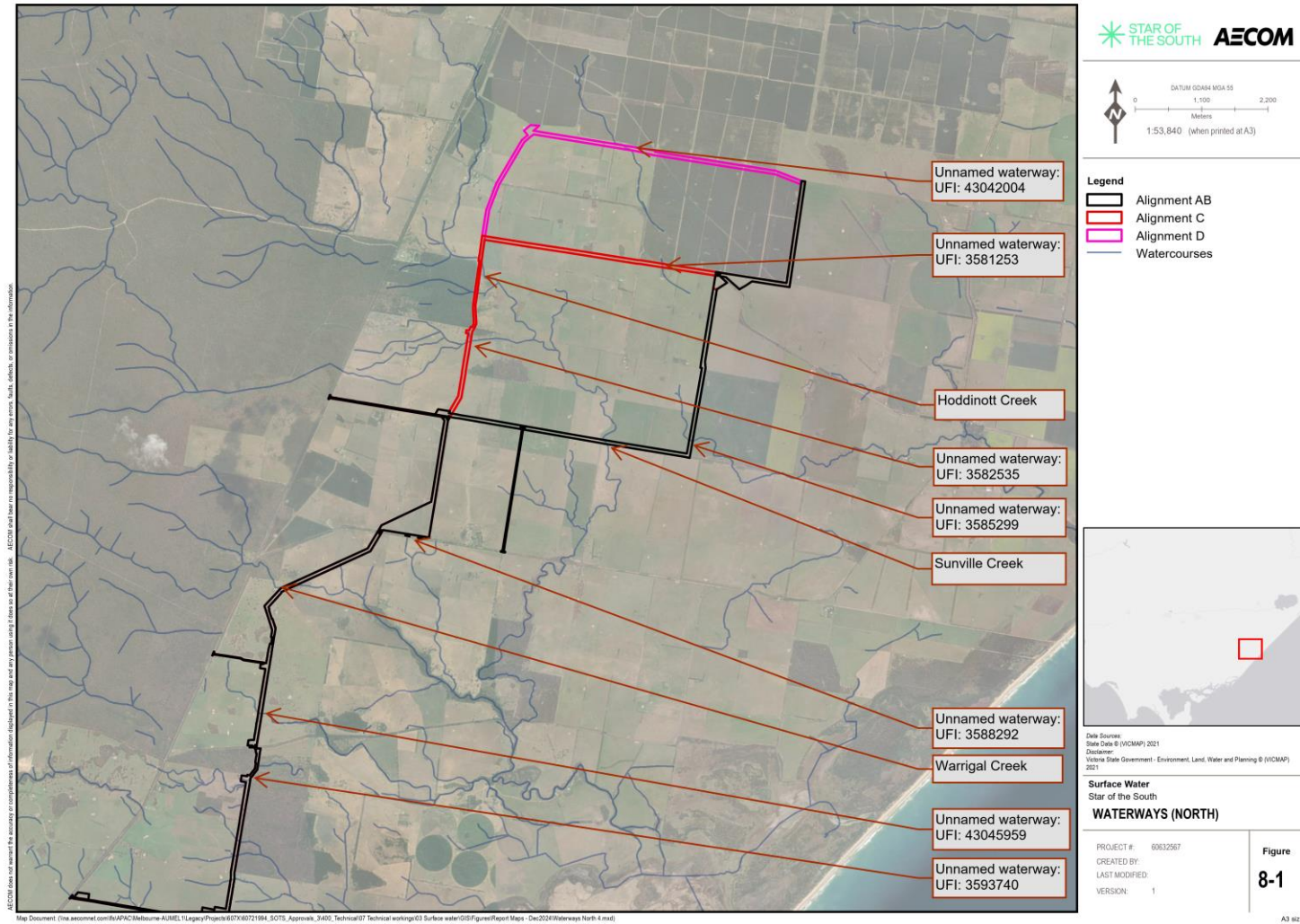


Figure 8-1 Location of waterways that intersect the project area (north)



Figure 8-2 Location of waterways that intersect the project area (south)

8.2. Habitat trees

Trees provide habitat for wildlife by providing food, shelter and breeding sites. As trees get older, they provide greater resources for wildlife in terms of food (leaves, blossoms and nectar), shelter (hollows, bark, perches, cover) and breeding sites (hollows).

Hollow-bearing trees provide habitat for several threatened fauna species potentially in the project area, including Powerful Owls and Gang-gang Cockatoos. Hollow-bearing trees are present in most of the habitats listed above (with the exception of aquatic habitats). An assessment of the locations of hollow-bearing trees along the impact area has been undertaken and is presented in Section 10.2.2. A full list of potential habitat trees and their locations is found in Appendix 4.

8.3. Listed fauna species

The review of existing information (including VBA records and the EPBC Protected Matters Search Tool (DAWE 2020) indicated that within the search area, there were records of, or potential suitable habitat for, 92 vertebrate species listed under the Commonwealth EPBC Act and Victorian FFG Act. In addition, three species were identified as priority species on the *Provisional List of Animals Requiring Urgent Management Intervention* (DAWE 2020). The likelihood of occurrence of these species in the study area was assessed and the results are presented in Appendix 2. This analysis of potential occurrence of listed fauna species excludes marine fauna, as marine habitats were outside the scope of this investigation.

The assessment of likelihood of occurrence indicated that 25 listed fauna species have been recorded or have a likely or possible likelihood of occurrence within the project area. These short-listed species are listed in Table 8-2 and are described below. Figures are provided which show the location of potential habitat and database records in proximity to the project area. A 5 km line is provided on the figures as a point of reference for the distance of those records from the project area.

Some of the species are listed as threatened under the EPBC Act but are not considered as MNES in this report. This is because species listed as threatened under the EPBC Act after the referral decision was made for the Project (after 2 June 2020) are not required to be assessed as a MNES in accordance with Section 158A(4) of the EPBC Act.

Table 8-2 Listed fauna species possible or likely to occur, or recorded, in the project area

Scientific name	Common name	Conservation status			Likelihood of occurrence
		EPBC Act	FFG Act	Priority species	
Birds					
<i>Falco subniger</i>	Black Falcon	-	cr		Possible flying over and hunting from time to time
<i>Neophema chrysostoma</i>	Blue-winged Parrot	VU#	-		Likely visitor from time to time
<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped Heathwren	-	vu		Recorded in the general area, possible in very limited areas of suitable habitat
<i>Apus pacificus</i>	Fork-tailed Swift	M (CAMBA, ROKAMBA, JAMBA)	-		Likely to fly over and forage
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	EN#	en	✓	Recorded, suitable foraging habitat exists in project area. Possible breeding habitat if individuals remain locally during summer.

Scientific name	Common name	Conservation status			Likelihood of occurrence
		EPBC Act	FFG Act	Priority species	
<i>Gallinago hardwickii</i>	Latham's Snipe	VU# M (Bonn A2H, ROKAMBA, JAMBA, CAMBA)	-		Likely to occur from time to time in areas of wet grassland
<i>Hieraaetus morphnoides</i>	Little Eagle	-	vu		Likely to fly over and forage from time to time
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	CR	cr	✓	Potential to occasionally visit areas of coastal saltmarsh and nearby estuarine wetland and adjacent paddocks within the project area
<i>Ninox strenua</i>	Powerful Owl	-	vu		Likely to occur in suitable habitat in project area from time to time, no breeding habitat in study area
<i>Lathamus discolor</i>	Swift Parrot	CR	cr		Likely at times in the small areas of potential woodland habitat within the project area
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	-	en		Likely to fly over, no foraging habitat
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU, M (CAMBA, ROKAMBA, JAMBA)	vu		Likely to fly over and forage aerially
Mammals					
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	vu	✓	Likely to forage within suitable habitat
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	VU	en	✓	Possible in Woodside H28 Bushland Reserve and coastal reserve although lack of records.
<i>Sminthopsis leucopus</i>	White-footed Dunnart	-	vu		Possible in Woodside H28 Bushland Reserve and coastal reserve but habitat disconnected from known distribution.
Reptiles					
<i>Lissolepis coventry</i>	Swamp Skink	EN#	en		Unlikely outside of vegetated sand dunes; revised from possible based on targeted surveys.

Scientific name	Common name	Conservation status			Likelihood of occurrence
		EPBC Act	FFG Act	Priority species	
<i>Varanus varius</i>	Lace Monitor	-	en		Recorded; likely to occur in areas of woodland habitat.
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink	-	en		Recorded; likely to occur in association with creeks, farm dams and wet grassy areas near waterways and dams.
Frogs					
<i>Uperoleia martini</i>	Martin's Toadlet	EN#	en		Possible in suitable habitat, surveys incomplete therefore presence assumed.
<i>Litoria aurea</i>	Green and Golden Bell Frog	VU			Unlikely; revised from possible based on targeted surveys.
<i>Litoria raniformis</i>	Growling Grass Frog	VU	vu		Unlikely; revised from possible based on targeted surveys.
<i>Pseudophryne semimarmorata</i>	Southern Toadlet	-	en		Likely in suitable habitat
Fish					
<i>Neochanna cleaver</i>	Australian Mudfish	-	en		Possible; may move along the unnamed waterway UFI 42824679 in the shore crossing area between Bruthen Creek estuary and Freshwater Swamp when flows facilitate connection.
<i>Galaxiella pusilla</i>	Dwarf Galaxias	VU	en		Unlikely; no connectivity of waterways to known occurrences. Waterways ephemeral.
<i>Nannoperca</i> sp. 1	Flinders Pygmy Perch	-	vu		Unlikely; no connectivity of waterways to known occurrences. Waterways ephemeral.

Notes: EPBC-T = threatened species status under EPBC Act (CR = Critically endangered; EN = endangered; VU = vulnerable); EPBC-M: migratory status under the EPBC Act (M = listed migratory taxa; Bonn Convention (A2H) – listed as a member of a family; Bonn Convention (A2S) - species listed explicitly; CAMBA - China- Australia Migratory Birds Agreement; JAMBA - Japan-Australia Migratory Birds Agreement; ROKAMBA - Republic of Korea Australia Migratory Birds Agreement); # - Species listed as threatened under the EPBC Act after the referral decision was made (2 June 2020) therefore not required to be assessed as a MNES in accordance with Section 158A(4) of the EPBC Act; FFG = threatened species status under the FFG Act (cr = critically endangered; en = endangered; vu = vulnerable).

8.3.1. Birds

Eleven listed threatened and/or migratory bird species were found to have a 'possible' or 'likely' likelihood of occurrence in the project area (see Table 8-2). These are discussed below.

Blue-winged Parrot (Vulnerable: EPBC Act post referral decision)

The Blue-winged Parrot occurs in areas of saltmarsh, grassland, chenopod shrubland, woodland and, in some cases, forest in southeastern Australia and Tasmania. Given the largely granivorous diet of the species, seed-bearing grasses are likely to be a key component of their habitat; although in saltmarsh and chenopod shrubland, they may feed on other plants. In summer, the species breeds, and part of the population migrates to Tasmania to do so, although some birds also remain on the mainland to breed. In the winter months, birds that bred in Tasmania return to the mainland. The species has declined due to decreases in habitat quality (DCCEEW 2023a).

A total of 37 VBA records of Blue-winged Parrots were found in the search area, with none occurring within the project area. Additionally, the species was recorded once during field surveys in Woodside H28 Bushland Reserve within the study area in 2024.

Suitable habitat for this species occurs in the project area in Eucalypt woodlands, forests, grassland and saltmarsh. This species is confirmed to occur in the project area.

Blue-winged Parrot was listed under the EPBC Act on 31 March 2023 after the referral decision for the project and is therefore not considered a MNES in this instance. As the species is not listed as threatened under the FFG Act it is therefore not considered as a threatened species for this report.

Chestnut-rumped Heathwren (Vulnerable: FFG Act)

The Chestnut-rumped Heathwren prefers low, dense undergrowth, mainly heath or heathy woodlands/sclerophyll forests, shrublands and box/ironbark forests, including proteaceous dominated woodland, often where vegetation is interspersed with open ground (Higgins 1999; Menkhorst et al. 2017). The habitat and population size of the Chestnut-rumped Heathwren have declined mainly due to the clearing of forests for urban, agricultural and forestry purposes (Higgins 1999).

A total of 27 VBA records of Chestnut-rumped Heathwren were found in the search area, with none occurring within the project area (Figure 8-3). An additional three records were provided by third-parties and are included in Table 8-2.

Suitable habitat for the Chestnut-rumped Heathwren occurs in heathy vegetation with or without tree cover in several parts of the project area (Figure 8_3). Chestnut-rumped Heathwrens were not observed during the targeted surveys in the project area but as a precaution, they are considered to be present within areas of suitable habitat in the project area.

Gang-gang Cockatoo (Endangered: FFG Act; Endangered: EPBC Act post-decision)

Gang-gang Cockatoos are altitudinal migrants moving from montane breeding habitat in the summer months to lowland areas in winter (DAWE 2022).

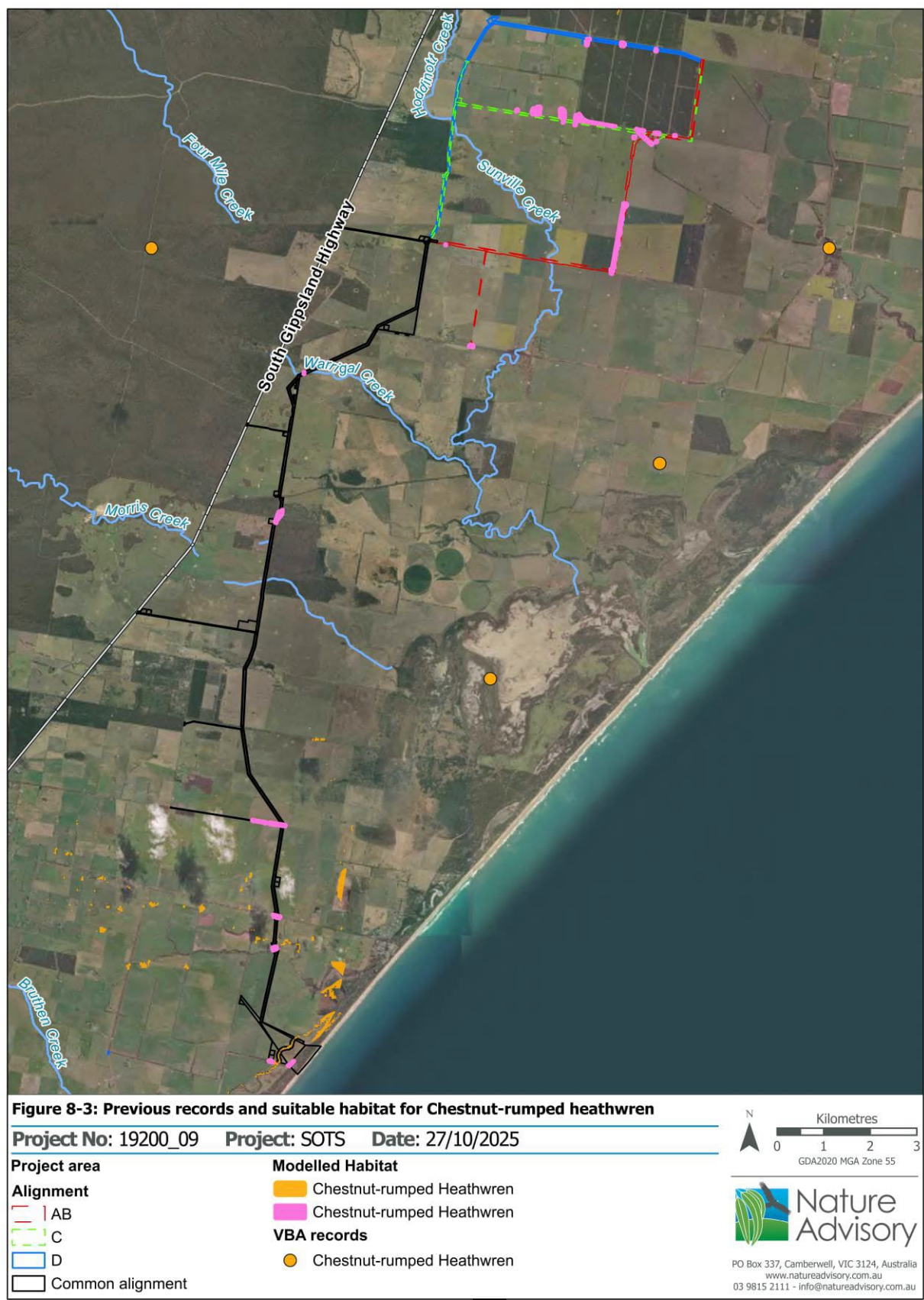
In summer, Gang-gang Cockatoos generally occur in tall mountain forests and woodlands, particularly in heavily timbered, mature wet sclerophyll forests and woodlands. The species prefers Eucalyptus-dominated assemblages and breeds in tree hollows. It also occurs in subalpine snow gum woodlands and occasionally in temperate rainforests and regenerating forests.

In winter, Gang-gang Cockatoos migrate from montane forests to inhabit more open forest and woodland at lower, drier altitudes (Higgins 1999). Some birds stay to breed locally

A total of 86 VBA records of Gang-gang Cockatoos were found in the search area (Figure 8-4). In addition, the species was recorded in the study area on several occasions during field surveys September to December 2024, including within the project area in Woodside Reserve H28.

Suitable habitat for Gang-gang Cockatoo occurs in the project area in Eucalypt woodlands and forests and it is considered certain that this species occurs in the project area. The species is mostly likely to utilise woodland and planted habitat (patches and scattered trees) for foraging, but it is also possible that hollows could be used for breeding if individuals remain locally during summer.

Gang-gang Cockatoo was listed as endangered under the EPBC Act on 2 March 2022 after the referral decision for the project and is therefore not considered a MNES in this instance. The species is listed as vulnerable under the FFG Act and is considered as a state-listed threatened species.



19200_09 Figure 8-3: Previous records and suitable habitat for Chestnut-rumped heathwren - Created by: [redacted] X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-3 Previous records and suitable habitat for the Chestnut-rumped Heathwren

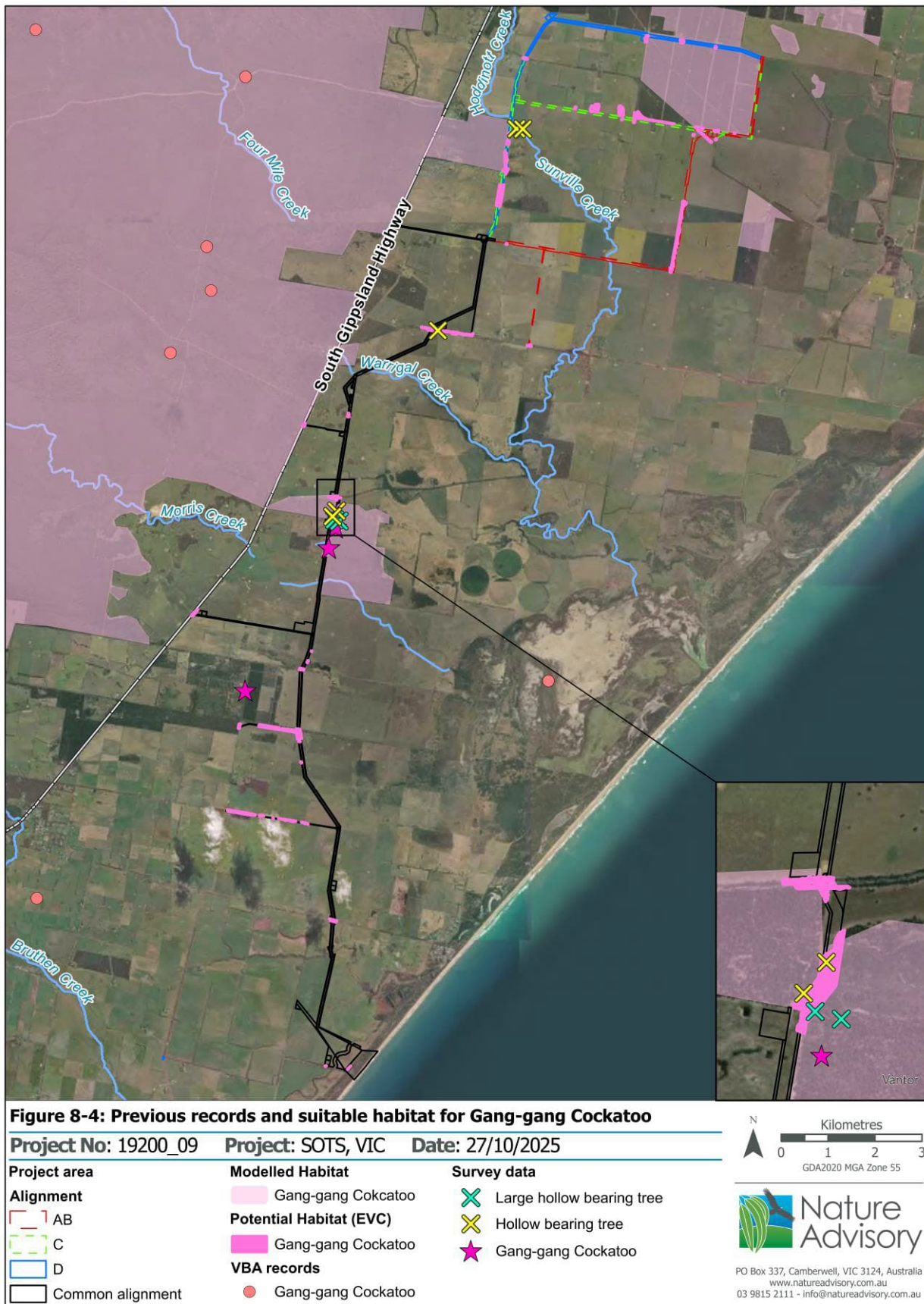


Figure 8-4 Previous records and suitable habitat for the Gang-gang Cockatoo

Latham's Snipe (Migratory: EPBC Act; Vulnerable: EPBC Act post referral decision)

This species occurs in wide variety of permanent and ephemeral wetlands. It prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps and waterholes. The species is widespread in southeast Australia and most of its population occurs in Victoria, except in the northwest of the state (Naarding 1983; Higgins and Davies 1996).

A total of 25 VBA records of Latham's Snipe were found within the search area, with none occurring within the project area. None were found during fauna surveys in the project area.

There is limited habitat for this species within the project area. It may occur in low-lying grassy areas within the study area. Numbers are expected to be low and scattered, with no area likely to support numbers that would qualify as an important population (i.e. regularly supports 18 birds or more).

Latham's Snipe was listed under the EPBC Act on 5 January 2024 after the referral decision for the project and is therefore not considered a threatened species in this instance. It is considered as a Migratory species under the EPBC Act.

Orange-bellied Parrot (Critically Endangered: EPBC Act and FFG Act)

The Orange-bellied Parrot occurs primarily in saltmarsh and adjacent grassland and pasture when present in mainland Australia (Recovery Plan). In spring, the species migrates to Melaleuca in southwestern Tasmania to breed, returning to parts of the Victorian and southeast South Australian coastline in autumn to spend the non-breeding season (Recovery Plan). During the non-breeding season, in coastal Victoria, the species primarily feeds on the saltmarsh plants Beaded Glasswort, Austral Seablite and Shrubby Glasswort (Recovery Plan). Orange-bellied Parrots have declined primarily due to degradation and loss habitat, particularly from development and land use changes, inappropriate hydrological regimes and invasive weeds, as well as from loss of genetic diversity and inbreeding, although many other threatening processes are known or suspected (Recovery Plan).

There were nine VBA records from within the search area, with none occurring within the project area.

Potential habitat for this species occurs in the study area in coastal saltmarsh adjacent to the shore crossing, and in estuarine wetland and adjacent pasture behind the coastal dunes. The Orange-bellied Parrot population is understood to be increasing, and it is likely that as current trends continue, they will have a correspondingly increased presence in former parts of their range, with the potential to include the region where the project is located.

Powerful Owl (Vulnerable: FFG Act)

The Powerful Owl prefers open and tall wet sclerophyll forests with sheltered gullies and old growth forest that provide large old hollow-bearing trees required for nesting (Higgins 1999). The species is also found in dry forests with Box-Ironbark eucalypts and River Red-gum and may also occur in urbanised areas and pine plantations (Webster et al. 1999, Garnett and Crowley 2000). It shows a preference for roosting and breeding in gullies with dense vegetation (Higgin 1999).

A total of 48 VBA records of Powerful Owl was found within the search area (Figure 8-6). The Powerful Owl was not recorded in the project area during targeted surveys. It was, however, recorded at three sites in the wider study area during previous targeted surveys. It is expected that the Powerful Owl occurs throughout suitable forest and woodland habitat in the wider region, including in the project area. Suitable forest and woodland habitat comprise larger, more intact remnant tracts such as Woodside H28 Bushland Reserve.

Swift Parrot (Critically Endangered: EPBC Act and FFG Act)

The Swift Parrot is a nectar-feeding parrot that prefers select species of eucalypts but will also forage from banksia and lerp (Higgins 1999). This species breeds in Tasmania and travels to the mainland in autumn, where it usually occurs on the inland slopes of the Great Dividing Range in Victoria, New South Wales or coastal areas of New South Wales. The species does travel to south-east Queensland on occasion.

There were two VBA records from within the search area. A pair of Swift Parrots was observed by Biosis at Reeves Beach in April 2020 (Figure 8-5). Coastal Banksia was in flower with many lorikeets feeding in it. It is likely that these Swift Parrots had recently migrated from Tasmania and were feeding in the flowering Coastal Banksia.

There are a few key foraging trees within the study area, including Yellow Box, which was present in small numbers. While Swift Parrots were recorded at Reeves Beach, this is not a regular occurrence. It is possible that Swift Parrots could occasionally occur in the project area in association with woodland patches and scattered trees.

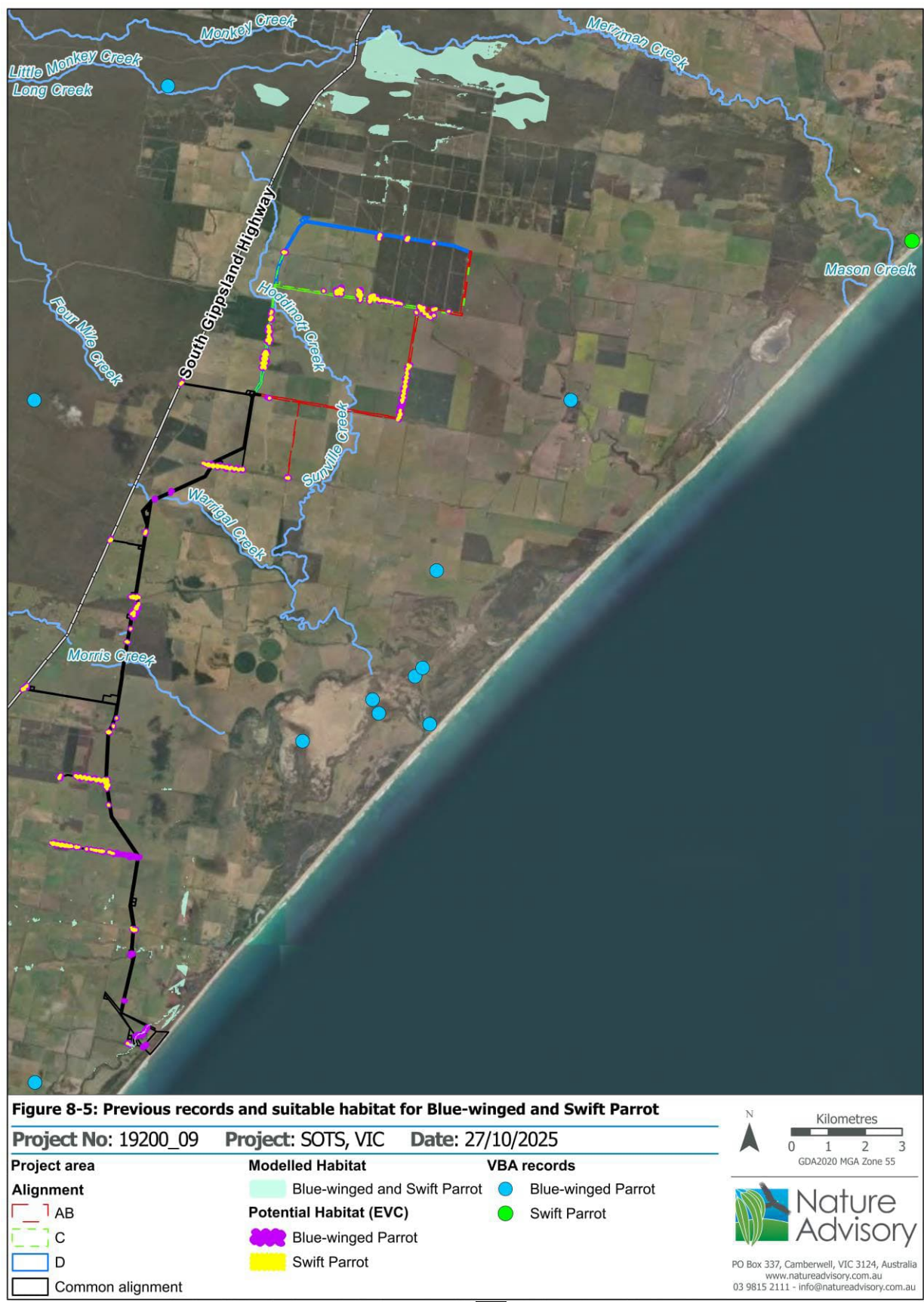
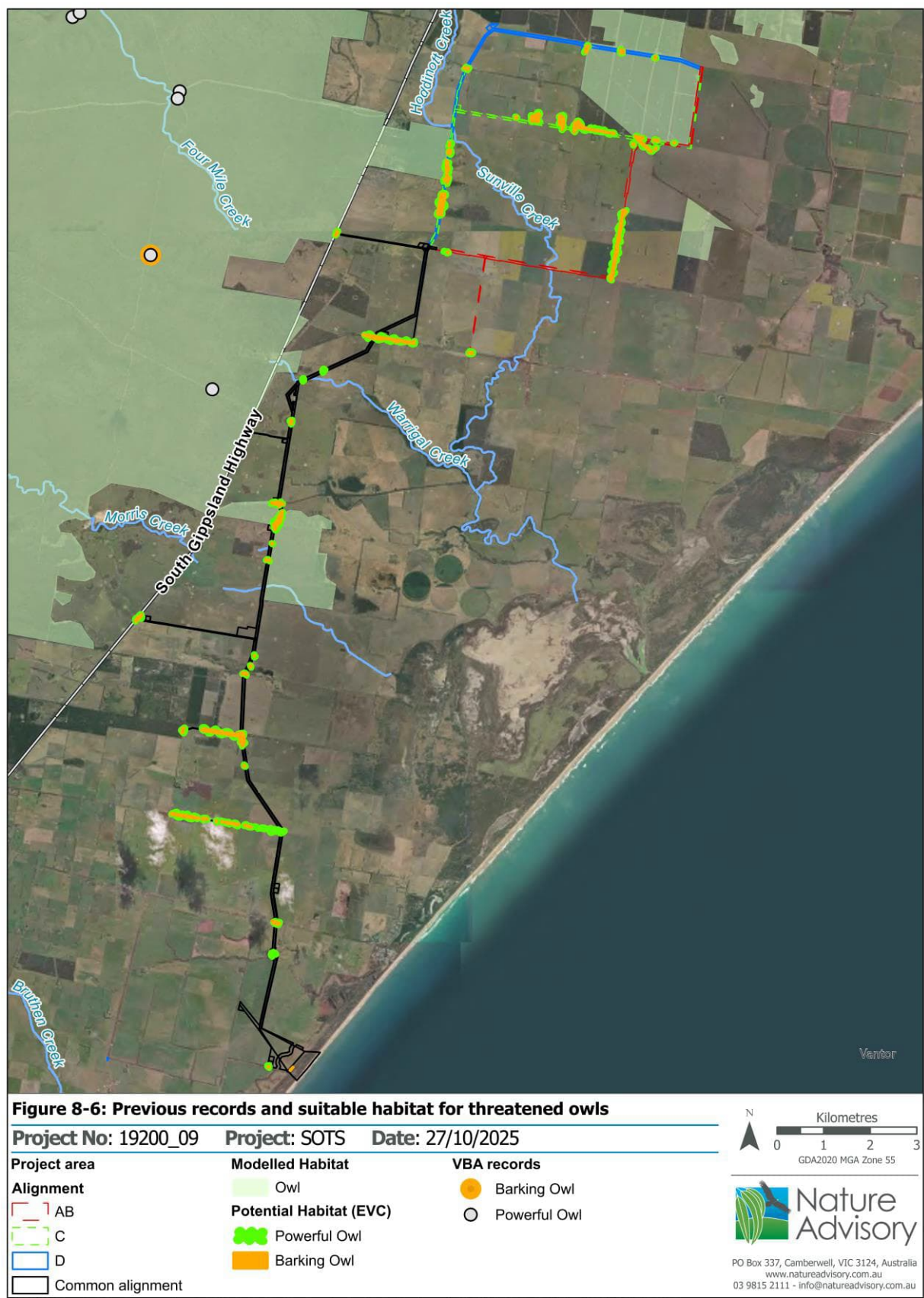


Figure 8-5 Previous records and suitable habitat for Blue-winged and Swift Parrot



19200_09 Figure 8-6: Previous records and suitable habitat for threatened owls - Created by: X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-6 Previous records and suitable habitat for threatened owls

Threatened raptors

Threatened raptors that may be present are the Little Eagle, White-bellied Sea-eagle and Black Falcon. The preferred habitats of each species are summarised, followed by an assessment of their status in the study area and adjacent habitats.

Little Eagle (Vulnerable: FFG Act)

The Little Eagle occurs in wooded and forested lands and open country. It is most abundant in open forest and woodland (Marchant & Higgins 1993).

Thirteen VBA records were found in the search area.

Habitat is present across the project area, as well as in the database search area. This species is considered likely to occur in the project area at low density.

White-bellied Sea-eagle (Endangered: FFG Act)

Preferred habitats include maritime habitats, terrestrial large wetlands, and coastal lands of tropical and temperate Australia and offshore islands. These eagles range inland only over large rivers and wetlands. The species usually breeds on the coast, on offshore islands, and inland beside large lakes or rivers, usually in tall trees in or near water. They have also been found breeding on cliffs, rock pinnacles and escarpments (Marchant and Higgins 1993).

A total of 76 VBA records were found within the search area, with none found in the project area.

Suitable habitat occurs along the coast in the project area, and an individual was observed flying along the coast elsewhere in the wider study area. This species is considered likely to occur in the coastal part of the project area (Figure 8-7).

Black Falcon (Critically endangered: FFG Act)

The Black Falcon prefers woodland, open country and terrestrial wetlands and, further inland, open plains and undulating land with large tracts of low vegetation. It is more commonly found in north-western Victoria and is only occasionally found in southern Victoria. It is a highly mobile species, moving in response to food availability and seasonal conditions (Marchant and Higgins 1993).

One Black Falcon record was found in the broader area, but not in the project area.

This species is nomadic, moving across the landscape in response to food availability. When moving to coastal regions of Australia after inland breeding events, Black Falcons may very occasionally be found in the project area (Figure 8-7).

Fork-tailed Swift and White-throated Needletail

These two species are listed migratory birds that breed in the northern hemisphere and migrate to Australia during the southern winter. Here, they spend most of their time at moderate heights above a range of habitats, foraging on airborne insects from the vegetation below.

Fork-tailed Swift (Migratory: EPBC Act)

The species can occur in wet sclerophyll forest but mainly prefers open forest or plains. It is almost exclusively aerial and feeds up to hundreds of metres above the ground, although it has been observed feeding among branches in open forest canopies (Higgins 1999).

One VBA record of this species was found within the search area, and none within the project area.

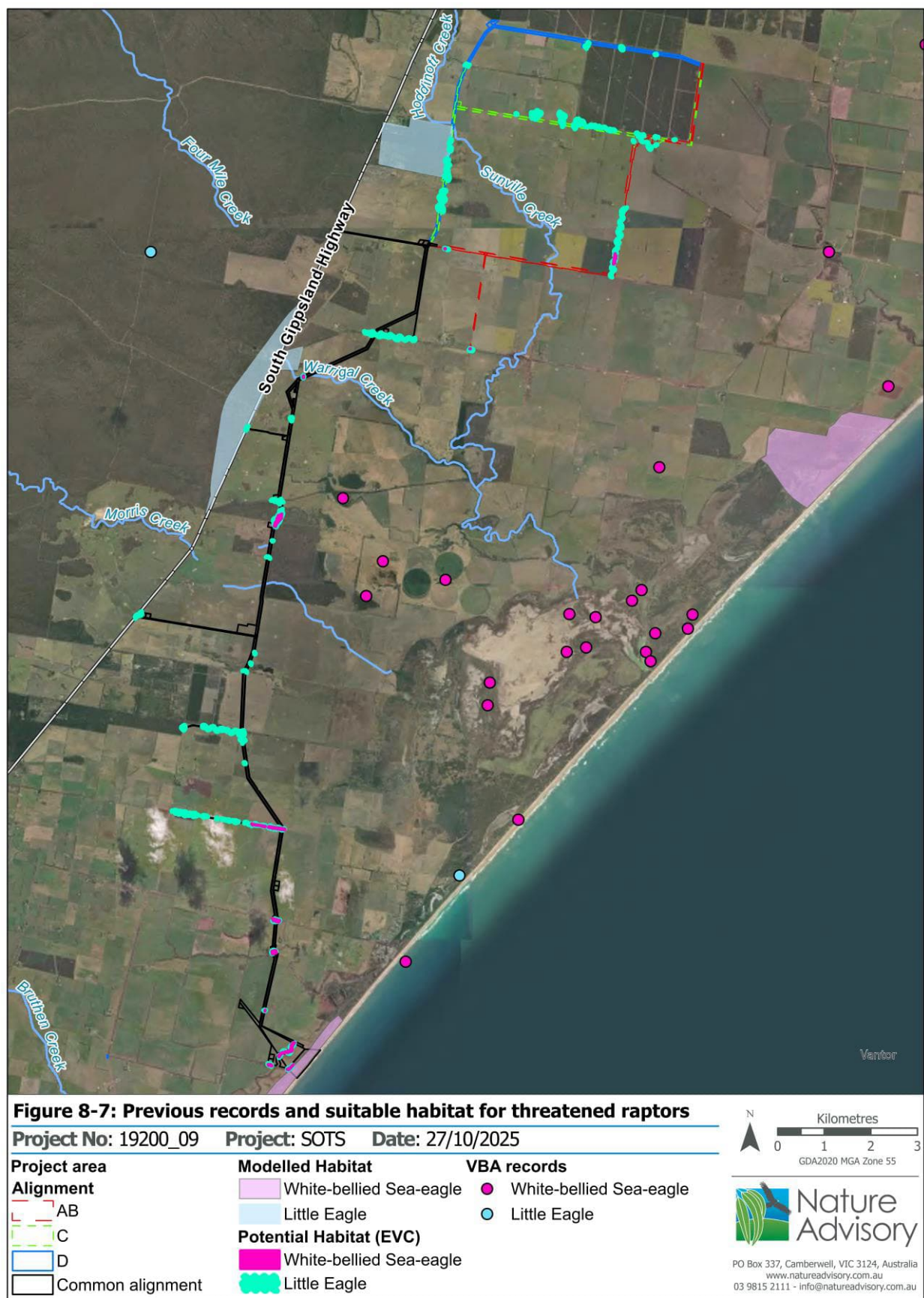
This species may fly over the project area occasionally in small numbers, foraging on insects. It is usually present in south-eastern Australia from November to April.

White-throated Needletail (Vulnerable and Migratory: EPBC Act and Vulnerable: FFG Act)

This species is predominantly aerial, flying high or low depending on insect abundance, over all habitat types in the study area. It shows a preference for wooded areas, including open forest and rainforest. It is often observed flying over heathland and, less often, above treeless areas such as grassland, swamps and farmland (Higgins 1999).

A total of 47 VBA records were found within the search area, with none found in the project area.

This species is likely to fly over the project area to forage on insects. It is usually present in south-eastern Australia from November to April, with numbers peaking in mid-to-late summer.



19200_09 Figure 8-7: Previous records and suitable habitat for threatened raptors - Created by: X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-7 Previous records and suitable habitat for threatened raptors



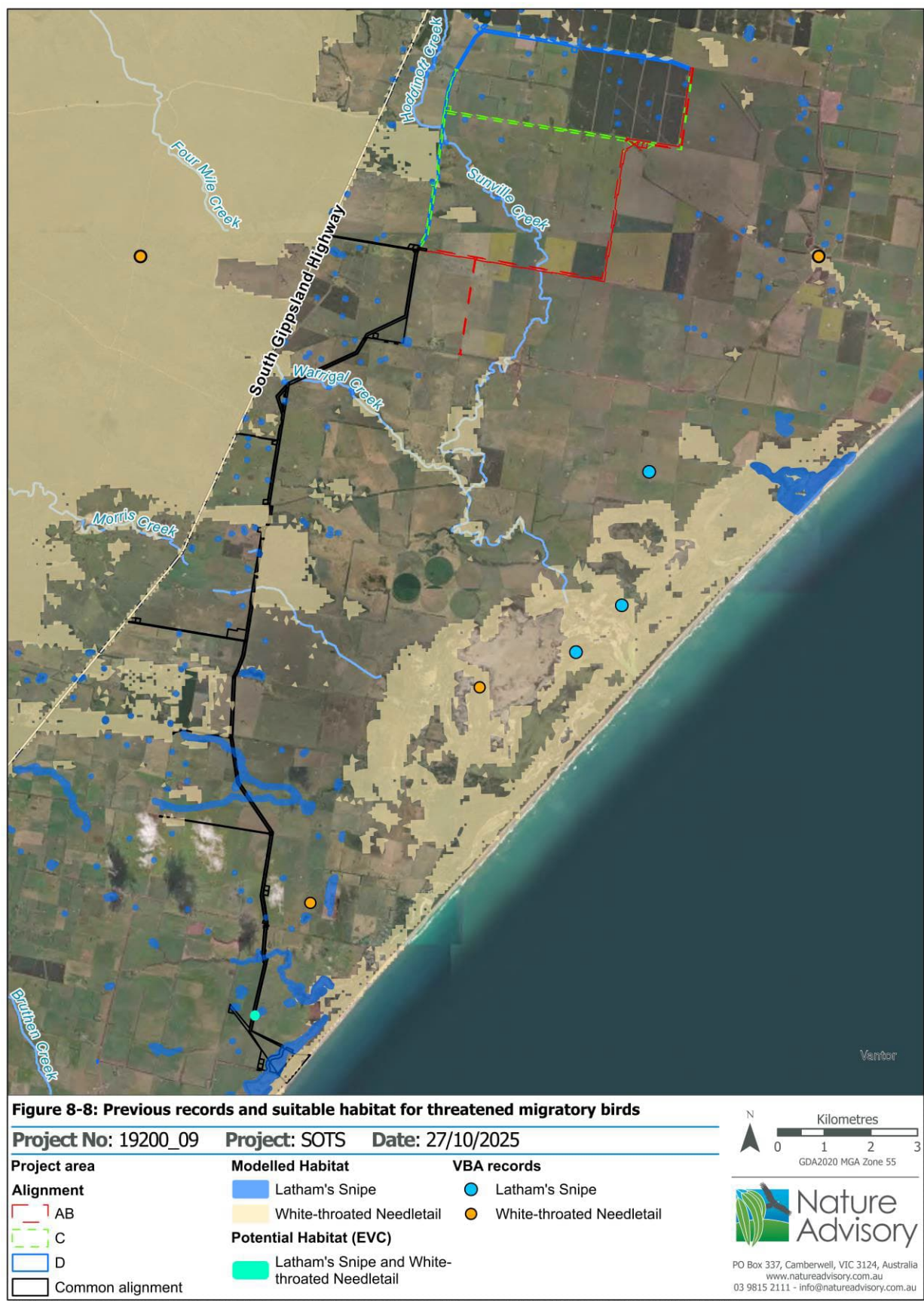


Figure 8-8 Previous records and suitable habitat for threatened migratory birds

8.3.2. Mammals

Three listed mammal species had a 'likely' or 'possible' likelihood of occurrence in the project area (New Holland Mouse, White-footed Dunnart and Grey-headed Flying-fox). These species are discussed below.

In addition, the occurrence of the Strzelecki population of Koalas was confirmed in the project area from the VBA. Given its unique status, it is also considered here.

Small ground-dwelling mammals

A review of VBA records of threatened small mammal species within the search area was undertaken. Two threatened ground-dwelling mammal species were found to have a 'possible' likelihood of occurrence in the project area: New Holland Mouse and White-footed Dunnart. These species are discussed below. No threatened mammals were detected by hair tube surveys in the broader area.

New Holland Mouse (Vulnerable: EPBC Act and Endangered: FFG Act)

The New Holland Mouse most commonly occupies dry coastal heath or heathy sclerophyll forest, preferably with deeper topsoils and softer substrates for digging and burrowing. Home ranges of the New Holland Mouse can range from 0.44 ha to 1.4 ha (Lazenby et al. 2008).

Eighteen records of New Holland Mouse were found within the search area, dating back to the 1970s, with none falling within the project area (Figure 8-9).

New Holland Mouse records were confined to the Stradbroke Flora and Fauna Reserve—well outside the current project area. This suggests that the project area, which has no records, is unlikely to support habitat critical to the species' survival, even though the species has been assumed present in areas of suitable habitat

White-footed Dunnart (Vulnerable: FFG Act)

White-footed Dunnarts occur in south-eastern mainland Australia and Tasmania in a range of habitats, including coastal areas, grassland, sedgeland, wet heath and forests. They make nests from bark under fallen logs or dense leaf litter.

Seven VBA records of White-footed Dunnart were found within the search area, almost all confined to Holey Plains State Park, which lies north of the project area. The distribution of records and absence of records in or adjacent to the project area, suggests that the project area is unlikely to support habitat critical to the species' survival, even though the species has been assumed present in areas of suitable habitat.

Grey-headed Flying-fox (Vulnerable: EPBC Act and FFG Act)

This species roosts during the day in aggregations of various sizes of up to thousands of individuals on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation. Colonies also use highly modified and planted vegetation in urban and suburban areas (DAWE 2021).

One VBA record for this species was found within the search area—outside the project area (Figure 8-9).

There have been temporary camps in nearby parts of Gippsland the past, in Traralgon and Woodside, and further afield in Bairnsdale. DEECA have advised that the species has been recorded in recent years in large numbers (>1000) foraging in Coast Banksia Woodland along Ninety Mile Beach. DEECA has recorded recent camps at Snake Island and Welshpool and another suspected camp in the vicinity of Jack Smith Lake and advised the species has been recorded in recent years in large numbers (>1000) foraging in Coast Banksia Woodland along Ninety Mile Beach. These records indicate a large portion of

the population are relying on the Coastal Banksia Woodland as a food source (DEECA, pers comm. 11 August 2025).

This species is considered likely to forage in flowering trees in the project area and may roost in the area at times particularly when eucalypts and banksias are flowering heavily, producing lots of nectar. This is unlikely to occur every year given the sporadic nature of eucalypt flowering and the wide-ranging movements of the flying fox.

Koala (Strzelecki population)

Although Koalas are not currently listed as a threatened species in Victoria, the Koalas of the Strzelecki Ranges and South Gippsland represent one of the few remaining original populations of the species in Victoria. It has comparatively high genetic diversity compared with the mostly re-introduced populations elsewhere in the state. Hunting and land clearing in the early 20th century almost drove the Koala to extinction in south-eastern Australia. The majority found in Victoria and South Australia come from a few translocated individuals and, therefore, have very low genetic diversity (Lee et al. 2011; Wedrowicz et al. 2017).

No targeted Koala surveys were conducted during the 2020 survey; however, Koalas were recorded during field surveys for other species and there are many VBA records around the project area. Koalas are likely to occur in suitable (treed) habitat within the project area.

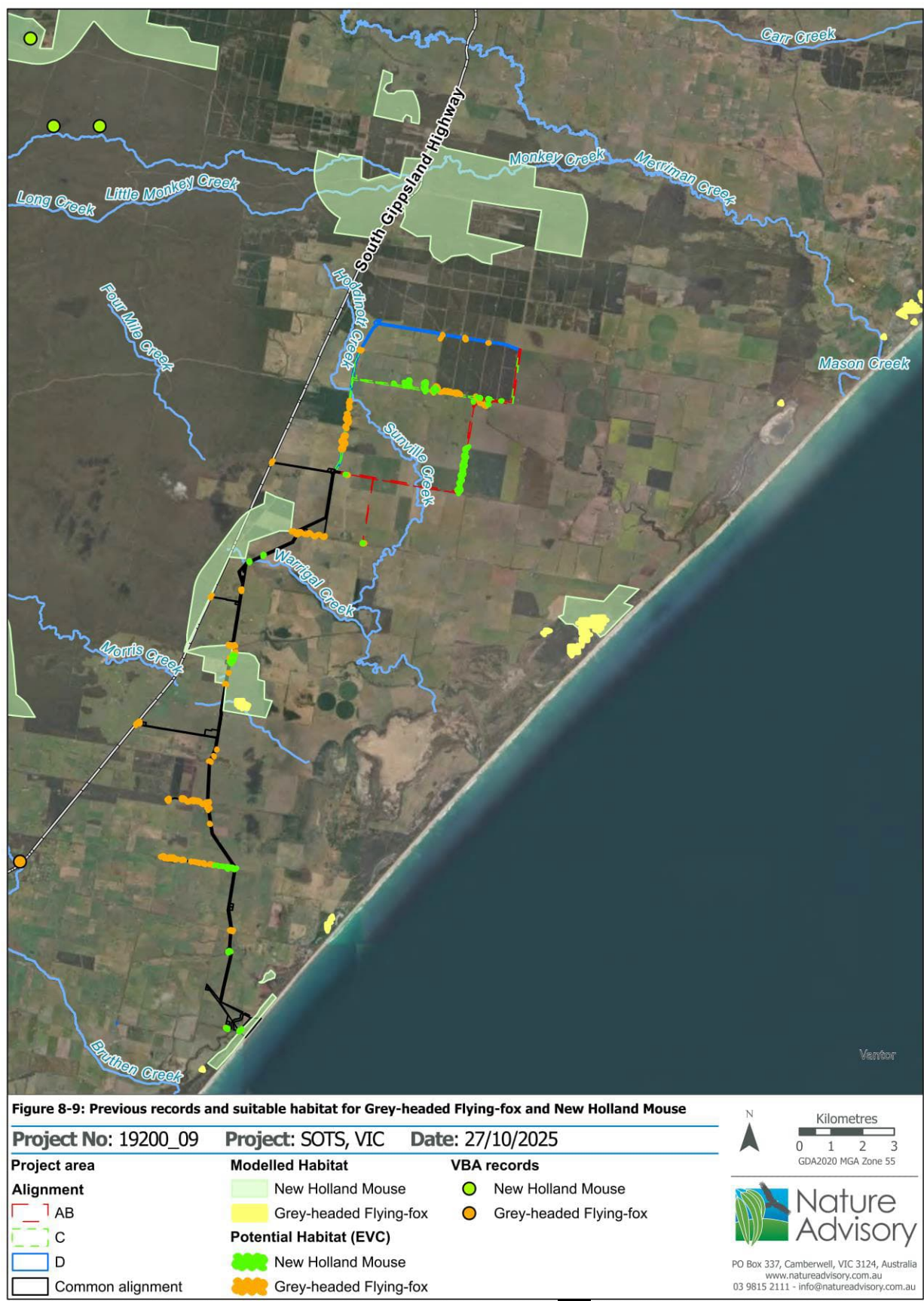


Figure 8-9 Previous records and habitat for Grey-headed Flying-fox and New Holland Mouse

8.3.3. Reptiles

Three reptile species were found to have a 'possible' or 'likely' likelihood of occurrence in the project area: the Glossy Grass Skink, Swamp Skink and Lace Monitor. They are discussed below.

Swamp Skink (Endangered: FFG Act; Endangered: EPBC Act post referral decision)

The Swamp Skink is found in cool temperate, low-lying wetlands, swamp margins, Melaleuca or Leptospermum thickets and tidal saltmarshes and sedgelands, and is often restricted to densely vegetated swamps and associated waterways and adjacent wet heaths (Cogger 2018; SWIFFT 2020a).

Threats to the species include habitat loss caused by fragmentation through clearing and road and drain construction, drainage of wetlands resulting in changes to hydrology, loss of vegetation due to grazing, predation by feral predators and introduced weeds (SWIFFT 2020a).

There were two VBA records of Swamp Skinks in the search area (dating back to 1977) and none in the project area (Figure 8-10). Biosis recorded an incidental observation of a Swamp Skink in the study area at the sand dunes at Reeves Beach (Figure 10 7). On this basis, potential habitat for the species within the project area was mapped and subject to targeted surveys from November 2024 to January 2025. The lack of individuals detected during targeted surveys meant that this species was subsequently assessed as unlikely to occur in the project area, apart from within the vegetated sand dunes at the shore crossing. The vegetated sand dunes at the shore crossing were not subject to targeted surveys, and so the species has been assumed present there, but no impacts to the habitat in this area will occur due to the use of HDD. As such, this species is not discussed further.

Swamp Skink was listed under the EPBC Act on 25 March 2023 after the referral decision for the project and is therefore not considered a MNES in this instance. The species is listed as threatened under the FFG Act and is therefore considered as a state-listed species in this report.

Lace Monitor (Endangered: FFG Act)

The Lace Monitor inhabits well-timbered areas from dry woodland to wet southern forests and rainforest (Wilson & Swan 2010).

A total of 66 VBA records of Lace Monitors in the search area were found.

Suitable woodland and forested habitat occurred in the project area. Lace Monitors were recorded within the study area several times during field surveys.

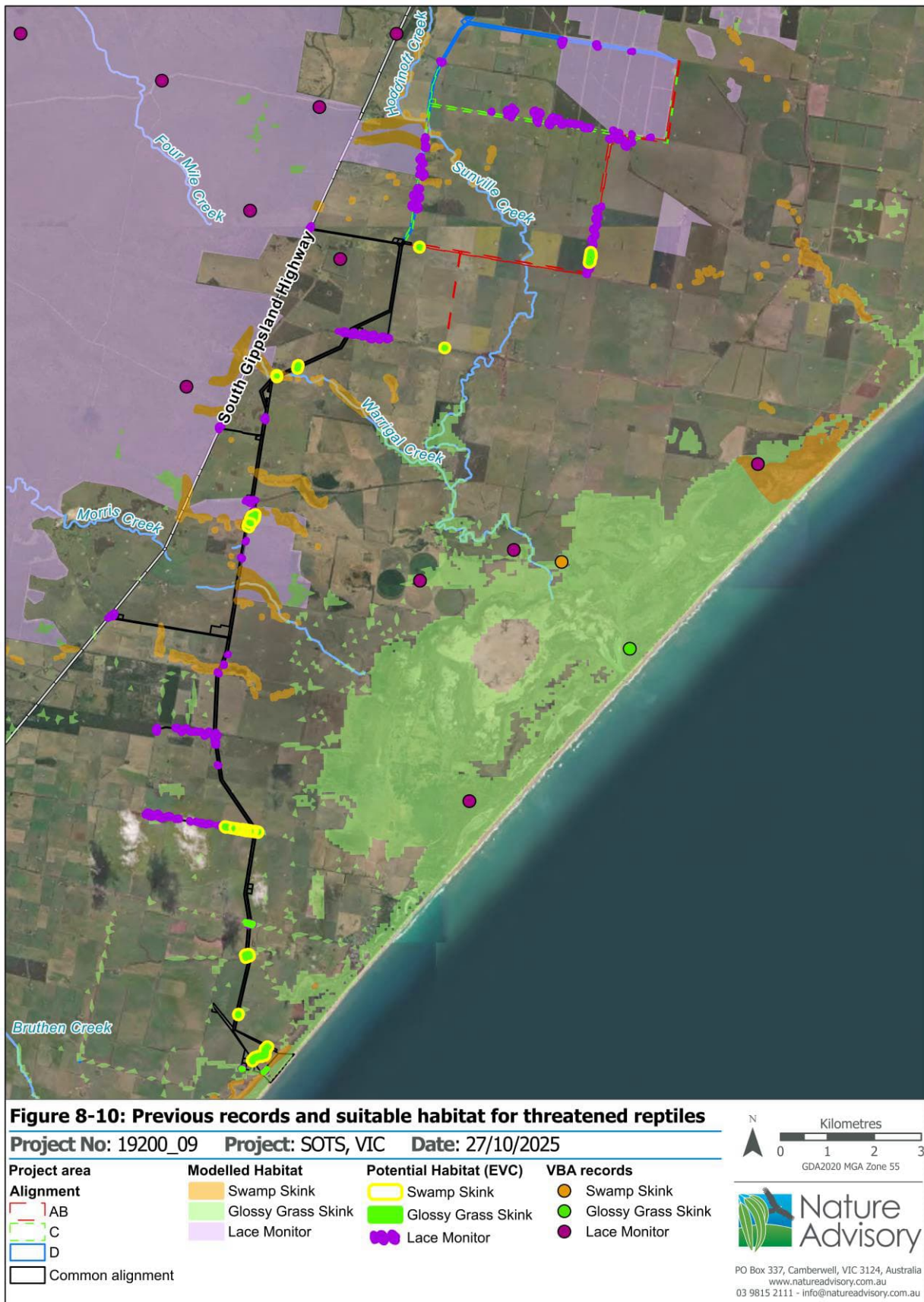
As Figure 8-10 shows, this species is widespread in the region, being protected in conservation reserves. The small area of habitat in the project area does not represent habitat critical to the species' survival.

Glossy Grass Skink (Endangered: FFG Act)

The Glossy Grass Skink is found among rushes, grasses, rotting logs and low dense vegetation in moist areas bordering swamps and watercourses (Cogger 2018).

Threats to the species include habitat loss caused by fragmentation through clearing and road and drain construction, drainage of wetlands resulting in changes to hydrology, loss of vegetation due to grazing, predation by feral predators and introduced weeds (SWIFFT 2020a).

Nine VBA records of Glossy Grass Skinks in the search area were found (Figure 8-10). Glossy Grass Skinks were recorded in the study area during the targeted surveys in 2024-2025 and, as such, are considered to occur throughout suitable habitat



19200_09 Figure 8-10: Previous records and suitable habitat for threatened reptiles - Created by [redacted] X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-10 Previous records and habitat for threatened reptiles

8.3.4. Frogs

Two frog species have a 'possible' or 'likely' likelihood of occurrence within the project area. A further two frog species were initially considered to have a 'possible' likelihood of occurrence, but this was revised to 'unlikely' following the results of targeted surveys. These species are discussed below. Previous records are shown in Figure 8-11.

Southern Toadlet (Endangered: FFG Act)

The Southern Toadlet is generally found at lower elevations in damp areas of wooded, heathy and grassy habitats, usually under leaf litter. It does not necessarily occur near permanent water and can live in areas of ephemeral water flows. This species has a small home range of approximately 5 metres from its breeding sites (SWIFFT 2020).

A lack of data on species ecology and populations status, habitat loss, changes to hydrology, habitat destruction, other environmental factors (such as salinity, pesticides and disease), climate change and Chytrid fungus are identified as threats to the Southern Toadlet (SWIFFT 2020).

A total of 109 VBA records of Southern Toadlet were found in the search area, with none found within the project area (Figure 8-11).

Surveys outside the project area recorded three individuals calling during call-playback searches beside Hollands Road in Stradbroke Flora and Fauna Reserve. Two individuals were found during tile grid searches. One was within the Giffard Flora and Fauna Reserve and the other in Stradbroke Flora and Fauna Reserve. Both of those reserves are several kilometres from the project area. All sites where the species was observed were comprised of large depressions, appearing to only be inundated seasonally, and dominated by sedge.

Targeted surveys for the Southern Toadlet have not been undertaken in the project area. It is likely that Southern Toadlets occur in parts of the project area where extensive native vegetation remains in gullies and low points in the landscape in or adjacent to areas of forest/woodland habitat.

Martin's Toadlet (Critically Endangered: FFG Act; Endangered: EPBC Act post referral decision)

Martin's Toadlet is found in dry forests, woodlands, shrublands, grasslands and disturbed areas near still water or in ephemeral floodplains and semi-permanent swamps and ponds of moderate size with no apparent flow. This species has only been found near water bodies with adjacent woodland or coastal scrub (DELWP 2015). It has a small home range of approximately 5 metres from its breeding site (DELWP 2015).

A lack of data on species ecology and populations status, habitat loss, changes to hydrology, habitat destruction, other environmental factors (such as salinity, pesticides and disease), climate change and Chytrid fungus are identified as threats to the Martin's Toadlet (DELWP 2015).

There were 22 VBA records of Martin's Toadlet in the search region between 1990 and 2011 (Figure 8-11). None of these records were within the project area.

Martin's Toadlet was not recorded in the project area during targeted surveys (one survey was undertaken in 2024). However, the 2024 survey was conducted at the end of the survey season for the species, and two out of the three survey-nights were windy, possibly discouraging the species from calling if present. Additionally, the species was recorded in the surveys elsewhere in the local area with five individuals heard calling at a site near Old Rosedale Road west of the project area (Figure 8-11). One of those individuals was confirmed by sight. Therefore, the species has been assumed present in the project area, in all areas of potential habitat.

Potential habitat for Martin's Toadlet in the project area is limited in extent (Figure 8-11).

Martin's Toadlet was listed under the EPBC Act on 15 November 2023 after the referral decision for the project and is therefore not considered a MNES in this instance. The species is listed as threatened under the FFG Act and is therefore considered as a state-listed species in this report.

Green and Golden Bell Frog (Vulnerable: EPBC Act)

Green and Golden Bell Frog breeds in open wetland habitats within woodlands, shrublands and grasslands, and uses the surrounding terrestrial habitat for foraging (DEWHA 2010). They prefer still or slow-flowing water for breeding, and breeding wetlands must have a good cover of aquatic vegetation and be capable of holding water from September-February (DEWHA 2010). It is a relatively mobile frog species, capable of moving 1.5 kilometres in a single night, and readily uses terrestrial habitat <200 metres from aquatic habitat (DEWHA 2010).

Habitat loss, changes to hydrology, habitat destruction, invasive predatory fish species, other environmental factors (such as salinity, pesticides and disease), climate change and Chytrid fungus are identified as threats to the Green and Golden Bell Frog (DEWHA 2010).

There were no VBA records of Green and Golden Bell Frog in the search region.

Green and Golden Bell Frog was not recorded in the project area during targeted surveys. As the surveys were conducted in accordance with the survey guidelines (DEWHA 2010), the species is now considered absent from the project area.

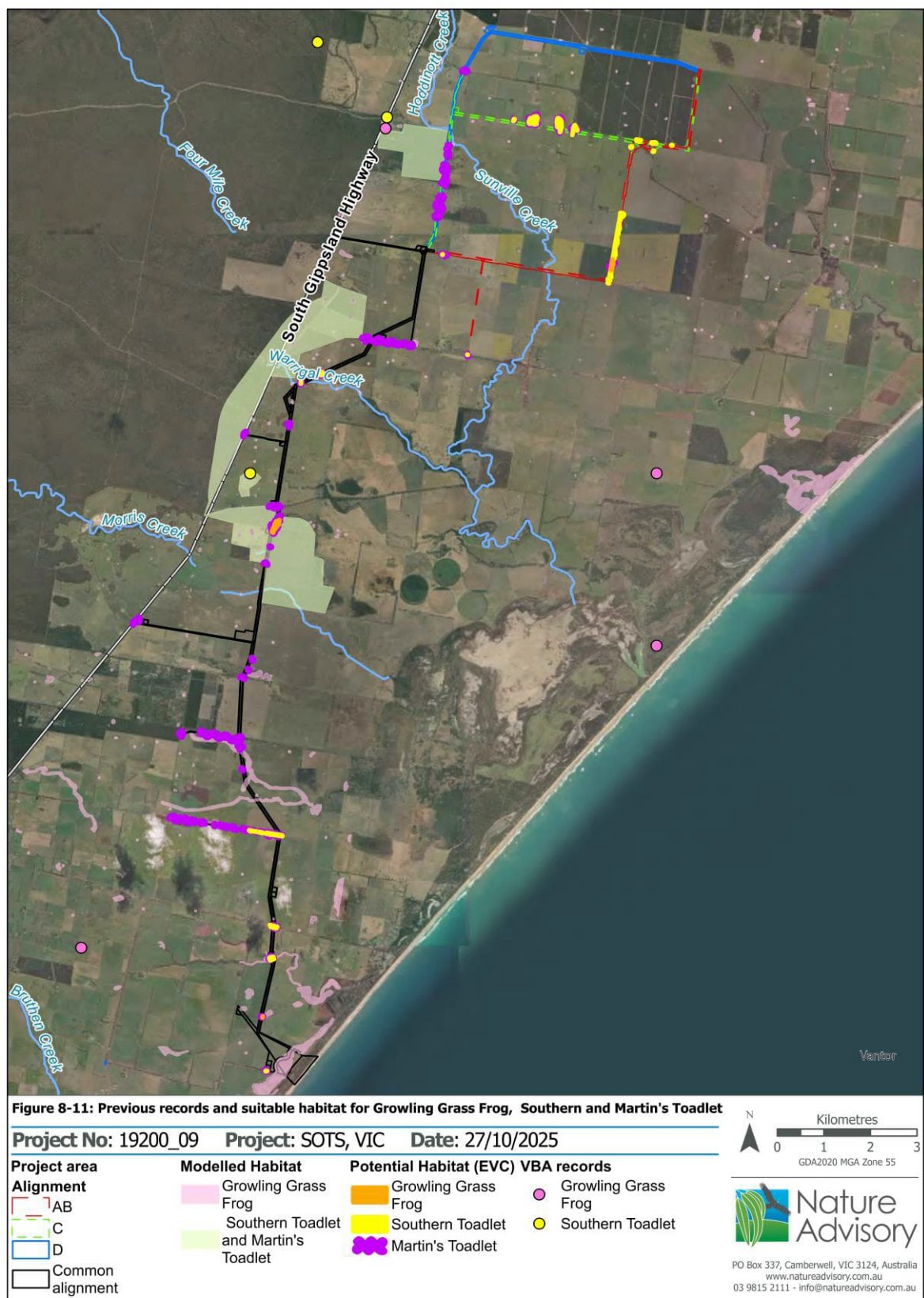
Growling Grass Frog (Vulnerable: FFG Act; Vulnerable: EPBC Act)

Growling Grass Frog breeds in open wetland habitats within woodlands, shrublands and grasslands, and uses the surrounding terrestrial habitat for foraging (DEWHA 2009). They prefer still or slow-flowing water for breeding, and breeding wetlands must have a good cover of aquatic vegetation and be permanent (DEWHA 2009). It is a relatively mobile frog species and readily uses terrestrial habitat <200 metres from aquatic habitat (DEWHA 2009b).

Habitat loss, changes to hydrology, habitat destruction, invasive predatory fish species, other environmental factors (such as salinity, pesticides and disease), climate change and Chytrid fungus are identified as threats to the Growling Grass Frog (DEWHA 2009).

There were 4 VBA records of Growling Grass Frog in the search region between 1788 and 1977 (Figure 8-11). None of these records were within the project area.

Growling Grass Frog was not recorded in the project area during targeted surveys. As the surveys were conducted in accordance with the survey guidelines (DEWHA 2009), the species is now considered absent from the project area.



19200_09 Figure 8-11: Previous records and suitable habitat for Growling Grass Frog, Southern and Martin's Toadlet - Created by: [redacted] X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-11 Previous records and habitat for Growling Grass Frog, Southern and Martin's Toadlet

8.3.5. Aquatic species

Australian Mudfish (Endangered: FFG Act)

Australian Mudfish are diadromous, meaning they have a marine phase in their life cycle. Spawning is believed to occur in mid-winter in freshwater habitats, where eggs and/or larvae are carried downstream to estuarine and marine environments. By spring, juveniles in the "whitebait" phase begin migrating from saline waters into freshwater habitats, including swampy areas, drains, and semi-permanent wetlands with abundant aquatic vegetation. The species can tolerate short periods without water by aestivating, either by burrowing into mud or seeking shelter under rocks and logs.

There were no existing records of the species in the VBA and the species was not detected during the targeted survey. However, the species is cryptic, there is a paucity of records, and little is known about their actual distribution along the Victorian coastline. According to the State Wide Integrated Flora and Fauna Teams (SWIFFT) website, habitat distribution models suggest the species could occur along the coast of central Gippsland but only know records of adult Australian Mudfish between 2000 and 2025 are from a tributary drain of Barham River near Apollo Bay and Aire River drain and Maribyrnong Rier upstream in the Niddrie area

As the project area is within the modelled distribution of the species and there is little known about their occurrence along the Victorian coastline, it is assumed that Australian Mudfish may move along unnamed waterway UFI 42824679 in the shore crossing area between the Bruthen Creek estuary and Freshwater Swamp. It is unlikely the species would successfully aestivate in mud substrate due to access by stock pugging the substrate. It is possible Australian Mudfish occurs within the study area at least during movements between freshwater swamp and estuarine habitats when flows facilitate connection.

Dwarf Galaxias (Vulnerable: EPBC Act and Endangered: FFG Act)

The species can occur in habitats that are ephemeral and partially or completely dry up during summer, where the wetlands/waterways rely on seasonal flooding and linkages to more permanent waterbodies, including connectivity to rivers and creeks. Dwarf Galaxias are also understood to seek refuge in freshwater crayfish/yabby burrows and are capable of aestivating (dormancy) in damp mud during drier periods (DAWE 2021, Saddler et al. 2010).

There were no existing VBA records for Dwarf Galaxias within the project area or any of its immediate catchments, with the nearest records occurring approximately 30 kilometres west in Flynns Creek and 30 kilometres north near Longford, all associated with the Latrobe River catchment (Figure 8-12). A single female Dwarf Galaxias was also recorded in Merriman Creek in 2021. Merriman Creek is approximately 7 kilometres to the north of the project area. Additionally, recently unearthed 2012 records indicate a significant population occurs in Monkey Creek, a tributary of Merriman Creek approximately 5 kilometres north- of the project area (Jenkin 2025, pers. comm., 12 February). Waterways crossed by the project area are not tributaries of (connected to) Monkey Creek or Merriman Creek as they flow to coastal wetlands and estuaries. The aquatic habitat assessment did not identify waterways as potential to support Dwarf Galaxias. The assessment acknowledged there is a record >10kilometres NW/N of the study area but there are no records in sub-catchments for most of the waterways. Survey in unnamed waterway UFI 42824679 did not detect the species. Dwarf Galaxias is therefore considered unlikely to occur.

Australian Grayling (Endangered: FFG Act; Vulnerable: EPBC Act)

Australian Grayling are diadromous, meaning they have a marine phase in their life cycle. Spawning is believed to occur in late-summer to mid-winter in the lower reaches of freshwater rivers, where eggs

and/or larvae are carried downstream to estuarine and marine environments. The precise timing of spawning is determined by specific hydrological cues like water velocity and temperature and occurs in a highly co-ordinated two-week window. Juveniles begin migrating from saline waters into brackish, then freshwater habitats, and inhabit freshwater environments by the time they sexually mature at one to two years of age. However, they are largely confined to permanent watercourses with hydrological connectivity to coastal marine environments.

There were two existing records of the species in the VBA, in Merriman Creek, both from 1976. However, the species was not detected during the targeted survey. As the surveys were conducted in accordance with the survey guidelines (DSEWPaC 2011), the species is now considered absent from the project area.

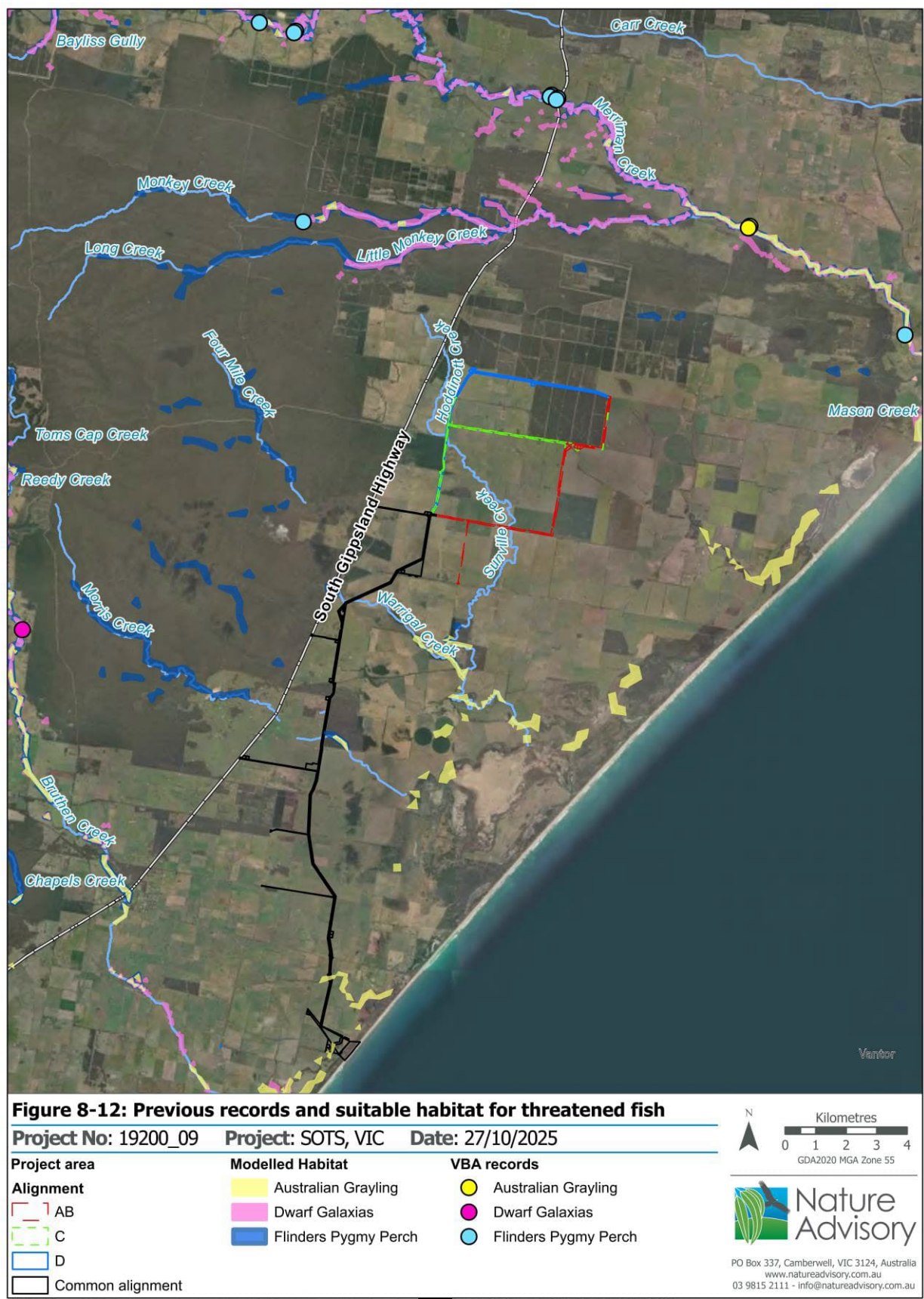
Flinders Pygmy Perch (Vulnerable: FFG Act)

Flinders Pygmy Perch inhabit a wide range of well-vegetated aquatic environments. These include low-gradient waterways and floodplains characterised by still or gently flowing streams, lakes, billabongs, drains, dams, swamps and ephemeral creeks, and wetlands and dense aquatic macrophyte cover or wood at shallow depths, which may have little or no flow in summer (DELWP 2021a).

Spawn occurs during spring to summer (September to January) at water temperatures $> 16^{\circ}\text{C}$ (Kuitert et al. 1996 in DELWP 2021a). Very little is known of the breeding biology of this species, although it is assumed that breeding behaviour is similar to that of the Southern Pygmy Perch, which lays demersal, non-adhesive eggs over aquatic vegetation and the substrate.

Similarly to Dwarf Galaxias, there were no existing VBA records for Flinders Pygmy Perch within the project area or any of its immediate catchments, with the nearest current records occurring in waterways associated with the Latrobe River catchment (Figure 8-12). There is also a 1998 VBA record in Monkey Creek, approximately 6 kilometres north of the project area.

Waterways which lack the flow connectivity required for the dispersal of Flinders Pygmy Perch are unlikely to support the species. The waterways crossed by the project area are not tributaries of (connected to) Monkey Creek or Merriman Creek as they flow to coastal wetlands and estuaries. There are no records of the species in the sub-catchments of the waterways. As such, the species is considered unlikely to occur.



19200_09 Figure 8-12: Previous records and suitable habitat for threatened fish - Created by: X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 8-12 Previous records and DEECA-modelled habitat for threatened fish

8.4. Pest species

Pest species observed in the project area during fauna surveys are listed in Table 8-3.

No pest fish or species listed as 'noxious aquatic species' under Section 75 of the *Fisheries Act 1995* were recorded in the surveyed waterways in the project area.

Table 8-3 Pest species recorded within the project area

Scientific name	Common name	CaLP Act status	Fisheries Act	EPBC/FFG Act threatening process
<i>Felis catus</i>	Feral cat	Established (on crown land only)	-	Predation of native wildlife by feral cats
<i>Canis lupus</i>	Domestic/feral dog	Established	-	-
<i>Oryctolagus cuniculus</i>	European Rabbit	Established	-	Competition and land degradation by rabbits. Reduction in biomass and biodiversity of native vegetation through grazing by the European Rabbit
<i>Mus musculus</i>	House Mouse	Established	-	-
<i>Vulpes vulpes</i>	Red Fox	Established	-	Predation of native wildlife by the introduced Red Fox
<i>Rusa unicolor</i>	Sambar Deer	Established	-	Reduction in biodiversity of native vegetation by Sambar Deer

9. Issues for assessment

This section provides framework and context for the impact assessments in Sections 10, 11 and 12.

The issues for assessment were identified by reviewing the project description for interactions between the key project components and the proposed construction, operations and decommissioning activities and sensitive receptors. These cause-and-effect pathways were designated as *impacts* or *risks* based on whether they relate to effects that are certain or uncertain.

Impacts are those pathways that are certain and typically relate to works associated with construction that involve direct removal of ecological values. Risks are those pathways that are uncertain and typically relate to mechanisms that have potential to affect ecological values. The identified issues are presented in Table 9-1. A maximum design scenario has been defined as the basis for the assessment and is presented at the start of each of Sections 10, 11 and 12. The tables indicate the residual impact or risk levels for each issue following the implementation of avoidance and mitigation measures. The complete impact and risk register is presented in Appendix 5.

9.1. Impact pathways

Onshore ecology impact pathways are identified in Table 9-1. Impacts are those pathways that are certain and typically relate to works associated with construction that involve direct removal of ecological values. As such, residual impacts are assigned a consequence level based on the method in Section 6.4.

Table 9-1 Onshore ecology assessment issues – impact pathways

Impact ID	Impact pathway	Residual impact rating	Section
Construction			
FFM-I001	Clearance of highly sensitive native vegetation Removal of patches of native vegetation that are endangered EVCs, high quality patches or areas of high Strategic Biodiversity Value.	Major	10.2.1
FFM-I002	Clearance of less sensitive native vegetation Removal of patches of native vegetation that are not endangered EVCs, high quality patches or areas of high Strategic Biodiversity Value.	Moderate	10.2.1
FFM-I003	Clearance of large trees (in patches or scattered) resulting in the direct loss of habitat for fauna (FFG Act listed threatening process) Removal of large trees (including hollow-bearing trees) that provide habitat for fauna leading to exacerbation of FFG Act threatening processes	Major	10.2.2
FFM-I004	Clearance of threatened ecological communities during construction Removal of EPBC Act-listed and FFG Act-listed threatened ecological communities.	Minor	10.2.3
FFM-I005	Clearance of native vegetation removing habitat for EPBC and FFG Act-listed threatened flora	Minor to Moderate	10.2.4

	Removal of habitat for EPBC Act and/or FFG Act listed flora		
FFM-I006	Clearance of vegetation providing habitat for EPBC and FFG Act-listed threatened fauna Removal of habitat for EPBC Act and/or FFG Act listed fauna	Negligible to Minor	10.2.5
FFM-I007	Clearance of native vegetation impacting FFG-protected flora	Minor	10.2.6
FFM-I008	Construction across waterways leading to loss of habitat Removal of aquatic habitat in the project area Altered flows that may affect upstream/downstream high-quality areas of habitat	Minor	10.2.7
Operation			
N/A			
Decommissioning			
N/A			

9.2. Risk pathways

Risk pathways are identified in Table 9-2. Risks are those pathways that are uncertain and typically relate to mechanisms that have potential to affect ecological values but are not definitely going to occur. Risks are attributed to the construction, operation and decommissioning phases of the project.

Table 9-2 Onshore ecology assessment issues – risk pathways

Risk ID	Risk pathway	Residual risk rating	Section
Construction			
FFM-R009	Clearance of native vegetation disrupting connectivity for wildlife (habitat fragmentation)	Low	10.3.1
FFM-R010	Indirect impacts leading to degradation or loss of native vegetation and habitat (inadvertent clearance, smothering, soil compaction, sedimentation, pollution, dust, noise, light) Loss or degradation of vegetation through advertent incursions, smothering by dust or misplacement of stockpile material, sedimentation and pollution. Possible disturbance to local fauna populations, deterrence from adjacent habitat	Low	10.3.2
FFM-R011	Introduction and spread of weeds, pest species or pathogens leading to the exacerbation of an EPBC Act and FFG Act threatening processes	Medium	10.3.3

	Reduction in ecological values from the introduction or spread of weeds, pest species or pathogens		
FFM-RO12	Fauna injury or mortality Risk of animals falling in and becoming trapped in trenches Risk of animals being run over by heavy machinery and vehicles Risk of collision with transmission lines Risk of aquatic fauna mortality during trench installation Risk of animals being injured or killed during habitat removal	Low	10.3.4
FFM-RO13	Alterations to groundwater hydrology during construction leading to a decline in the extent and health of Groundwater Dependent Ecosystems	Low	10.3.5
FFM-RO14	Initiation and/or exacerbation of other listed potentially threatening process under the EPBC Act and/or FFG Act	Low	10.3.6
FFM-RO15	Construction across waterways and/or groundwater change affecting the Corner Inlet Ramsar Site	Low	10.3.7
Operation			
FFM-RO16	Indirect impacts leading to degradation or loss of retained native vegetation and habitat Loss or degradation of vegetation through advertent incursions, smothering by dust or misplacement of stockpile material, sedimentation and pollution. Possible disturbance to local fauna populations, deterrence from adjacent habitat	Low	11.3
FFM-RO17	Introduction and spread of weeds and pathogens	Low	11.3
FFM-RO18	Prevention of regrowth of native vegetation contributing to ongoing habitat fragmentation Removal of re-established native vegetation and associated habitat.	Medium	11.3
FFM-RO19	Fauna mortality from increased traffic within the project area	Low	11.3
Decommissioning			
FFM-RO20	Removal of native vegetation Low risk as removal would be regrowth.	Low	12.3
FFM-RO21	Introduction and spread of weeds and pathogens Reduction in ecological values from the introduction or spread of weeds, pest species or pathogens	Low	12.3

FFM-R022	Indirect impacts leading to degradation or loss of retained native vegetation and habitat Loss or degradation of vegetation through advertent incursions, smothering by dust or misplacement of stockpile material, sedimentation and pollution. Possible disturbance to local fauna populations, deterrence from adjacent habitat	Low	12.3
FFM-R023	Fauna mortality from increased traffic within the project area Risk of animals being run over by heavy machinery and vehicles	Low	12.3

10. Construction assessment

This section discusses the potential impacts and risks associated with the project as a result of construction activities. It also describes the associated mitigation measures that aim to minimise these, which are summarised in Section 14.

Construction works proposed for the project will have direct and indirect impacts on ecological values. Direct impacts relate primarily to the losses of native vegetation and habitat that will occur due to construction activities. Removal of native vegetation will, in turn, result in losses of other ecological values that it supports, including threatened ecological communities, and habitats for threatened species and resident wildlife (both threatened and non-threatened). It will also contribute to the creation of new edge effects in protected-area estates (conservation reserves).

Construction activities may also potentially indirectly impact retained values adjacent to the project area. These are potential risks of impact associated with the project and comprise potential loss of trees through soil compaction and tree root damage, disruption of connectivity for wildlife (habitat fragmentation), injury or death of wildlife during habitat removal or due to increased traffic movements, and degradation or loss of retained vegetation and habitat through introduction or spread of weeds and pathogens, smothering of adjacent vegetation by inaccurate soil placement or dust, groundwater drawdown affecting water available to vegetation. Some of these risks relate to the exacerbation of threatening processes.

The impacts of construction activities are discussed below for each ecological value potentially impacted. Impacts have been assessed separately for large and small canopy trees in accordance with the *Guidelines for the Removal, Destruction and Lopping of Native Vegetation* (see Section 10.2.1). Measures to avoid and minimise impacts on ecological values are provided for each of the potential impacts associated with the construction, operation, and decommissioning stages of the project. Impacts which cannot be avoided, minimised or mitigated through implementation of these measures are referred to as *residual impacts*, and are discussed for each ecological value.

All impacts of the project will be considered and appropriately managed in accordance with the mitigation hierarchy in Section 6.6 (Figure 2-2).

10.1. Project parameters that form the basis of impact assessment

Table 10-1 specifies the maximum design scenario (MDS) that has been assessed for construction. This contains the ranges of project parameters, as specified in the project design envelope, that represent the greatest potential impact to an identified sensitive receptor or receptor group.

Table 10-1: Maximum design scenario, construction phase

Impact/Risk	Key parameter values	Justification
FFM-I001 – FFM-I008 FFM-R009 to FFM-R015	The works and infrastructure are located within the project area, which is defined by the area required for construction of the following: - Onshore Wind Farm transmission system infrastructure: - Up to 8 underground cable circuits with the following upper limit footprints: - Temporary construction corridor width between shore crossing and VicGrid connection hub: 60 m width incorporating a 40 m wide cable easement.	The project area defines the maximum land area to be directly impacted by construction of the project. Conservative loss calculations also assume indirect loss of native vegetation within 15 m of the project area where

Impact/Risk	Key parameter values	Justification
	◆ Trenchless crossing locations at: • Unnamed waterway - UFI:42824679 at Reeves Beach to reduce ecological impacts. • Woodside Beach Road to reduce disruption to the Woodside Beach township and avoid roadside vegetation impacts. ▪ Joints and bays at 1-km (approx.) intervals with upper limit joint footprints of 5 m x 15 m x 3 m (W/L/D) ▪ Other temporary construction infrastructure including access roads. • Shore crossing infrastructure: ▪ Trenchless shore crossing approaches with maximum length of 1400 m and depth of up to 35 m from entry level ▪ Transition joints and bays with upper limit footprints of 10 m x 30 m x 5 m (W/L/D) ▪ Temporary causeway across unnamed waterway (UFI:42824679). Up to 6m wide and constructed of rock or soil for the purpose of tracking vehicles and materials over the waterway during construction of the shore crossing. Temporary construction compounds with a typical footprint of 100 m x 100 m (W/L) at each location.	trees occur due to potential impacts on NRZs (treed patches or scattered trees)

To assess potential impacts associated with the project, the assessment has also considered the following assumptions and indicative construction techniques:

- Trenching construction techniques across each waterway that will take approximately two to three days to complete per trench and could be constructed during dry periods with minimal impacts on flow regime. Cable crossing installation durations may vary based on waterway width and technique utilised.
- That all vegetation and habitat would be removed within the project area to facilitate construction of the onshore underground transmission system
- Following construction, all cable trenches will be covered with topsoil and seeded with appropriate groundcover. Similarly, all joint bays will be covered with topsoil and seeded, leaving just the link pit lids above ground.

10.2. Impacts

10.2.1. Highly sensitive native vegetation loss (FFM-I001) and less sensitive native vegetation loss (FFM-I002).

Native vegetation is protected under the P&E Act and its removal usually requires a permit in Victoria, unless an exemption applies. In the case of this project, native vegetation loss will be addressed through a Planning Scheme Amendment (PSA). Nevertheless, the requirements of the *Guidelines for the removal destruction and lopping of native vegetation* are required to be applied in accordance with the Victorian EES Scoping Requirements for the project.

Native vegetation provides habitat for wildlife and delivers a range of ecosystem services that make land more productive and contribute to human wellbeing (COAG Standing Council on Environment and Water 2012). Native vegetation is also protected under the EPBC and FFG Acts when it meets the criteria for a listed TEC, provides habitat for a listed threatened species, or is a threatened or protected flora species. Native vegetation impacted by the project are shown in Figure 10-1. For the purposes of this impact assessment, highly sensitive native vegetation refers to endangered EVCs, high quality patches and areas of high Strategic Biodiversity Value.

Potential impacts

Native vegetation within the project area includes patches of native vegetation, large trees in patches and scattered trees (large and small). The dominant EVCs include Lowland Forest, Heathy Woodland and Plains Grassy Forest (all with bioregional conservation status of vulnerable), which support a high density of large trees, but only in the Woodside H28 Bushland Reserve. Outside the conservation reserve, habitat corridors on roadsides also support large trees. The removal of canopy trees (including large trees) from conservation reserves and roadside reserves may fragment habitat links and dispersal corridors between larger areas of native vegetation and habitat (habitat fragmentation – see Section 10.3.1).

Losses of native trees, particularly large trees, will impact habitat available to fauna in the form of foraging resources, and nesting and roosting habitat (Section 10.3.1). These trees and the resources they provide can take many years to become established and, therefore, to replace through revegetation.

Additionally, small areas of the endangered EVC, Swamp Scrub would be impacted.

Management and mitigation

Adjustments to the alignment have been made as the project area was refined to avoid sensitive ecological values and, where practicable, reducing working widths near ecological values adjacent to road reserves, conservation reserves (FFM-M009) and private land containing native vegetation (FFM-M001).

Key locations where the project has avoided and minimised impacts to native vegetation and sensitive ecological values are:

- Avoidance of native vegetation in the McLoughlins Beach-Seaspray Coastal Reserve at the shore crossing by HDD.
- Minimisation of impacts to Plains Grassy Forest (endangered) within Woodside H28 Bushland Reserve by adjusting the alignment to avoid most of the bushland reserve and large trees which provide habitat for fauna. The alignment crosses at the point where the two areas that comprise the bushland reserve meet (at the north-west corner of the larger, eastern rectangular block and south-east corner of the western triangular shaped block).
- Implementation of a No Go Zone within the project area to avoid impacts on the small area of DEECA mapped wetland (ID 83488).
- Reduction in working width of the project area where it crosses key sensitive areas to minimise impacts on native vegetation and habitat. Those reductions have been achieved by strategically removing the temporary construction area adjacent to the 40m cable easement at the locations listed in Table 10-2.

No Go Zones (NGZ) will also be implemented inside the project area boundary to protect the Notional Root Zones (NRZ) of scattered trees beyond the project area boundary and therefore avoid removal of those trees (FFM-M005). The NGZ have been applied to scattered trees where the project area encroaches more than 10% into the NRZ. The NRZ was calculated in accordance with AS 4970-2025

Protection of Trees on Development Sites where NRZs are calculated for an individual tree based on its tree Diameter at Standard Height (DSH) multiplied by 12 ($NRZ = DSH \times 12$); a NRZ will not be less than 2 m nor greater than 15 m. The NGZs are shown on Figure 14-1 in Appendix 9 and will be shown on Environmental Line Lists and displayed on maps in construction site offices.

Measures to further reduce impacts to native vegetation and habitat include:

- Implementation of NGZ on the boundary of the project area to protect retained areas of native vegetation from inadvertent impacts during construction (see Section 10.3.2) (FFM-M005). Priority areas for NGZ include roadsides, waterways, Woodside H28 Bushland Reserve and patches of native vegetation on private land at KP 21.55 and KP 22.60. The NGZs are shown on Figure 14-1 in Appendix 9. The NGZs appear to intersect native vegetation patches in some instances because they are to be implemented on the boundary of the project area to protect retained vegetation including areas of treed native vegetation within 15 m of the project area boundary that are shown as removal based on the 'deemed loss' as required by the Native Vegetation Removal Regulations.
- Continuing to look for opportunities to reduce the quantity of native vegetation (patches and trees) during the detailed design process where possible including:
 - Selecting location for the temporary causeway across unnamed waterway (UFI 42824679) in near the shore crossing area that minimises impacts to native vegetation (Estuarine Wetland). The unnamed waterway is otherwise avoided by selection of trenchless crossing installation method.
 - Seeking to further reduce working widths through areas that support high-quality native vegetation to reduce the area removed and the width of fragmentation.
 - Rehabilitation of the temporary construction zone adjacent to the cable easement as part of the construction phase. The revegetation and restoration of areas of native vegetation and fauna habitat intersected during construction will be guided by a Rehabilitation and Reinstatement Plan (FFM-M013).

Table 10-2 - Locations where project area reduced to minimise impacts on native vegetation

Option AB	Option C	Option D
Stringy Bark Lane (KP 7.65 to KP 7.70) – reduced with by 10m on both sides	Stringy Bark Lane (KP 7.65 to KP 7.70) – reduced with by 10m on both sides	Stringy Bark Lane (KP 7.65 to KP 7.70) – reduced with by 10m on both sides
Woodside H28 Bushland Reserve corner and private land adjacent (KP 12.25 to KP12.50) – reduced width by 10 m on both side from KP 12.25 to KP12.50; reduced width continues on east side to KP 12.60)	Woodside H28 Bushland Reserve corner and private land adjacent (KP 12.25 to KP12.50) – reduced width by 10 m on both side from KP 12.25 to KP12.50; reduced width continues on east side to KP 12.60)	Woodside H28 Bushland Reserve corner and private land adjacent (KP 12.25 to KP12.50) – reduced width by 10 m on both side from KP 12.25 to KP12.50; reduced width continues on east side to KP 12.60)
Woodside H28 Bushland Reserve north-east corner near Giffard Road (KP 12.70 – KP 12.75) – reduced width by 10 m west side	Woodside H28 Bushland Reserve north-east corner near Giffard Road (KP 12.70 – KP 12.75) – reduced width by 10 m west side	Woodside H28 Bushland Reserve north-east corner near Giffard Road (KP 12.70 – KP 12.75) – reduced width by 10 m west side

Option AB	Option C	Option D
Giffard Road roadside (KP 12.75 to KP 12.80) – reduced width by 10m both sides	Giffard Road roadside (KP 12.75 to KP 12.80) – reduced width by 10m both sides	Giffard Road roadside (KP 12.75 to KP 12.80) – reduced width by 10m both sides
Small patch in private land KP14.5 to KP14.6 – reduced width by 10 m on west side	Small patch in private land KP14.5 to KP14.6 – reduced width by 10 m on west side	Small patch in private land KP14.5 to KP14.6 – reduced width by 10 m on west side
-	Patch on private land where alignment intersects (KP 21.45 to KP 21.55) – reduced width by 10 m on west side	Patch on private land where alignment intersects (KP 21.45 to KP 21.55) – reduced width by 10 m on west side
-	Adjacent to patch on private land between KP 21.55 and KP 22.60 – reduced width by 10m on west side.	Adjacent to patch on private land between KP 21.55 and KP 22.60 – reduced width by 10m on west side.

Residual impacts

Although avoidance and minimisation has been achieved, some residual impacts on native vegetation are unavoidable. Residual impacts on native vegetation will be offset in accordance with the Victorian native vegetation removal regulations. Native vegetation to be offset is detailed below and includes patches of native vegetation, large trees (in patches and scattered trees), DEECA mapped wetlands, areas of endangered EVC, and patches of high-quality native vegetation. Some of the native vegetation removal will also occur in areas covered by environmental overlays. Removal of native vegetation will occur in a staged manner commencing from the onshore shore crossing site.

This assessment of residual impacts on native vegetation is considered conservative as it is likely that further avoidance of vegetation and tree removal can be achieved during the detailed construction planning phase of the project, especially where higher value vegetation and habitat are concerned.

Residual impacts on native vegetation will be long term and permanent. The losses of native vegetation will be localised as the impact is comprised of removal of numerous patches of vegetation at discrete locations in the landscape. Losses will be small relative to the extent of native vegetation remaining in the Gippsland Plain Bioregion and in Victoria following the 2019/2020 bushfires. The magnitude of the impact is medium on a receptor of high sensitivity. The consequence of the impact is therefore major.

A summary of residual impacts on native vegetation patches and trees along with endangered EVCs is provided in Table 10-3. Detail on number of patches and extents by EVC and tree species are provided in Table 10-4 and Table 10-5. The location of native vegetation to be removed is shown in Figure 10-1 at an overview level below and in higher resolution in Appendix 9. The depiction of native vegetation patches in Figure 10-1 and Appendix 9 is based on the extent within the project area plus extent within 15 m of the project area to account for 'deemed loss' of treed native vegetation as a requirement of the Native Vegetation Removal Regulations. Where tree canopy cover does not extend the full 15 m from the project area boundary, the native vegetation extent follows the canopy line.

No Go Zones to be implemented on the boundary of the project area to protect retained vegetation includes protecting areas of treed native vegetation within 15 m of the project area boundary that are shown as removal based on the 'deemed loss' as required by the Native Vegetation Removal Regulations. This means that the NGZs appear to be intersecting areas of native vegetation removal on Figure 10-1.

Impacts to native vegetation will also exacerbate threatening processes listed under the EPBC Act and FFG Act (Section 10.3.6).

Table 10-3 Summary of native vegetation patches and trees to be removed and offset

Native vegetation feature		Option AB	Option C	Option D
Patches	Patches	15.009 ha across 78 HZs includes 0.957 ha endangered EVC – Swamp Scrub)	16.142 ha across 93 HZs includes 0.954 ha of Swamp Scrub (endangered EVC)	15.531 ha across 74 HZs includes 0.954 ha Swamp Scrub (endangered EVC)
	Large trees in patches	54	66	65
Scattered trees	Large	28	53 (includes 21 identified from aerial images)	42 (includes 13 identified from aerial images)
	Small	12	31	12
Sub-total	Large trees	82	119	107

*identified from aerial images in plantation area without access and assumed to be large trees. Trees clearly attributable to forestry plantations were not included.

Patches of native vegetation

Table 10-3 summarises the number of patches, their BCS and extent to be removed for each EVC. The results of VQA assessments undertaken for each patch are provided in Appendix 3.

Native Trees

Large trees within patches of native vegetation, as well as small and large scattered trees, occur in the project area. Appendix 4 provides a list of trees including location, species and size (DBH).

Large trees in patches

Large trees in patches to be removed by the project are identified in Table 10-3.

Scattered trees

Scattered trees (large and small) to be removed by the project are identified by species in Table 10-5.

Table 10-4 Extent of native vegetation to be removed and offset – patches (habitat zones)

EVC name	EVC no.	Bioregional Conservation Status	Number of habitat zones			Extent impacted(ha)		
			Option AB	Option C	Option D	Option AB	Option C	Option D
Coast Banksia Woodland	2	Vulnerable	1	1	1	0.002	0.002	0.002
Damp Sands Herb-rich Woodland	3	Vulnerable	4	4	4	0.103	0.103	0.103
Estuarine Wetland	10	Least Concern	1	1	1	0.885	0.885	0.885
Lowland Forest	16	Vulnerable	6	10	3	0.661	0.885	0.705
Heathy Woodland	48	Least Concern	0	8	0	0	0.223	0
Swamp Scrub	53	Endangered	14	13	13	0.957	0.954	0.954
Plains Grassy Forest	151	Vulnerable	37	45	45	7.036	11.517	11.517
Coastal Dune Scrub	160	Depleted	4	4	4	0.106	0.106	0.106
Riparian Scrub	191	Vulnerable	2	2	3	0.920	0.920	1.258
Lowland Forest/Heathy Woodland Mosaic	698	Vulnerable	9	5	0	4.339	0.547	0
Total			78	93	74	15.009	16.142	15.531

Species	Common name	Option AB			Option C			Option D		
		Large	Small	Total	Large	Small	Total	Large	Small	Total
<i>Eucalyptus angophoroides</i>	Apple-top Box	0	0	0	0	6	6	0	1	1
<i>Eucalyptus bosistoana</i>	Coast Grey-box	0	1	1	0	1	1	0	1	1
<i>Eucalyptus bridgesiana</i> s.s.	But But	1	1	2	3	1	4	3	1	4
<i>Eucalyptus melliodora</i>	Yellow Box	8	3	11	8	6	14	9	3	12
<i>Eucalyptus muelleriana</i>	Yellow Stringybark	4	0	4	4	0	4	4	0	4
<i>Eucalyptus ovata</i>	Swamp Gum	4	5	9	4	4	8	4	4	8
<i>Eucalyptus viminalis</i>	Manna Gum	5	2	7	5	2	7	5	2	7
Stag	N/A	6	0	6	8	11	19	4	0	4
Unknown (aerially mapped)	N/A	0	0	0	21	0	21	13	0	13
Total		28	12	40	53	31	84	42	12	54

Native vegetation within conservation reserves

One conservation reserve – Woodside H28 Bushland Reserve - will be impacted by the project, leading to the permanent loss of 0.302 ha of native vegetation that provides habitat for flora and fauna (Figure 10-1_K; HZ 35, HZ 37). Most of the vegetation in that location is associated with a private land parcel (HZ34, HZ36, HZ38) rather than the bushland reserve as the alignment has selected a crossing at the narrowest point between the two areas that comprise the reserve.

The area provides habitat for a range of threatened flora and fauna species based on DEECA Habitat Importance Model.

Native vegetation from environmental overlays

No residual impacts on native vegetation with ESO1 of Wellington Planning Scheme. Impacts on Estuarine Wetland in ESO1 at the shore crossing are avoided by drilling under the coast and unnamed waterway. Efforts will be made during detailed design to reduce impacts to native vegetation from establishment of temporary causeway over unnamed waterway UFI 42824679.

Native vegetation affected by the 2019/2020 bushfires

Impacts of the 2019/2020 bushfires on the EVCs known to occur in the project area are and the extent the project would impact of the area remaining of those EVCs in Victoria are summarised in Table 10-6. The proposed project will result in relatively low impacts to the overall extent of the EVCs in the Gippsland Plain Bioregion.

Table 10-6 Residual impacts to bushfire-impacted EVCs

EVC	Bioregional Conservation Status	Total remaining in Victoria after 2019/2020 fires (ha)	Option AB	Option C	Option D
			Extent impacted (ha)	Extent impacted (ha)	Extent impacted (ha)
Coast Banksia Woodland	Vulnerable	2180.48	0.002	0.002	0.002
Lowland Forest	Vulnerable	324,656	0.66	0.94	0.71
Riparian Scrub*	Vulnerable	16,682	0.92	0.96	1.26

*For Riparian Scrub, the extents for Riparian Scrub/Swampy Riparian Forest Mosaic (DELWP 2020) are used as an indication.

Native vegetation in Gippsland Plain Bioregion

Residual impacts as they relate to loss within the Gippsland Plain Bioregion are summarised in Table 10-7. An overview of these impacts are shown in Figure 10-1, and a detailed, high resolution version of this figure is provided in Appendix 9. This mapping forms the basis for the calculations of native vegetation removal.

Table 10-7 Extent of native vegetation to be removed in Gippsland Plain Bioregion

EVC name	EVC no.	Bioregional Conservation Status	Extent of DEECA modelled 2005 EVCs within the GPB (ha)	Option AB	Option C	Option D
				Extent impacted (ha)	Extent impacted (ha)	Extent impacted (ha)
Coast Banksia Woodland	2	Vulnerable	2180.48	0.002	0.002	0.002
Damp Sands Herb-rich Woodland	3	Vulnerable	20363.24	0.19	0.19	0.19
Estuarine Wetland	10	Least Concern	5756.18	0.88	0.88	0.88
Lowland Forest	16	Vulnerable	36559.62	0.66	0.94	0.71
Heathy Woodland	48	Least Concern	37522.42	0	0.22	0
Swamp Scrub	53	Endangered	27359.31	0.96	0.95	0.95
Plains Grassy Forest	151	Vulnerable	30426.5	9.66	15.48	15.48
Coastal Dune Scrub	160	Depleted	51.94	0.11	0.11	0.11
Riparian Scrub	191	Vulnerable	7807.68	0.92	0.96	1.26
Lowland Forest/Heathy Woodland Mosaic	698	Vulnerable	878.25	4.34	0.55	0

As described in the preceding sections, residual impacts on less sensitive native vegetation are assessed as having a medium magnitude. These vegetation types are considered to have medium sensitivity to disturbance. When combined, these ratings result in an overall residual consequence of moderate.

Highly sensitive native vegetation

For the purposes of this assessment, highly sensitive native vegetation includes endangered EVCs, high-quality native vegetation patches, and areas with high Strategic Biodiversity Value. These receptors are considered to have high sensitivity to potential impacts. When paired with a medium magnitude of impact, the resulting residual consequence is assessed as major.

The specific residual impacts on each component of highly sensitive native vegetation are detailed in the following sections.

Endangered EVCs

Two endangered EVCS would be impacted by the project: Swamp Scrub EVC 53 and Wetland Formation EVC74 which is assigned by DEECA to represented mapped wetlands. Extent of endangered EVC to be removed by the project is indicated in Table 10-8.

Table 10-8: Extent of impacts to Endangered EVCs

Endangered EVC	Extent of impact - Option AB (ha)	Extent of impact Option C (ha)	Extent of impact Option D (ha)
Swamp Scrub (53)	0.96	0.95	0.95
Total	0.96	0.95	0.95

No endangered EVCs that are potentially impacted by the project were impacted by the 2019/2020 bushfires.

High-quality native vegetation

High-quality (or value) native vegetation is defined by DEECA as areas with condition scores above 0.6 (DEECA 2025).

The removal of native vegetation patches also corresponds with the removal of high-quality native vegetation (FFM-I006). Native vegetation patches within the project area includes forest, woodland and scrub communities that received VQA scores of at least 60 out of 100. This high value reflects the intact nature of the patches, which contain the full suite of vegetation strata described in the EVC benchmark, and habitat elements for fauna. They also represent areas of low weed cover where ecological functions such as flora recruitment remain high. These areas are contiguous with or are connected to large extents of native vegetation in the surrounding landscape.

Construction will result in the removal of these high-quality habitat zones which, in turn, reduces the amount of high-quality habitat available for flora and fauna. The loss of high-quality vegetation also contributes to increased habitat fragmentation (Section 10.3.1).

Habitat zones representing high-quality native vegetation that will be removed by the project are listed in Table 10-9.

Strategic Biodiversity Value

Strategic Biodiversity Value (SBV) is a DEECA model that identifies areas of relative biodiversity importance. The SBV map combines information on areas important for threatened and flora fauna and native vegetation types and condition. Like high-quality vegetation, the Assessors Handbook (DEECA 2025) specifies that areas scored in the high SBV range are those that are above 0.8.

The Strategic Biodiversity Value (SBV) categories of habitat zones within the project area ranged between 9 and 100. A summary of the habitat zones with the highest SBV values (≥ 80) to be removed is provided in Table 10-10.

It is noted that this metric has been replaced by the habitat importance mapping but is included here for completeness.

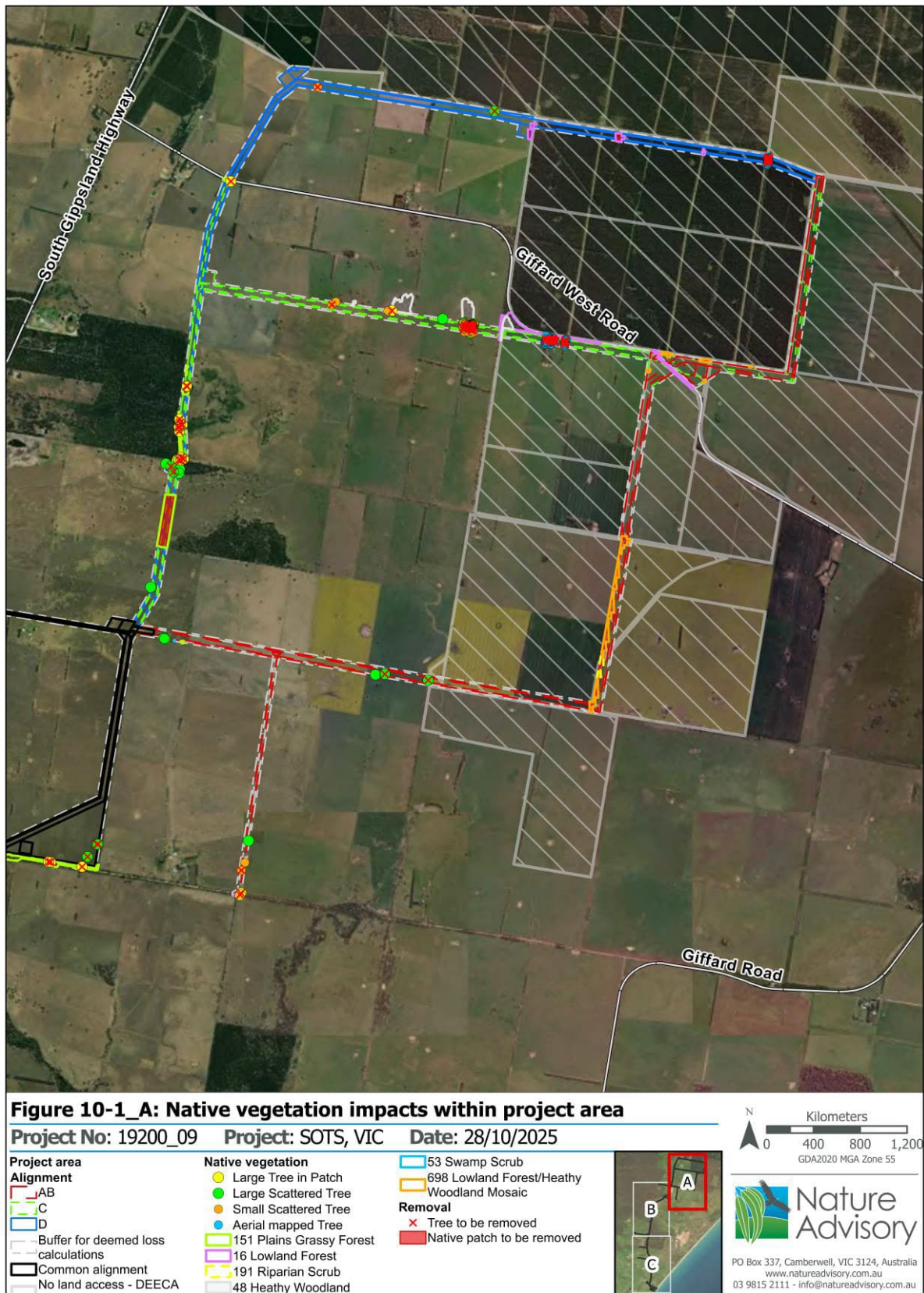
Table 10-9 Impacts to high-quality native vegetation

EVC	Option AB			Option C			Option D		
	No. habitat zones	KPs	Extent (ha)	No. habitat zones	KPs	Extent (ha)	No. habitat zones	KPs	Extent (ha)
Plains Grassy Forest (151)	9	8.95 - 9.25 – Dewars Road (HZ29); 11.45 - 11.55 – adjacent Woodside H28 Bushland Reserve (HZ33); 12.2 - 12.3 – Woodside H28 Bushland Reserve (HZ35 & HZ37), 12.25 - 12.65 – private land connected to Woodside H28 Bushland Reserve (HZ38); 12.75 - 12.85 – Giffard Road (HZ39 & HZ40); 14.15 - 14.3 – South Gippsland Highway roadside (HZ41); 17.3 - 17.85 – Four Mile Creek (HZ47)	2.346	11	8.95 - 9.25 – Dewars Road (HZ29); 11.45 - 11.55 – adjacent Woodside H28 Bushland Reserve (HZ33); 12.2 - 12.3 – Woodside H28 Bushland Reserve (HZ35 & HZ37), 12.25 - 12.65 – private land connected to Woodside H28 Bushland Reserve (HZ38); 12.75 - 12.85 – Giffard Road (HZ39 & HZ40); 14.15 - 14.3 – South Gippsland Highway roadside (HZ41); 17.3 - 17.85 – Four Mile Creek (HZ47) 21.45 – 21.90 – private land (HZ50)	3.563	10	8.95 - 9.25 – Dewars Road (HZ29); 11.45 - 11.55 – adjacent Woodside H28 Bushland Reserve (HZ33); 12.2 - 12.3 – Woodside H28 Bushland Reserve (HZ35 & HZ37), 12.25 - 12.65 – private land connected to Woodside H28 Bushland Reserve (HZ38); 12.75 - 12.85 – Giffard Road (HZ39 & HZ40); 14.15 - 14.3 – South Gippsland Highway roadside (HZ41); 17.3 - 17.85 – Four Mile Creek (HZ47) 21.45 – 21.90 – private land (HZ50) 23.90 – 23.95 – Giffard West Road (HZ51)	3.371

EVC	Option AB			Option C			Option D		
	No. habitat zones	KPs	Extent (ha)	No. habitat zones	KPs	Extent (ha)	No. habitat zones	KPs	Extent (ha)
Coastal Dune Scrub (160)	3	0.00 - 0.05 Reeves Beach Road (HZ2, HZ3, HZ4)	0.047	3	0.00-0.05 Reeves Beach Road (HZ2, HZ3, HZ4)	0.047	3	0.00-0.05 Reeves Beach Road (HZ2, HZ3, HZ4)	0.047
Riparian Scrub (191)	2	12.2-12.3 - Woodside H28 Bushland Reserve (HZ34) 12.3-12.55 - Private land adjacent Woodside H28 Bushland Reserve (HZ36)	0.952	2	12.2-12.3 - Woodside H28 Bushland Reserve (HZ34) 12.3-12.55 - Private land adjacent Woodside H28 Bushland Reserve (HZ36)	0.952	2	12.2-12.3 - Woodside H28 Bushland Reserve (HZ34) 12.3-12.55 - Private land adjacent Woodside H28 Bushland Reserve (HZ36)	0.952
Total	14	-	3.313	16	-	4.529	15	-	4.337

Table 10-10 Habitat Zones with high SBV value

EVC	EVC no.	Option AB		Option C		Option D		SBV value range (e.g. 80-100)
		No. of habitat zones of high SBV (≥ 80)	Extent (ha)	No. of habitat zones of high SBV (≥ 80)	Extent (ha)	No. of habitat zones of high SBV (≥ 80)	Extent (ha)	
Coast Banksia Woodland	1	1	< 0.01	1	< 0.01	1	< 0.01	84
Damp Sands Herb-rich Woodland	3	1	< 0.01	1	< 0.01	1	< 0.01	82
Plains Grassy Forest	151	4	0.91	5	4.97	5	4.97	84-93
Coastal Dune Scrub	160	1	0.06	1	0.06	1	0.06	82
Riparian Scrub	191	2	0.92	2	0.92	2	0.92	88
Total		9	1.90	10	5.96	10	5.96	-



19200_09 Figure 10-1: Native vegetation impacts within project area (3Page) - Created by: X:\GIS\2019 Jobs\19200\19200_09_SOTS_AECOM.aprx

Figure 10-1_A Native vegetation impacts within the project area - overview

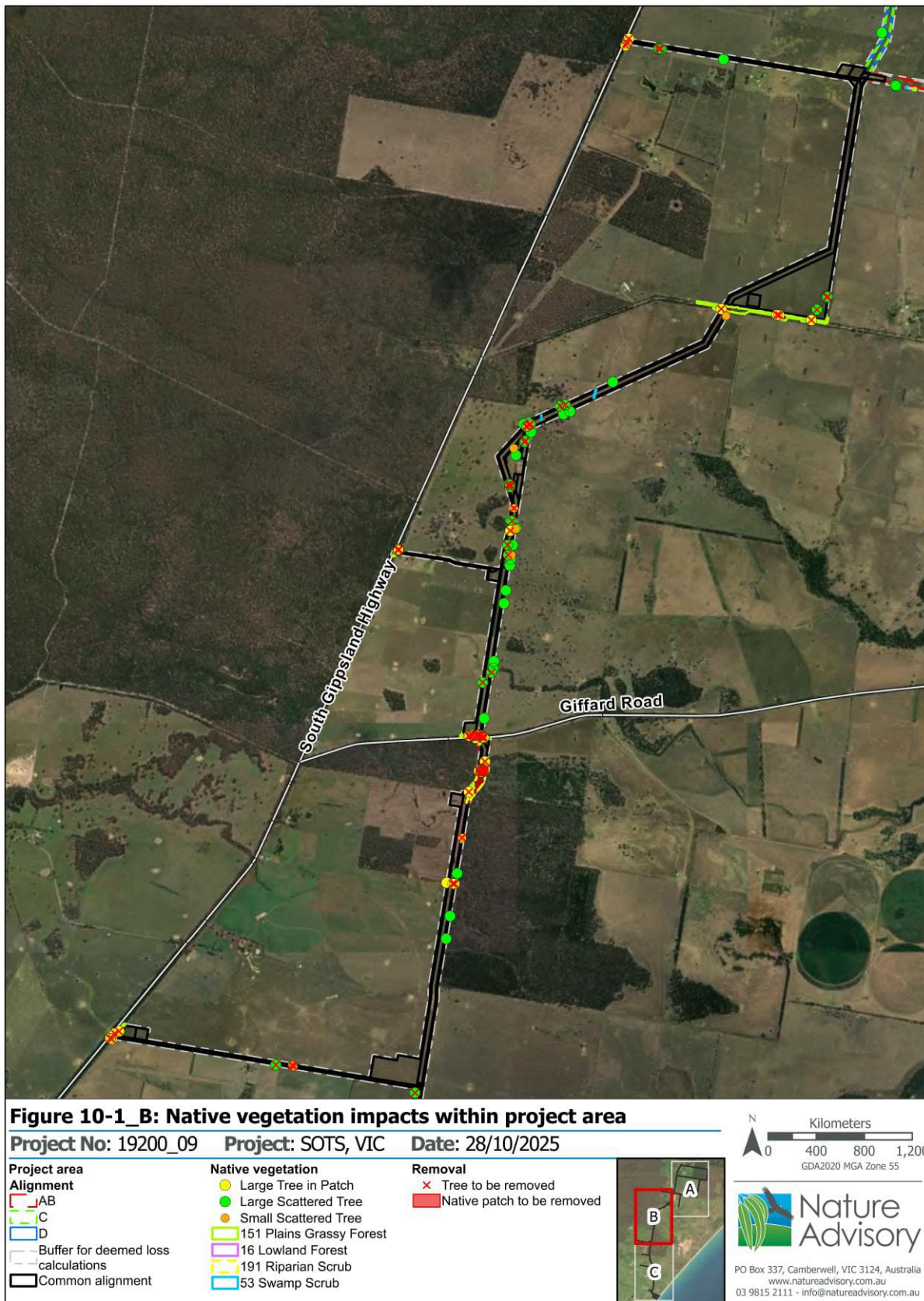


Figure 10-1_B Native vegetation impacts within the project area - overview

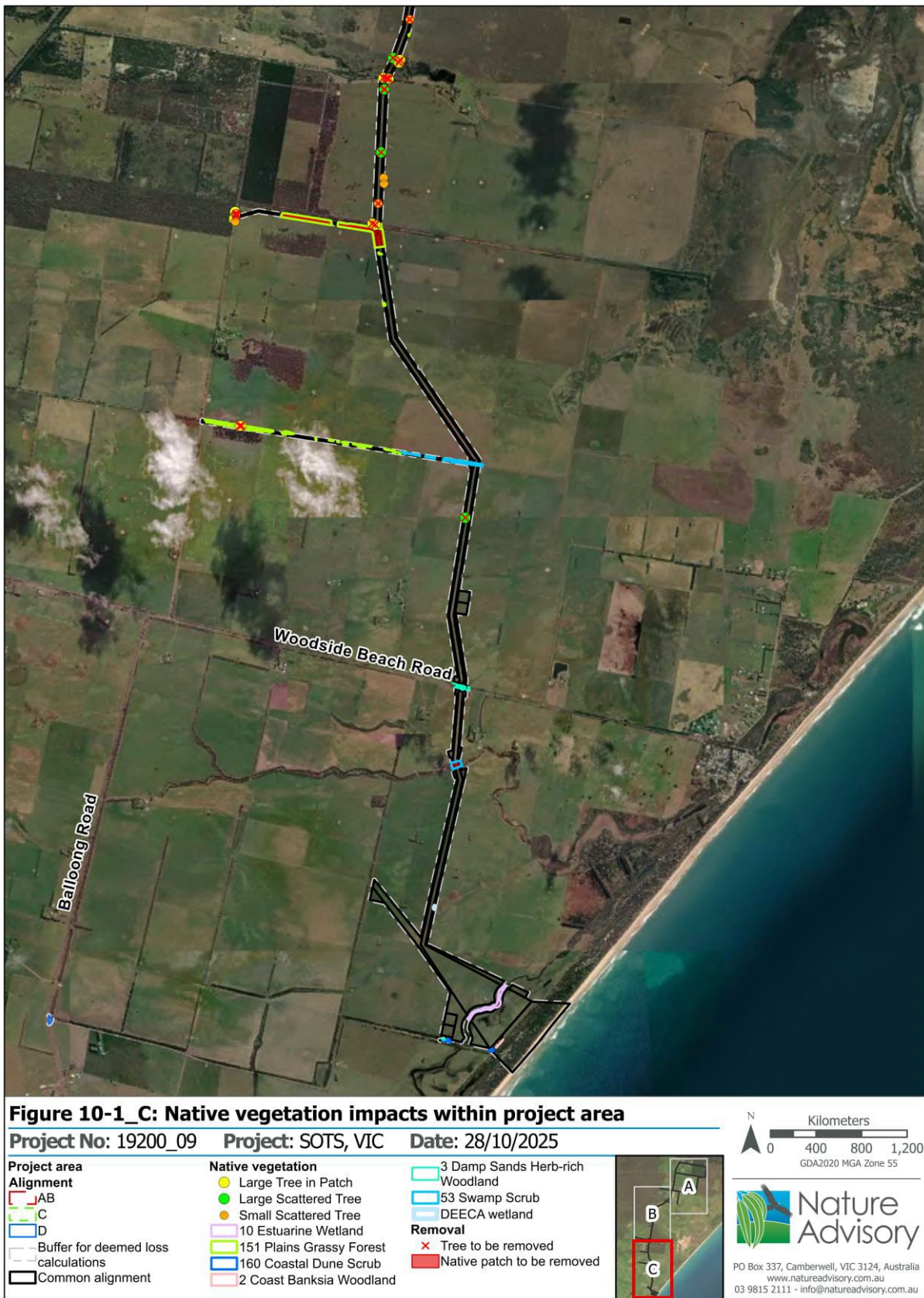


Figure 10-1_C Native vegetation impacts within the project area - overview

10.2.2. Loss of large and/or hollow-bearing trees (FFM-I003)

Hollows support a wide range of species. A study by Gibbons and Lindenmayer (1997) determined that 17% of bird, 42% of mammal, and 28% of reptile species in Australia are hollow-dependent. DSE (2003) considered hollows to be essential for 16 mammal species and 44 bird species in Victoria, including many threatened species. The Lace Monitor *Varanus varius* (listed as threatened under the FFG Act) is also dependent on hollows (DSE, 2003). Roadside trees are a particularly important source of hollows in rural landscapes (DSE, 2003), which is the setting for this project.

The tree age, hollow size and number required vary by species. For example, bats select large, old trees as roosts and individuals move roosts regularly, often daily. Therefore, for a colony to survive, numerous trees with suitable hollows are essential (Bennett et al. 1994). Gliders and phascogales prefer hollows with a tight entrance hole (< 50 mm) and use multiple den sites within their home range (van der Ree et al. 2003; Sloanes and van der Ree 2015). Owls tend to use larger, deeper hollows (Mackowski 1984; Menkhorst 1984; Scotts 1991). It is, therefore, essential that a large number of hollows exist and that they have a variety of sizes and shapes, as different species have their own, sometimes unique, preferences (Recher 1991).

Factors that contribute to hollow suitability include their location (height on the tree, spout, or trunk) entrance size, shape, depth, and degree of insulation (NPWS 1999). Entrance size is particularly important in determining which species utilise a hollow. Small entrances reduce the ability of predators to enter the hollow, thereby providing protection and allowing adults to leave their young while foraging (Dickman 1991).

Hollows are not easy to replace, as the specific size and shape required by particular species can be difficult to replicate and natural hollows take a very long time to form. Hollows are generally found in old-growth and dead trees and typically take 100 or more years to form (Mackowski 1984). There is a strong relationship between hollow size and tree age. Hollows often start off small and gradually increase in size through mechanisms such as exposure to the elements (wind, rain, extreme temperatures), insect attack, fungal or bacterial growth, and fire (Gibbon and Lindenmayer 1997). As hollows expand and develop over time, they provide opportunities for different species. Small hollows, such as those which support small mammals, generally form after 100 years. Medium hollows, such as those that support parrots, often take in excess of 200 years, and hollows large enough to support larger forest owls take even longer (Mackowski 1984; Menkhorst 1984; Scotts 1991). As such, the presence of trees of multiple age cohorts is important. It is estimated that in order to support biodiversity, as many as 30 hollows (3–10 hollow-bearing trees) per hectare may be required (NPWS 1999; DELWP 2018).

Potential impacts

The presence of hollow-bearing trees within the project area and the potential losses of these trees may exacerbate a potential threatening process listed under the FFG Act (FFM-R014). Loss of remnant mature trees (with or without hollows) will reduce nesting and roosting resources for wildlife in the project area (FFM-R010). Loss of hollow-bearing trees from the project area will result in increased resource competition for remaining hollows. Recruitment of hollows in Australian forests takes over 100 years, and reductions in hollow-bearing tree numbers are causing declines in certain species.

Most hollow-bearing trees are found in Lowland Forest and Plains Grassy Woodland/Forest habitat, and most hollows are found in Yellow Stringybark, Manna Gum, Broad-leaved Peppermint and Narrow-leaf Peppermint. The greatest density of potential hollow-bearing trees occurs within Woodside H28 Bushland Reserve H28.

Management and mitigation

No specific approvals are required under the FFG Act to remove hollow-bearing trees. However, as their loss is recognised as a threatening process under the FFG Act, consideration will be given to avoiding and minimising the loss of hollow-bearing trees during the design phase. Avoiding and minimising loss of hollow-bearing trees is consistent with the requirements under the P&E Act (via Cl. 52.17 of the local Planning Schemes) in relation to loss of native vegetation. Authorisation may also be required to damage, disturb or destroy wildlife habitat under the *Wildlife Act 1975*.

Measures to avoid and minimise impacts on native vegetation outlined in Section 10.2.1 also seek to reduce impacts on hollow-bearing and habitat trees. Those measures include reducing the project area through areas of higher quality native vegetation and implementation of No Go Zones to protect scattered trees and on the boundary of the project area.

Hollows are not easy to replace as the specific size and shape required by fauna species can be difficult to replicate and natural hollows take a very long time to form (Mackowski, 1984; Gibbons and Lindenmayer, 1997). For this reason, revegetation does not provide a short-term mitigation for their loss.

Consideration will therefore be given to providing artificial hollow replacements for this critical habitat feature as part of the Flora and Fauna Management Plan (FFM-M006). *Artificial hollow* is a term used to describe a 'hollow structure that aims to mimic a natural tree hollow' (BCT 2020, p.3). There are several types of artificial hollows—nest boxes, chainsaw-cut hollows, and salvaged natural hollows. The project should investigate opportunities to incorporate artificial hollows. An initial assessment of the effectiveness of application of these types of artificial hollows is outlined in Table 10-11.

Table 10-11 Summary of artificial hollow types, description, and effectiveness

Artificial hollow type	Description	Effectiveness
Nest boxes (manufactured hollows)	Prefabricated boxes built to standard specifications dependent on the target species.	Until recently, nest boxes were the primary method used to replace hollows. However, their effectiveness has been shown to be variable depending on the target species, design specifications and material quality (DSE 2003; TSRH 2018). Nest boxes also only provide a short-term solution if not maintained, depending on material used (DELWP 2018; BCT 2020). Plywood nest boxes are generally poorly insulated and produce lower-quality thermal environments (Griffiths et al. 2020).
Nest boxes (new technology)	3D printed modular hollows developed by Habitech	These nest boxes are made from more durable plastic-based materials (UV-stabilised), double-walled for temperature and humidity control, and modular which allows them to be adjusted to suit different sized species. Effectiveness is unknown as this is an emerging technique. However, a more natural shape, more flexible and durable design, and improved thermal mass and insulative properties suggest this product may overcome the limitations of traditional nest boxes.

Artificial hollow type	Description	Effectiveness
Chainsaw-carved cavities	Artificial hollows cut into live trees or felled logs	Novel approach that requires technical training and certification and may pose a risk to tree health (BCT 2020). Hollows carved directly into live trees design to replicate natural hollows can provide thermally similar habitat to natural hollows (Griffiths et al. 2020). This is still considered a novel approach, and the effectiveness has only been preliminarily investigated. This technique may provide a more stable thermal environment and better retain their integrity over time compared to nest boxes. They have been found to be utilised by Sugar Gliders and Brush-tailed Phascogales (Terry et al. 2021)
HollowHog	A small entry hole (50 mm) is drilled into a live tree or dead wood, then progressively carves a larger hollow	This is a very novel approach with little to no information publicly published regarding the effectiveness. Early uses of this technique show less impact to trees than chainsaw carved hollows while still providing the same thermally stable environment (HollowHog 2020).
Salvaged natural tree hollows	Hollow branches or trunks cut from felled trees and refitted to trees not currently containing hollows. Hollow section cut into lengths of > 0.5 m to maintain depth between the entrance and base of the chamber. Salvaged timber can be used to cap the bottom of the hollow if it is open (Gleeson and Gleeson, 2012).	There is little information on the effectiveness of salvaged natural hollows compared with nest boxes and chainsaw cut hollows. This approach may also pose a risk to any fauna still occupying the hollows of felled trees. Like nest boxes, periodic maintenance will be required. It is assumed that salvaged natural hollows would provide habitat similar to in situ natural hollows.

Hollows carved directly into live trees can provide thermally similar habitat to natural hollows, whereas plywood nest boxes are generally poorly insulated and produce lower-quality thermal environments (Griffiths et al. 2020). It is assumed that salvaged natural hollows would also provide habitat similar to in situ natural hollows.

If the project considers the use of artificial hollows as a mitigation measure, a number of factors need to be considered (BCT 2020). These include:

- Target species. While threatened species impacted or potentially impacted by the project such as owls would be the primary targets for artificial hollows, a variety of hollows catering for a range of species should be considered.
- Consultation with an expert in the ecological requirements of the target species to determine the appropriate type, specification and installation location for artificial hollows. As described above, different species have different preferences for hollow entrance and cavity sizes and different types of artificial hollows are more effective at replicating natural hollows.

- Presence and location of suitable enhancement sites to receive artificial hollows and if those enhancement sites adequately compensate for the habitat lost.
- Existing density of hollows within those enhancement sites.
- Spacing/density and diversity of hollows. As previously stated, an abundance of hollows is needed to support the full range of indigenous biodiversity.
- Retention of felled hollow-bearing trees as hollow logs to provide shelter and foraging resources and movement runways for a variety of native ground-dwelling fauna (Gleeson and Gleeson 2012).
- An ongoing monitoring and maintenance program as artificial hollows need to be monitored and repaired / replaced when damaged or exotic species evicted to make the hollow available again for native fauna.
- The metric for success as a mitigation measure should be occupancy by target species rather than number of artificial hollows installed.

Details on the implementation of hollow replacement would be developed as part of a Flora and Fauna Management Plan prepared in consultation with DEECA (FFM-M006).

Residual impacts

The project will have a residual impact on large trees containing important habitat values in the form of tree hollows, spouts, and fibrous bark (Table 10-12). All the large trees are considered significant due to their location in the landscape, namely within a large patch of contiguous habitat, as paddock trees, or threatened EVC. These trees likely provide shelter and nesting opportunities to a range of species inhabiting the project area and surrounds, namely, arboreal mammals such as Sugar Glider and Brushtail Possum, as well as Lace Monitor, Powerful Owl and other nesting bird species.

Other trees in patches and scattered trees which do not contain hollows will also be impacted as part of the overall habitat removal assessed in this report.

No Go Zones will be implemented on the boundary of the project area to prevent impacts on trees adjacent to project area. While the canopy cover (shelter) of trees within 15 m could be lost through a decline in tree health or death of the tree, the hollows themselves will not be removed. Loss of trees within 15 m of the project area are accounted for in native vegetation removal and will be offset accordingly.

Residual impacts on hollow-bearing and habitat trees are of major consequence due to the medium magnitude (localised scale but long-term and permanent nature) and high sensitivity of the receptor to impact. However, whilst removal of habitat trees cannot be avoided and artificial hollows do not fully mitigate loss of natural hollows, loss of large trees is unlikely to represent a significant residual impact in the context of availability in the surrounding landscape and protected in conservation reserves.

Table 10-12 Residual impacts on large habitat/hollow-bearing trees

Landform	KP	EVCs	Habitat area	Number of trees			Species
				Option AB	Option C	Option D	
Coastal and near-coastal areas	0.0-0.50	Coastal Dune Scrub, Estuarine Wetland	Conservation reserve, campground, wetland	0	0	0	-
Lowland Plains	0.5-VicGrid investigation area	Swamp Scrub, Damp Sands Herb-rich Woodland, Plains Grassy Forest, Riparian Scrub, Lowland Forest, Heathy Woodland	Open paddock, roadside reserve, conservation reserve, forestry	82	119	107	Yellow Stringybark, Red Stringybark, Swamp Gum, Gippsland Peppermint, Manna Gum, Yellow Box, Coast Grey Box, But But, Yertchuk
Total				82	119	107	-

*includes trees identified from aerial images in plantation areas without access and assumed to be large habitat trees

10.2.3. Threatened ecological communities (FFM-I004)

Land clearance during construction will not impact native vegetation TECs listed under the EPBC Act and/or FFG Act (Section 7.3).

While the patch of Estuarine Wetland (HZ5) meets the key diagnostic criteria to be EPBC Act listed Subtropical and Temperate Coastal Saltmarsh, the patch does not meet the condition thresholds to retain sufficient conservation values to be considered as a matter of national environmental significance. This means that the patch does not represent an area of EPBC Act listed TEC

Although an area of Plains Grassland (South Gippsland) was previously identified in earlier assessments, it is considered the patch is too aligned with Swamp Scrub and is fragmented. As such, the patch is no longer considered to represent an area of the FFG Act listed TEC.

10.2.4. Threatened flora species (FFM-I005)

Threatened flora species listed under the EPBC and FFG Acts have been recorded within the project area or were identified as 'possible' or 'likely' to occur based on the presence of suitable habitat and regional records. Targeted surveys were subsequently completed and the likelihood of occurrence revised for most species to unlikely based on the species not being observed during surveys and/or lack of suitable habitat (Section 7.8).

Construction of the project has the potential to impact on threatened flora species recorded or with potential to occur in the project area.

Potential impacts

The project has potential to impact on threatened flora species through the removal of potential habitat during construction. Areas of potential habitat for threatened flora species include conservation reserves

and roadsides. Threatened flora species resolved to have a likelihood rating of possible, likely or recorded in Section 7.8 are:

- Thick-lipped Spider-orchid (EPBC Act listed)
- Dense Leek-orchid (EPBC Act and FFG Act listed)
- Spiral-leaved Sun-orchid (EPBC Act and FFG Act listed)
- Pale Swamp Everlasting (FFG Act listed)
- Coast Grey-box (FFG Act listed)
- Dune Wood-sorrel (FFG Act listed)
- Cobra Greenhood (FFG Act listed)

A summary of the species considered 'possible' or 'likely' to occur, and an assessment of the project's potential to have a residual impact on these species is provided in Section 7.2.1

Management and mitigation

Measures adopted by the project to date to avoid and minimise impacts to threatened flora species include:

- Adjustment of the project area at KP 10.65-12.25 so that it is located within cleared private land and positioned 15 m from land parcel boundary to avoid impacts to tree NRZs. The Coast Grey-box recorded within this section of the project area and southern portions of Woodside H28 Bushland Reserve will therefore be protected from impacts during construction (FFM-M001).
- Adjustment of the project area at KP 12.50-12.80 to avoid the significant Coast Grey Box population within the northern portions of Woodside H28 Bushland Reserve and into private property to the east, minimising impact to Coast Grey Box population. Coast Grey Box individuals are located within the neighbouring land parcel at a significantly lower density, minimising overall impact.
- Adjustment of the project area at KP 21.50-22.60 to minimise impacts to adjacent high-quality native vegetation which may provide habitat for threatened flora including Thick-lip Spider-orchid, Spiral-leaved Sun-orchid and Cobra Greenhood –).
- Avoidance of Matted Flax-lily population along Stringy Bark Lane (closest KP 7.70). The project will clearly demarcate a vehicle turnaround point on Stringy Bark Lane to ensure no impacts to the population of Matted Flax-lily occur (FFM-M001, FFM-M002, FFM-M003, FFM-M005, FFM-M010).
- Avoidance of Dune Wood-sorrel populations and sensitive Coastal Dune Scrub EVC by drilling below the McLoughlins Beach - Seaspray Coastal Reserve at Reeves Beach (FFM-M010).
- Avoidance of potential threatened species habitat by drilling below the McLoughlins Beach - Seaspray Coastal Reserve at Reeves Beach and unnamed waterway UFI 42824679.
- Implementation of No Go Zones within the project area to protect the Notional Root Zones of Coast Grey Box.
- Reductions in the width of the project area in areas of high quality habitat as outlined for native vegetation in Section 10.2.1.

The project will also continue to explore means to reduce impacts to threatened flora species and their habitat in line with measures detailed in Section 10.2.1 for native vegetation (FFM-M001).

Residual impacts

While avoidance of threatened habitat has been achieved by the project, land clearance associated with construction will result in the unavoidable loss of habitat for threatened flora species and loss of individual plants. The project has committed to seeking further opportunities to minimise impacts as part of the design work. However, at this stage, the residual impacts are as detailed below.

DELWP's (2020) initial analysis of impacts to biodiversity from the 2019/2020 bushfires identified priority flora species and their habitats that were impacted by the bushfires. None of the flora species identified as possible or likely to occur within the project area are listed as priority species from the DELWP (2020) assessment. This means that the project will not contribute to the cumulative loss of threatened flora species in the Gippsland Plain Bioregion.

Residual impacts to EPBC Act and FFG Act listed threatened flora species are summarised below. The extent of potential habitat removal is based on native vegetation impacts and therefore includes habitat outside of the project area that is 'deemed lost' but will not be directly impacted by the project.

EPBC Act-listed flora species

Residual impacts to EPBC Act-listed threatened flora species are summarised in Table 10-13. Impacts on habitat for these species is of moderate consequence due to the high sensitivity of the receptor and low magnitude of impact. The low magnitude rating has been assigned based on localised extent, medium duration of impact and potential to be reversed through recruitment in retained habitat adjacent to project area.

An assessment has been made against the significant impact criteria under the EPBC Act to identify whether the impact is likely to be significant and therefore require offset in accordance with the EPBC Act Environmental Offsets Policy. The extent of impact on these species was assessed against the Significant Impact Criteria outlined in Matters of National Environmental Significance Significant Impact Guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013).

Although the project will have residual impact on habitat for EPBC Act listed threatened flora species, the impact is unlikely to constitute a significant impact under the EPBC Act.

FFG Act-listed threatened flora species

Residual impacts to FFG Act-listed threatened flora species are summarised in Table 10-14. Impacts on habitat for these species is of minor consequence due to the medium sensitivity of the receptor and low magnitude of impact. The low magnitude rating has been assigned based on localised extent, medium duration of impact and potential to be reversed through recruitment in retained habitat adjacent to project area.

Although the project will have residual impact on habitat for FFG Act listed threatened flora species, the localised loss of individuals or discrete populations is unlikely to result in a significant impact to the species.

A protected flora permit to take (kill, injure, disturb or collect) threatened flora species under the FFG Act will be required for works within public land (Woodside H28 Bushland Reserve and roadsides). The number of individuals to be removed will be determined at the time of preparing the permit application prior to construction commencing (FFM-M015).

Table 10-13 Residual Impacts on EPBC Act-listed flora species

Species	EPBC Act status	Presence of MNES within the project area	Impact			Consequence of impact	Is the residual impact likely to be significant under the EPBC Act?
			Option AB	Option C	Option D		
Thick-lip Spider-orchid	Vulnerable	Not recorded in the project area but cannot be discounted owing to the high-quality Plains Grassy Forest vegetation present (>0.6 condition score).	2.901 ha potential high-quality Plains Grassy Forest habitat Woodside H28 Bushland Reserve (HZ35 and HZ37 – 0.302 ha) and adjacent private land (HZ38 – 0.562 ha). Dewars Road (HZ29 – 0.249 ha) Giffard Road (HZ39 and HZ40 – 0.67 ha) South Gippsland Highway (HZ29 – 0.236 ha) Four Mile Road (HZ47 – 0.882 ha)	4.201 ha potential high-quality Plains Grassy Forest habitat Woodside H28 Bushland Reserve (HZ35 and HZ37 – 0.302 ha) and adjacent private land (HZ38 – 0.562 ha). Dewars Road (HZ29 – 0.249 ha) Giffard Road (HZ39 and HZ40 – 0.67 ha) South Gippsland Highway (HZ29 – 0.236 ha) Four Mile Road (HZ47 – 0.882 ha) Patch on private land KP21.45 to KP21.55 (HZ50 – 1.205 ha). Giffard West Road (HZ51 – 0.096 ha)	4.201 ha potential high-quality Plains Grassy Forest habitat Woodside H28 Bushland Reserve (HZ35 and HZ37 – 0.302 ha) and adjacent private land (HZ38 – 0.562 ha). Dewars Road (HZ29 – 0.249 ha) Giffard Road (HZ39 and HZ40 – 0.67 ha) South Gippsland Highway (HZ29 – 0.236 ha) Four Mile Road (HZ47 – 0.882 ha) Patch on private land KP21.45 to KP21.55 (HZ50 – 1.205 ha). Giffard West Road (HZ51 – 0.096 ha)	Moderate Based on high sensitivity of receptor and low magnitude of impact. Magnitude based on localised extent, medium duration of impact and potential to be reversed through recruitment in retained habitat adjacent to project area.	Unlikely – no plants were recorded and there is a low chance that an important population is present within the project area. The project area doesn't support a documented important population of the species, and the closest population is located in Yarram (Duncan, 2010a). No Thick-lip Spider-orchid plants were recorded during targeted surveys. Across the wider Gippsland region, the species shows a strong association with near-coastal habitats closer to the Gippsland Lakes, and it is therefore considered unlikely that an important population of the species occurs within the project area.
Dense Leek-orchid	Vulnerable (EPBC Act) Critically endangered (FFG Act)	Not recorded in the project area but due to the temporal and solitary nature of the species it remains possible to occur in limited Heathy Woodland in the project area. McLoughlins Beach - Seaspray Coastal Reserve is avoided by the project.	No Heathy Woodland habitat.	0.101 ha Heathy Woodland potential habitat on Epplestuns Road (HZ335).	No Heathy Woodland habitat.	Moderate Based on high sensitivity of receptor and low magnitude of impact. Magnitude based on localised extent, medium duration of impact and potential to be reversed through recruitment in retained habitat adjacent to project area.	Unlikely – no plants were recorded during targeted survey and there is a low chance that an important population is present within the project area. Project area is near an extant subpopulation recognised in the Conservation Advice at Longford > 20 km to the north. The Conservation Advice does not identify important populations due to insufficient information. No observations during targeted survey suggest the potential for a population to be present is low.

Table 10-14 Residual Impacts on FFG Act-listed flora species

Species or community	FFG Act status	Presence within the project area	Impact			Consequence of impact
			Option AB	Option C	Option D	
Pale Swamp Everlasting	Critically endangered	The species was recorded on targeted surveys in 2024 growing beside drainage lines in a Swamp Scrub EVC habitat at Lyons Road (KP5.35-5.36).	Loss of a known population (10 individuals) and 0.653 ha Swamp Scrub habitat along Lyons Road in Swamp Scrub EVC	Loss of a known population (10 individuals) and 0.653 ha Swamp Scrub habitat along Lyons Road in Swamp Scrub EVC	Loss of a known population (10 individuals) and 0.653 ha Swamp Scrub habitat along Lyons Road in Swamp Scrub EVC	Minor Impact would be localised and reversible with recovery through recruitment of new individuals possible in the medium to long-term in habitat adjacent to the project area. The impact would be of low magnitude on a receptor of medium sensitivity.
Coast Grey-box	Endangered	Coast Grey-box was recorded during targeted surveys within Woodside H28 Bushland Reserve and adjacent private land (KP 12.20 – 12.65) and Giffard Road roadside (12.75 – 12.85). Although the project area has been adjusted to avoid numerous Coast Grey-box and No Go Zones will be implemented within the project area to protect the NRZ of some individuals, there are individuals that remain in the project area.	Loss of one small scattered tree and 22 individuals (3 large and 18 small trees in patches of Plains Grassy Forest) within Woodside H28 Bushland Reserve and adjacent private land and Giffard Road roadside.	Loss of one small scattered tree and 22 individuals (3 large and 18 small trees in patches of Plains Grassy Forest) within Woodside H28 Bushland Reserve and adjacent private land and Giffard Road roadside	Loss of one small scattered tree and 22 individuals (3 large and 18 small trees in patches of Plains Grassy Forest) within Woodside H28 Bushland Reserve and adjacent private land and Giffard Road roadside	Minor The impact would be localised and reversible with recruitment of new individuals anticipated in retained habitat. However, the duration would be long-term due to the time it takes for trees to reach maturity. The impact would be of low magnitude on a receptor of medium sensitivity.
Dune Wood-sorrel	Endangered	The species was recorded within the McLoughlins Beach - Seaspray Coastal Reserve in 2023 (area avoided) and along Reeves Beach Road in 2024. The populations are associated with near coastal scrub growing within relatively open areas of stabilised sand.	Loss of 0.106 ha of Coastal Dune Scrub habitat and loss of any individuals that may occur in that area (Reeves Beach Road).	Loss of 0.106 ha of Coastal Dune Scrub habitat and loss of any individuals that may occur in that area (Reeves Beach Road).	Loss of 0.106 ha of Coastal Dune Scrub habitat and loss of any individuals that may occur in that area (Reeves Beach Road).	Minor The impact would be localised and reversible in the medium-term with recruitment of new individuals anticipated in retained habitat adjacent to the project area. The impact would be of low magnitude on a receptor of medium sensitivity.
Cobra Greenhood	Endangered	Cobra Greenhood was recorded in areas beyond the current project area. Potential habitat for this species occurs in the project area in Plains Grassy Forest and Lowland Forest habitat, particularly within Woodside H28 Bushland Reserve, private land (KP21.50-22.60) and some roadside reserves including Stringy Bark Lane (KP 7.70) and Dewars Road (KP 8.95)	Loss of 3.197 ha potential high-quality Plains Grassy Forest habitat (2.901 ha as for Thick-lipped Spider-orchid) and Stringybark Lane (HZ28 – 0.296 ha). Loss of 0.661 ha potential Lowland Forest habitat	Loss of 4.497 ha potential high-quality Plains Grassy Forest habitat ((2.901 ha as for Thick-lipped Spider-orchid) and Stringybark Lane (HZ28 – 0.296 ha). Loss of 0.938 ha potential Lowland Forest habitat	Loss of 4.497 ha potential high-quality Plains Grassy Forest habitat (2.901 ha as for Thick-lipped Spider-orchid) and Stringybark Lane (HZ28 – 0.296 ha). Loss of 0.705 ha potential Lowland Forest habitat	Minor The impact would be localised and reversible in the medium-term with recruitment of new individuals anticipated in retained habitat adjacent to the project area. The impact would be of low magnitude on a receptor of medium sensitivity.
Spiral-leaved Sun-orchid#	Endangered (also listed EPBC Act but after referral decision for project)	Not recorded in the project area, but due to nearby records and the disturbance resilience of the species it is still possible to occur in higher quality Plains Grassy Forest habitat. Higher quality habitat is associated with Woodside H28 Bushland Reserve and adjacent private land (KP21.50-22.60), and roadsides.	2.901 ha potential high-quality Plains Grassy Forest habitat (as for Thick-lipped Spider-orchid)	4.201 ha potential high-quality Plains Grassy Forest habitat (as for Thick-lipped Spider-orchid)	4.201 ha potential high-quality Plains Grassy Forest habitat (as for Thick-lipped Spider-orchid)	Moderate Based on high sensitivity of receptor and low magnitude of impact. Magnitude based on localised extent, medium duration of impact and potential to be reversed through recruitment in retained habitat adjacent to project area.

10.2.5. Threatened and migratory fauna species (FFM-I006)

This section describes the impacts of the removal of habitat for threatened fauna. Other potential impacts on fauna associated with construction, including temporary disturbance, fauna injury and mortality, loss of hollow-bearing habitat trees and habitat fragmentation are described in later sub-sections.

Potential impact

The project has potential to impact on threatened fauna species through the removal of potential habitat during construction. Threatened fauna species resolved to have a likelihood of occurrence of possible, likely or recorded in Section 8.3 and assessed in relation to potential impacts based on native vegetation removal estimates of preferred EVCs.

Management and mitigation

In line with recommended mitigation measures for native vegetation, the project has considered a range of modifications to the alignment to reduce as much as possible the extent of removal of threatened species habitats.

Any opportunity will be taken to further avoid indirect impacts to native fauna habitats within the project area as much as feasible during the design process. Mitigation measures to avoid adverse indirect impacts on retained habitats are outlined in Section 10.3.2.

A Designated Waterway Crossing Management Plan will be prepared for each designated waterway to allow site-specific mitigations to be developed and implemented including measures to retain the waterways' hydrology and flow regime and measures to maintain bank stability. This plan will include managing the temporary causeway over unnamed waterway UFI 42824679 near the shore crossing area.

Residual impacts

While avoidance has been achieved by the project, land clearance associated with construction will result in the unavoidable loss of habitat for threatened fauna species. The project has committed to seeking further opportunities to minimise impacts as part of the design work. However, at this stage, the residual impacts are as detailed below.

EPBC Act-listed threatened fauna species

Residual impacts to EPBC Act-listed threatened fauna species listed as threatened under the EPBC Act prior to 2 June 2020 (the referral decision for the project) are summarised in Table 10-15.

None of the potential impacts are likely to be significant for fauna species listed as threatened under the EPBC Act by definition under the EPBC Act criteria (Appendix 6). Therefore, the project is unlikely to have a significant impact on EPBC Act-listed fauna.

FFG Act-listed threatened fauna species

Residual impacts to FFG Act-listed threatened fauna species are summarised in Table 10-16.

Potential impacts on FFG Act-listed fauna are localised and small in extent when compared with the availability of habitat in the broader region. As such, removal of habitat by the project is unlikely to compromise the survival of FFG Act-listed fauna species in the region.

Table 10-15 Residual Impacts on EPBC Act-listed fauna species (based on native vegetation extents)

Species	EPBC Act status	Potential occurrence in project area	Impact			Consequence	Is the residual impact likely to be a significant impact under the EPBC Act?
			Option AB	Option C	Option D		
White-throated Needle-tail	Vulnerable; Migratory (also listed vulnerable under FFG Act)	Likely to fly over the project area occasionally in small numbers in November to April when migrates to south-eastern Australia. Peak numbers are in mid to late summer.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Negligible	Unlikely
Fork-tailed Swift	Migratory	Likely to fly over the project area occasionally in small numbers in November to April when migrates to south-eastern Australia. Peak numbers are in mid to late summer.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Unlikely – project area represents a very small proportion of the habitat used by this fast, mobile aerial-feeder.	Negligible	Unlikely
Latham's Snipe	Migratory (also listed vulnerable under EPBC Act but after referral decision)	Likely. Although habitat is limited, this species may occur in low-lying swamps and wetlands.	Habitat removal: <0.1 ha removal of potential habitat	Habitat removal: <0.1 ha removal of potential habitat	Habitat removal: <0.1 ha removal of potential habitat	Negligible The action represents a small loss of habitat availability but is limited in extent to an immediate vicinity / or less than site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have minor sensitivity, and therefore a Negligible Consequence.	Unlikely – habitat limited in extent in small patches; project area not considered to hold an important population therefore not likely to represent significant impact under the EPBC Act.
Orange-bellied Parrot	Critically endangered (also listed critically endangered under FFG Act)	Potential. Habitat is limited, but this species could occasionally use coastal saltmarsh, estuarine wetland and nearby pasture areas associated with the shore crossing, including within the project footprint. Any use of the area would occur through dispersal along the coast after reaching the mainland from Tasmania as their migratory route from Tasmania is located substantially further west.	Habitat removal: ~25 ha removal of potential habitat. All of this habitat is degraded pasture within the project area, near the shore crossing, that occurs <500 m from saltmarsh and <200 m from water (DELWP 2016). Whilst these areas may plausibly be used by the species, their value as foraging habitat is likely to be very low.	Habitat removal: ~25 ha removal of potential habitat. All of this habitat is degraded pasture within the project area, near the shore crossing, that occurs <500 m from saltmarsh and <200 m from water (DELWP 2016). Whilst these areas may plausibly be used by the species, their value as foraging habitat is likely to be very low.	Habitat removal: ~25 ha removal of potential habitat. All of this habitat is degraded pasture within the project area, near the shore crossing, that occurs <500 m from saltmarsh and <200 m from water (DELWP 2016). Whilst these areas may plausibly be used by the species, their value as foraging habitat is likely to be very low.	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas and can return when the site is restored to its former condition. This would be achieved through consideration of the species' habitat in the Rehabilitation and Reinstatement Plan (RRP) (FFM-	Unlikely – occurrence and abundance in the project area is likely to be low and sporadic. Habitat represents a small proportion of available habitat.

Species	EPBC Act status	Potential occurrence in project area	Impact			Consequence	Is the residual impact likely to be a significant impact under the EPBC Act?
			Option AB	Option C	Option D		
						M013), minimising any impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity, and therefore a Minor Consequence.	
Swift Parrot	Critically endangered (also listed critically endangered under FFG Act)	A pair observed in treed coastal habitat foraging in Coastal Banksia. Suitable woodland foraging habitat occurs in the project area. Occurrence in the project area is seasonal and is assumed to be infrequent.	Habitat removal: ~6.5 ha forest and woodland habitat. Other impacts: Potential short-term disturbance when construction occurring near the dunal system (shore crossing) or woodland and forest patches (onshore transmission). Occurrence in the project area is assumed to be infrequent.	Habitat removal: ~8.5 ha forest and woodland habitat. Other impacts: Potential short-term disturbance when construction occurring near the dunal system (shore crossing) or woodland and forest patches (onshore transmission). Occurrence in the project area is assumed to be infrequent.	Habitat removal: ~9 ha forest and woodland habitat. Other impacts: Potential short-term disturbance when construction occurring near the dunal system (shore crossing) or woodland and forest patches (onshore transmission). Occurrence in the project area is assumed to be infrequent.	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity, and therefore a Minor Consequence.	Unlikely – occurrence and abundance in the project area is likely to be low and sporadic. Habitat represents a small proportion of available habitat.
Grey-headed Flying-fox	Vulnerable (also listed vulnerable under FFG Act)	Likely to forage in flowering trees when roosting at temporary camps in Traralgon and Woodside. Unlikely to be present every year but may move into the area when eucalypts and banksias are flowering heavily	Habitat removal: ~8 ha of potential forest and woodland habitat	Habitat removal: ~10 ha of potential forest and woodland habitat	Habitat removal: ~10.5 ha of potential forest and woodland habitat	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity, and therefore a Minor Consequence.	Unlikely – occurrence and abundance in the areas surrounding the project area is relatively high, with particularly significant foraging grounds in the Coastal Banksia Woodland along 90 Mile Beach, and known camps at Snake Island, Welshpool, and potentially Jack Smith Lake. However, no camps are considered likely to occur in project area itself, and HDD will be used to avoid impacts to the small amount of coastal vegetation within the project footprint. As such, whilst some habitat for this species is being removed in inland areas, habitat removal in the key coastal areas is minimal, and works will be conducted during the day to avoid behavioural impacts to foraging individuals at night. The habitat being removed represents a small proportion of available habitat for the species

Species	EPBC Act status	Potential occurrence in project area	Impact			Consequence	Is the residual impact likely to be a significant impact under the EPBC Act?
			Option AB	Option C	Option D		
							in the area and is not the primary resource the species relies on. In addition, habitat removed does not qualify as critical habitat for the species as outlined in the <i>National Recovery Plan for the Grey Headed Flying Fox</i> (DEW 2021).
New Holland Mouse	Vulnerable (also listed endangered under FFG Act)	Possible. Suitable coastal heath and heathy woodland habitat occurs in project area. Although not detected during targeted surveys, a conservative approach has been taken, and the species is considered possible to occur in areas of suitable habitat (Figure 8-9).	Habitat removal: ~4 ha of potential habitat in total. This includes small, isolated, fragmented patches (typically <0.25 ha) unlikely to realistically be important to the species. High-quality habitat patches that may realistically be of considerable value to the species are confined to vicinity of coastal dune system (HZ1-4), and adjacent to Woodside H28 Bushland Reserve (HZ34-40). HZ1-4 comprise a negligibly small part (0.067 ha) of the large extent of potential habitat along the dune system (<0.1%). HZ34-40 comprise a minor part (approx. 2 ha) of the moderately large extent of potential habitat within and around the Woodside H28 Bushland Reserve (approx. 250 ha). As such, the impacted HZs comprise <1% of the habitat within this patch. Habitat Fragmentation: HZs 34-40 also link the two sections of the Woodside H28 Bushland Reserve. Their removal will result in the temporary fragmentation of this habitat into two separate	Habitat removal: ~2.5 ha of potential habitat. in total. This includes small, isolated, fragmented patches (typically <0.25 ha) unlikely to realistically be important to the species. High-quality habitat patches that may realistically be of considerable value to the species are confined to vicinity of coastal dune system (HZ1-4), and adjacent to Woodside H28 Bushland Reserve (HZ34-40). HZ1-4 comprise a negligibly small part (0.067 ha) of the large extent of potential habitat along the dune system (<0.1%). HZ34-40 comprise a minor part (approx. 2 ha) of the moderately large extent of potential habitat within and around the Woodside H28 Bushland Reserve (approx. 250 ha). As such, the impacted HZs comprise <1% of the habitat within this patch. Habitat Fragmentation: HZs 34-40 also link the two sections of the Woodside H28 Bushland Reserve. Their removal will result in the temporary fragmentation of this habitat into two separate	Habitat removal: ~2 ha of potential habitat. in total. This includes small, isolated, fragmented patches (typically <0.25 ha) unlikely to realistically be important to the species. High-quality habitat patches that may realistically be of considerable value to the species are confined to vicinity of coastal dune system (HZ1-4), and adjacent to Woodside H28 Bushland Reserve (HZ34-40). HZ1-4 comprise a negligibly small part (0.067 ha) of the large extent of potential habitat along the dune system (<0.1%). HZ34-40 comprise a minor part (approx. 2 ha) of the moderately large extent of potential habitat within and around the Woodside H28 Bushland Reserve (approx. 250 ha). As such, the impacted HZs comprise <1% of the habitat within this patch. Habitat Fragmentation: HZs 34-40 also link the two sections of the Woodside H28 Bushland Reserve. Their removal will result in the temporary fragmentation of this habitat into two separate	Moderate The action represents a small loss of habitat availability but is limited in extent to an immediate vicinity / or less than site level. However, the effects of fragmentation extend to areas <5 km from the site. Effects are considered to be a temporary but long-term disruption given that recovery may take 7-9 years post-rehabilitation based on peak abundances documented to occur in other analogous scenarios. However, the impacts should be reversible with revegetation with habitat appropriate plants (particularly locally indigenous species from the Fabaceae or legume plant family), subject to landowner agreement. The species prefers areas of open heath with a high percentage of bare ground suggesting it may be able to occupy and/or cross the revegetated areas relatively quickly thereby reducing risk of fragmentation with a minimal impact on population viability. This equates to a medium magnitude impact on a receptor considered to have medium sensitivity and, therefore, a Moderate Consequence.	Unlikely – Potential habitat affected represents a very small proportion of the habitat in the region, much of it protected in conservation reserves. Fragmentation would temporarily occur between the two parts of the Woodside H28 Bushland Reserve, but it is likely that connectivity would be restored in <10 years. Additionally, the revegetating of the impacted area (subject to landowner agreement) with shrub and groundcover species favoured by New Holland Mouse as habitat and food (particularly from the Fabaceae or legume plant family) would likely result in a net improvement in the habitat quality for this species in the affected areas in the long-term.

Species	EPBC Act status	Potential occurrence in project area	Impact			Consequence	Is the residual impact likely to be a significant impact under the EPBC Act?
			Option AB	Option C	Option D		
			patches (a 202-ha patch and a 40-ha patch). Revegetation with shrubs and groundcover plants favoured by the species would reconnect the two sides of the Woodside H28 Bushland Reserve in <10 years (as the species has been documented reaching peak abundance 7-9 years post-sand mine rehabilitation) (DCCEEW 2024), assuming the species would not already be crossing the initial 60-m gap between the patches. The preference of the species to use heathy habitats with a high percentage of bare ground suggests they could use the regenerating vegetation to cross between the two parts of Woodside H28 Bushland Reserve substantially earlier.	patches (a 202-ha patch and a 40-ha patch). Revegetation with shrubs and groundcover plants favoured by the species would reconnect the two sides of the Woodside H28 Bushland Reserve in <10 years (as the species has been documented reaching peak abundance 7-9 years post-sand mine rehabilitation) (DCCEEW 2024), assuming the species would not already be crossing the initial 60-m gap between the patches. The preference of the species to use heathy habitats with a high percentage of bare ground suggests they could use the regenerating vegetation to cross between the two parts of Woodside H28 Bushland Reserve substantially earlier.	patches (a 202-ha patch and a 40-ha patch). Revegetation with shrubs and groundcover plants favoured by the species would reconnect the two sides of the Woodside H28 Bushland Reserve in <10 years (as the species has been documented reaching peak abundance 7-9 years post-sand mine rehabilitation) (DCCEEW 2024), assuming the species would not already be crossing the initial 60-m gap between the patches. The preference of the species to use heathy habitats with a high percentage of bare ground suggests they could use the regenerating vegetation to cross between the two parts of Woodside H28 Bushland Reserve substantially earlier.		

Table 10-16 Residual Impacts on FFG Act-listed fauna species

Species	FFG Act status	Occurrence in project area	Impact			Consequence of residual impact
			Option AB	Option C	Option D	
Black Falcon	Critically Endangered	Possible. Nomadic species which may occasionally be found in the project area when moving across the landscape in response to food resources	Unlikely – Proposed habitat removal represents a small proportion of potential habitat.	Unlikely – Proposed habitat removal represents a small proportion of potential habitat.	Unlikely – Proposed habitat removal represents a small proportion of potential habitat.	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity , and therefore a Minor Consequence .
Gang-gang Cockatoo	Endangered (listed Endangered EPBC Act but after referral decision for the project)	Recorded. Likely to forage in eucalyptus tree within the project area particularly during autumn and winter. Potential breeding sites in hollow trees present in Woodside H28 Bushland Reserve for individuals that may remain local rather than migrate to higher altitude forests in summer.	Habitat removal: ~7 ha of potential habitat including 19 large trees in patches Other impacts: Loss of 13 scattered habitat trees / hollow-bearing trees Temporary disturbance from construction activities	Habitat removal: ~9 ha of potential habitat including 36 large trees in patches Other impacts: Loss of 17 scattered habitat trees / hollow-bearing trees Temporary disturbance from construction activities	Habitat removal: ~9 ha of potential habitat including 36 large trees in patches Other impacts: Loss of 17 scattered habitat trees / hollow-bearing trees Temporary disturbance from construction activities	Minor Potential habitat affected represents a very small proportion of the habitat in the region, much of it protected in conservation reserves. The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity , and therefore a Minor Consequence .
Blue-winged Parrot	Not listed FFG Act Listed EPBC Act after referral decision	Recorded. Suitable habitat for this species occurs in the project area in Eucalypt woodlands, forests, grassland and saltmarsh.	Habitat removal: ~9 ha of potential habitat Other impacts: Loss of 13 habitat trees Temporary disturbance from construction activities	Habitat removal: ~10.5 ha of potential habitat Other impacts: Loss of 17 habitat trees Temporary disturbance from construction activities	Habitat removal: ~11 ha of potential habitat Other impacts: Loss of 17 habitat trees Temporary disturbance from construction activities	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity , and therefore a Minor Consequence
Chestnut-rumped Heathwren	Vulnerable	Known. Not observed during targeted surveys though was recorded incidentally. Heathy vegetation with or without tree cover is suitable habitat. Species assumed present in areas of suitable habitat as a precaution (Figure 8-1).	Habitat removal: ~4 ha of potential habitat.	Habitat removal ~3 ha of potential habitat.	Habitat removal ~3 ha of potential habitat.	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, however potentially permanent due to the highly sedentary and shy nature of this territorial species which is inferred to live up to 5 years. A low impact on population viability is therefore projected. This equates to a low magnitude impact on a receptor considered to have medium sensitivity , and therefore a Minor Consequence .

Species	FFG Act status	Occurrence in project area	Impact			Consequence of residual impact
			Option AB	Option C	Option D	
Little Eagle	Vulnerable	Likely to occur in low numbers in open forest and woodland areas.	Habitat removal: ~9 ha of potential habitat.	Habitat removal: ~10.5 ha of potential habitat.	Habitat removal: ~11 ha of potential habitat.	Negligible The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have low sensitivity , and therefore a Negligible Consequence .
Powerful Owl	Vulnerable	Likely. Not recorded during targeted surveys but is likely to occur throughout suitable forest and woodland habitat (Figure 8-4).	Habitat removal: ~8 ha of potential habitat.	Habitat removal: ~10 ha of potential habitat.	Habitat removal: ~10.5 ha of potential habitat.	Negligible The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have low sensitivity , and therefore a Negligible Consequence .
White-bellied Sea-eagle	Vulnerable	Observed flying along the coast in the region during targeted survey. Suitable habitat occurs along the coast within the project area. Occurrence and abundance in the project area is likely to be low and sporadic.	Unlikely – The project will not remove any open water or treed habitats at the coast. Consequently, impacts on this species are likely to be temporary and very limited in extent. The use of the coast by this species will continue over the project area.	Unlikely – The project will not remove any open water or treed habitats at the coast. Consequently, impacts on this species are likely to be temporary and very limited in extent. The use of the coast by this species will continue over the project area.	Unlikely – The project will not remove any open water or treed habitats at the coast. Consequently, impacts on this species are likely to be temporary and very limited in extent. The use of the coast by this species will continue over the project area.	Minor The action does not represent a loss of habitat availability and is limited in extent to the site level. Any effect is considered to be a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a low magnitude impact on a receptor considered to have minor sensitivity , and therefore a Minor Consequence .
White-footed Dunnart	Vulnerable	Possible. Suitable forest and woodland habitat with dense understorey occurs in the project area. Although not detected during targeted surveys, a conservative approach has been taken, and the species is considered possible to occur in areas of suitable habitat.	Habitat removal: ~8 ha of potential habitat.	Habitat removal: ~10.5 ha of potential habitat.	Habitat removal: ~11 ha of potential habitat.	Minor The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a medium-term disruption, reversible as any individuals move into new areas and revegetation efforts replace lost habitat with a shrubby and groundcover layer they can still use, and has a minimal impact on population viability, resulting in a low-magnitude impact This equates to a low magnitude impact on a receptor considered to have medium sensitivity , and therefore a Minor Consequence .
Koala (Strzelecki population)	N/A	Recorded. Although not listed as threatened, Koala of the Strzelecki Ranges and South Gippsland are notable as	Habitat removal: ~8 ha of potential habitat, not including areas of eucalypt plantation.	Habitat removal: ~10 ha of potential habitat, not including areas of eucalypt plantation.	Habitat removal: ~10 ha of potential habitat, not including areas of eucalypt plantation.	Negligible Reduction in potential habitat for the species. Most vegetation affected by the project belongs to treed EVCs potentially suitable for this species.

Species	FFG Act status	Occurrence in project area	Impact			Consequence of residual impact
			Option AB	Option C	Option D	
		they represent one of the few remaining original populations of the species in Victoria. As such, the population has comparatively high genetic diversity compared with the mostly re-introduced populations elsewhere in the state.				The action represents a loss of habitat availability but is in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have low sensitivity, and therefore a Negligible Consequence.
Lace Monitor	Endangered	Recorded. Suitable woodland and forested habitat occurred in the project area	Habitat removal: ~8 ha of potential habitat.	Habitat removal: ~10.5 ha of potential habitat.	Habitat removal: ~10.5 ha of potential habitat.	Negligible Reduction in habitat for the species. The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have low sensitivity, and therefore a Negligible Consequence.
Glossy Grass Skink	Endangered	Recorded. Suitable moist, densely vegetated habitat occurred in the project area	Habitat removal: ~2.5 ha of potential habitat. HZ12 along an unnamed waterway (UFI: 42806331) within the project area is known to house this species and is considered the most important habitat for the species in the project area. Habitat Fragmentation: HZ 12 occurs along an unnamed watercourse (UFI: 42806331) intersected by the project area, and habitat for this species may extend along the watercourse on either side of the project area. As such, the removal of habitat for this species from within the project area could cause a break in habitat connectivity for this species along the watercourse, causing habitat fragmentation at a medium scale (effects extend beyond project area, but limited to <5 km beyond project area). This would likely be medium-term, as the low, dense	Habitat removal: ~2 ha of potential habitat. HZ12 along an unnamed waterway (UFI: 42806331) within the project area is known to house this species and is considered the most important habitat for the species in the project area. Habitat Fragmentation: HZ 12 occurs along an unnamed watercourse (UFI: 42806331) intersected by the project area, and habitat for this species may extend along the watercourse on either side of the project area. As such, the removal of habitat for this species from within the project area could cause a break in habitat connectivity for this species along the watercourse, causing habitat fragmentation at a medium scale (effects	Habitat removal: ~2 ha of potential habitat. HZ12 along an unnamed waterway (UFI: 42806331) within the project area is known to house this species and is considered the most important habitat for the species in the project area. Habitat Fragmentation: HZ 12 occurs along an unnamed watercourse (UFI: 42806331) intersected by the project area, and habitat for this species may extend along the watercourse on either side of the project area. As such, the removal of habitat for this species from within the project area could cause a break in habitat connectivity for this species along the watercourse, causing habitat fragmentation at a medium scale (effects extend beyond project area, but limited to <5 km beyond project area). This would likely be relatively medium-term, as the low,	Minor The action represents a loss of habitat availability but is limited in extent to the immediate vicinity / or less than site level. However, this species has highly specialised habitat requirements and occurs in discrete and small populations – as such, it is considered a receptor of medium sensitivity. The action also represents a fragmentation of the population of this species along the unnamed creek-line (UFI: 42806331) where HZ10 is located, which is an effect that extends to a medium scale, although this will only be temporary. As habitat is being removed only temporarily, the effect is considered a medium-term disruption because it is likely to soon grow back over the impact footprint once works are complete (i.e. in <5 years). However, unless managed appropriately, impacts to the local population within the footprint may not be readily reversible. This is because the full extent of suitable habitat available to this population beyond the impact footprint is not clear, although it may extend along much of the creek that HZ 12 is on, particularly downstream towards the coast. Therefore, whilst it appears plausible that individuals could disperse back into the footprint once impacts conclude, it remains uncertain. Hence, impacts to this population may cause it to go extinct without appropriate management, particularly if occupied habitat does not extend far beyond the footprint.

Species	FFG Act status	Occurrence in project area	Impact			Consequence of residual impact
			Option AB	Option C	Option D	
			groundcover species that Glossy Grass Skink favours as habitat would likely regrow over the impacted area in <5 years.	extend beyond project area, but limited to <5 km beyond project area). This would likely be medium-term, as the low, dense groundcover species that Glossy Grass Skink favours as habitat would likely regrow over the impacted area in <5 years.	dense groundcover species that Glossy Grass Skink favours as habitat would likely regrow over the impacted area in <5 years.	Therefore, the following mitigation measures will be applied to reduce impacts precautionarily, aimed at preventing potential loss of the local Glossy Grass Skink population and ensuring that impacts to its habitat and population are reversible: ▪ If possible, reducing impacts to the species' habitat so that fragmentation does not occur and some connectivity remains. This may be achieved using HDD to install the transmission line under the creek and micro-siting the drill sites to be located outside or partly outside areas of the species' habitat; ▪ If using HDD to avoid impacts is not possible, the following 3 measures will be completed instead: ▪ The extent of likely occupied habitat beyond the impact footprint will be identified with additional habitat mapping, including the identification of candidate sites for translocation; ▪ A salvage and translocation plan will be drafted and implemented within the impacted areas of habitat; and ▪ Subject to landowner agreement, impacted habitat will be reinstated by revegetating with appropriate groundcover plant species for Glossy Grass Skink. In particular, locally indigenous plants that form a dense, complex, matted structure that creates thermally buffered microhabitats will be selected. Once the above mitigation measures are applied, the magnitude of impacts is considered to be low. A low magnitude impact on a receptor considered to have medium sensitivity is considered a Minor Consequence. It is worth noting that without the above mitigations, the magnitude of impacts would likely be medium to high, which would result in a moderate to major consequence. As such, it is important that the above mitigation measures are implemented to prevent this from occurring.
Martin's Toadlet	Endangered	Possible. Not recorded during targeted surveys in project area though it was recorded in the wider study area near Old Rosedale Road. Assumed present.	Habitat removal - approximately ~6 ha of potential habitat.	Habitat removal - ~10 ha of potential habitat.	Habitat removal - approximately ~10.5 ha of potential habitat.	Moderate The action represents a loss of habitat availability but is limited in extent to the immediate vicinity / or less than site level. Any effect is considered a medium-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. Additionally, salvage will be conducted in areas of potential habitat, particularly <200 m from potential breeding wetlands, to prevent direct injury to individuals that may be present. This equates to a low magnitude impact on a receptor considered to have high sensitivity, and therefore a Moderate Consequence.

Species	FFG Act status	Occurrence in project area	Impact			Consequence of residual impact
			Option AB	Option C	Option D	
Southern Toadlet	Endangered	Targeted surveys for the Southern Toadlet have not been undertaken in the project area. It is likely that Southern Toadlets occur in parts of the project area where extensive native vegetation remains in gullies and low points in the landscape in or adjacent to areas of woodland habitat.	Habitat removal: ~4 ha of potential habitat.	Habitat removal: ~2.5 ha of potential habitat.	Habitat removal: ~2 ha of potential habitat.	Moderate The action represents a loss of habitat availability but is limited in extent to the immediate vicinity / or less than site level. Any effect is considered a medium-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. Additionally, salvage will be conducted in areas of potential habitat, particularly <50 m from potential breeding wetlands, to prevent direct injury to individuals that may be present. This equates to a low magnitude impact on a receptor considered to have high sensitivity, and therefore a Moderate Consequence.
Australian Mudfish	Endangered	It is assumed that Australian Mudfish may move along the unnamed waterway in the shore crossing area between the Bruthen Creek estuary and Freshwater Swamp.	Unnamed waterway UFI 42824679 avoided by drilling under. Temporary 6 m wide causeway across unnamed waterway UFI 42824679	Unnamed waterway UFI 42824679 avoided by drilling under. Temporary 6 m wide causeway across unnamed waterway UFI 42824679	Unnamed waterway UFI 42824679 avoided by drilling under. Temporary 6 m wide causeway across unnamed waterway UFI 42824679	Negligible The action represents a loss of ephemeral habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability. This equates to a negligible magnitude impact on a receptor considered to have medium sensitivity, and therefore a Negligible Consequence.

10.2.6. Protected flora (FFM-I007)

Potential impacts

Several flora species listed as generally protected flora under the FFG Act have the potential to be impacted by the project during vegetation clearance (Section 7.9). These impacts will be permanent and may result in a loss of individuals or a loss of habitat for the species. This may result in a reduction in local population numbers; however, high-quality habitat for a number of these species is present within conservation reserves in the wider region and population numbers are unlikely to be affected.

The species recorded within the project area include a variety of widespread, non-threatened common Orchidaceae species. Whilst land clearance will remove a number of individuals, it is anticipated that common and widespread species will re-establish post construction. It is less likely that species typically found in higher-quality habitat would re-establish following construction as this level of disturbance is likely to affect the more specialised environmental factors under which they normally persist.

Additionally, initial analysis of impacts to biodiversity from the 2019/2020 bushfires (DELWP 2020) did not identify any of the protected flora species identified for the project as being potentially impacted by the fires.

Management and mitigation

No further specific mitigation measures have been applied, other than those for avoiding and minimising impacts on native vegetation where most threatened flora occur as outlined in Section 10.2.1.

Further avoidance and minimisation of impacts will be explored and implemented where possible during the design and construction planning phases in line with measures detailed in Section 14.1 for native vegetation (FFM-M001, FFM-M002). Furthermore, a specific protocol for how these measures would be implemented in conservation reserves will be developed, with site-specific requirements where necessary (FFM-M009).

Residual impacts

The project will have a residual impact on several generally protected flora species as these species are likely to occur in native vegetation to be removed.

Post-construction, native vegetation will naturally re-establish over time and areas subject to temporary construction works will be rehabilitated. This means that generally protected flora species have opportunities to recolonise those areas outside the cable easement following disturbance.

Orchid species that are associated with higher quality vegetation that has not been subject to past disturbance will also be impacted during construction. As species associated with higher quality habitat areas are less likely to recover after the disturbance created by construction works, this may lead to a decrease within the local population.

Localised loss of individuals of generally protected flora species from habitat removed during construction is unlikely to result in a significant impact to the species. Consequence of the impact is minor as the magnitude is low based on minor effect on the range of the species and medium sensitivity of the receptor.

A permit to take (kill, injure, disturb or collect) flora generally protected flora species under the FFG Act will be required for works within public land. The total loss of protected flora will need to be quantified in preparing the application and FFG Act permits will need to be secured prior to commencement of construction (FFM-M015).

10.2.7. Waterways (FFM-I008)

Potential impacts

Numerous ephemeral waterways are crossed by the project area, including Warragul Creek and Morris Creek.

The proposed construction method to cross waterways is open trenching. Each trench is anticipated to take two to three days to construct. Cable crossing installation durations may vary based on waterway width and technique utilised. The proposed crossings of minor waterways could be undertaken during dry periods to minimise impacts on flow regime. It should be noted that longer term construction activities and site infrastructure could change overland flow pathways and downstream habitat. Longer term activities and infrastructure includes laydown areas, temporary haul roads, batching compounds, construction compounds and materials storage areas.

The potential ecological impacts from temporary creek crossings generally relate to removal of native vegetation and aquatic fauna habitat (e.g. frogs and fish) (FFM-R009). Potential impacts for the onshore transmission infrastructure relates to the 60m wide construction footprint. Potential impacts from the 6m wide temporary causeway to be constructed over unnamed waterway UFI 4282679 in the shore crossing area relates to an assumed 10m wide construction width as construction approach is not yet known.

Management and mitigation

Mitigation strategies will be implemented by the project to reduce impacts to waterway crossings.

The surface water report recommended environmental mitigation measures to prevent any significant impact on water quality and flow volumes in waterways.

A Designated Waterway Crossing Management Plan will be prepared to allow site-specific mitigations to be developed and implemented including measures to retain the waterways' hydrology and flow regime and measures to maintain bank stability.

Measures that will form part of waterway management for the project include:

- Where practicable, construct all trenched crossings of waterways during no or low flow conditions and reinstate as soon as practicable.
- Monitor weather forecasts to minimise the likelihood of having open trenches at waterways when high rainfall events are expected.
- Form discrete stockpile segments (i.e. rather than a continuous row of stockpile materials) to prevent causing water to pond on the upstream side of stockpiles.
- Place flow diversion measures upstream of soil stockpiles where drainage lines intersect the project area
- Direct surface water runoff from external catchments through regular gaps in soil stockpiles where erosion and sediment controls are installed to allow runoff to pass over the project area at a controlled location without causing erosion. Surface water management will follow the Surface Water Management Plan, see Technical report I: Surface water for additional details.
- Install and monitor best practice erosion and sediment control measures throughout and post-construction. Construction works will be completed in accordance with relevant regulatory requirements and industry best practice guidelines such as the *IECA Best Practice Erosion and Sediment Control Appendix P* and the *Land Based Pipeline Construction Guidelines* (2015).

- Avoid stockpiling material near waterways. Material must be located away from the top of banks so that there is no restriction to the flow conveyance area.
- Apply potentially hazardous materials storage and handling protocols to avoid the risk of any spills. Where practicable, all material storage sites will be located at least 100 m from waterways.
- Check any structures that become inundated and have the potential to trap fauna (i.e. excavated trenches and sediment/exclusion fencing) and salvage aquatic fauna prior to and during any initial dewatering event. Salvage should only be undertaken by and appropriately experienced and licenced person/s.
- Reinstate the open trench within the waterway and riparian zones as soon as reasonably practicable following construction.
- Reinstate vegetation cover and construction area profile as soon as practicable following construction and continue remaining controls for a period of time until the crossing has deemed the project area stabilised and the risk of further impact/s negligible.
- Include emergency measures within the project's EMP as far as reasonably practical for any construction works that occur in a waterway's channel or floodplain. This will protect earthworks and works areas from inundation and/or will include protocols for site closure for predicted higher rainfall and river flow events.
- Maintaining hydrology and connectivity of unnamed waterway UD in the shore crossing area for temporary causeway.
- Engage with West Gippsland CMA regarding how construction can be designed to manage impacts to native riparian vegetation and obtain works on waterways permits.

Residual impacts

Residual impacts on waterways are likely to be minimal with mitigation. Consequence of the impact is rated minor due to the medium sensitivity of the receptor and low magnitude of impact.

10.3. Risks

Construction activities may also potentially indirectly impact retained values adjacent to the project area. These are potential risks of impact associated with the project and include degradation or loss of retained vegetation and habitat, disruption of connectivity for wildlife (habitat fragmentation), injury or death of wildlife during habitat removal or due to increased traffic movements and exacerbation of threatening processes.

10.3.1. Habitat fragmentation (FFM-R009)

Habitat fragmentation is the process of subdividing habitat into smaller segments separated by inhospitable habitat (Gleeson & Gleeson 2012). It is recognised under the FFG Act as a threat to native fauna in Victoria. The process of habitat fragmentation has several components: reduction in the amount of habitat (habitat loss), a decrease in the size of habitat patches (habitat reduction), and an increase in the isolation of patches (habitat isolation; Bennett 1999; Fahrig 2003). Factors influencing the susceptibility of species to fragmentation include mobility, the distance of gaps in the canopy or ground cover, the width of corridors, and the presence of suitable habitat to move to.

Fragmentation can limit dispersal of individuals between sub-populations and increases the risk that newly isolated habitats may not be recolonised after local extinction caused by fire or disease. Fragmentation of habitats also leads to more extensive edge effects that alter the structure and function

of the remaining habitat, potentially rendering the habitat unsuitable for threatened species of flora and fauna. Fragmentation of habitat consistently degrades ecosystems, reducing species diversity and abundance.

Potential impacts

Construction of the underground cables will be completed within a 60 m wide easement. As such, the gap that would be created in continuous native vegetation would be 60m wide. For Woodside H28 Bushland Reserve and private land KP 21.45 to KP 21.55 this removal represents a gap in a contiguous patch of vegetation. For roadsides and streamsides, this removal represents a gap in narrow linear corridors.

During operation the 60 m gap would be reduced to 40 m after areas either side are allowed to regenerate and/or are rehabilitated. Potential operation impact associated with habitat fragmentation are discussed in Section 10.3.1.

Fauna most likely to be affected by wider gaps in native vegetation within Woodside H28 Bushland Reserve are arboreal mammals, ground-dwelling mammals and small woodland birds with home ranges in the area. The movement of such fauna may be inhibited by wider gaps in the tree canopy (arboreal mammals) and/or mid and ground layer vegetation (birds and ground-dwelling mammals). The susceptibility of arboreal mammals, such as possums, gliders and Koalas, to widening of existing gaps within the project area varies between species (Bennett 1999; Gleeson and Gleeson 2012). Listed threatened fauna known or that have the potential to be affected by habitat fragmentation include Chestnut-rumped Heathwren, ground-dwelling mammals (New Holland Mouse and White-footed Dunnart).

Outside of Woodside H28 Bushland Reserve, the road reserves and riparian vegetation are likely to function as dispersal corridors for more mobile fauna to move between larger areas of native vegetation in the wider landscape. There may be some disruption to these corridors where the project crosses roadsides including Stringybark Lane, Dewars Road, Giffard Road, Four Mile Creek Road and Giffard West Road. There may also be some temporary disruption to corridors where the project crosses creeks, such as the unnamed waterway UFI: 42806331 where Glossy Grass Skink was recorded – as such, this sedentary species is also susceptible to habitat fragmentation.

Removal of native vegetation will also result in a reduction in, or loss of, home range for fauna occupying affected vegetation patches that have small, discrete home ranges. Such species include reptiles, frogs, small mammals, and small birds.

Management and mitigation

The project has done, and will continue to, seek opportunities during design to avoid loss of native vegetation and reduce habitat fragmentation in line with measures and priorities detailed in Section 10.2.1 for native vegetation. Measures include reducing the width of the project area at selection location which achieves a reduction in potential gap from 60 m to 40 m.

It is important that during construction of the project, measures are taken to ensure the Strzelecki Koala population is not restricted from moving about the landscape. Construction fencing, trenching and other construction elements must be designed to allow Koalas to exit the construction area should they enter it and that they are safe if they do enter the construction area (FFM-M006). These design elements will be included and detailed in the CEMP (FFM-M003).

The project will prepare and implement a Rehabilitation and Reinstatement Plan (RRP) to guide the approach to rehabilitation following the completion of construction in conservation reserves (FFM-M009)

and roadsides / streamsides with remnant vegetation (FFM-M013). As part of preparing the RRP, the project should identify areas to be subject to high quality, effective and rapid revegetation to restore links. For most fauna species, the restoration of temporarily cleared areas to a minimum width necessary for maintenance of the easement should restore habitat links for the most affected species. In some cases, it may take several years before the resulting temporary gap in vegetation and habitat reduces due to time revegetation takes to establish. The alignment maintenance regime will permit the re-establishment (through revegetation and/or natural colonisation from surrounding vegetation) of the tree, shrub and ground layers of vegetation/habitat to within 20 m of the underground infrastructure, as well as the re-establishment of the shrub and ground layers over most of the project area. This will reduce the impacts of fragmentation over the medium to long term on local fauna populations.

Details of revegetation will be elaborated on further in the RRP. However, to best minimise potential impacts to New Holland Mouse, locally indigenous plants from the Fabaceae or legume family should be prioritised for planting in areas of native vegetation to be removed that are adjacent to the Woodside H28 Bushland Reserve (i.e. HZs 34-40). To best minimise potential (albeit very small) impacts on Orange-bellied Parrot, locally indigenous plants known to be favoured food for this species (e.g. *Sarcocornia spp.*) should be prioritised for planting in the impacted areas of habitat for this species (degraded pasture behind the dunes at the shore crossing). All choices of plantings for revegetation are contingent on landowner consent being granted.

The project could also consider:

- Revegetation activities in the local area that could provide conservation benefits for wildlife directly through increasing the amount of suitable habitat in the landscape, improving the quality of existing habitats or promoting the connectivity of existing habitats by filling in 'gaps' in a link and establishing new habitat corridors or 'stepping stones' of habitat (Bennett et al. 2000). Increasing the amount of suitable habitat can be achieved by adding to existing vegetation to increase the size of a patch or width of a corridor. Improving the quality of habitat can be achieved through selective replanting or seeding to enhance the composition or structure of the vegetation.
- The use of HDD to avoid impacts to HZ12 at unnamed waterway UFI: 42806331 where Glossy Grass Skink was recorded, as this would prevent potential fragmentation of its habitat along this riparian corridor.

The project must also do the following:

- If HDD is not used to avoid impacts to HZ12 as described above, the following measures will be implemented:
- Habitat mapping for Glossy Grass Skink along this waterway to determine the true extent and locations of habitat for this species, including the identification of candidate sites for translocation;
- The drafting and implementation of a salvage and translocation plan for Glossy Grass Skink, including follow-up surveys at the translocation sites to monitor the health of the population; and
- A revegetation program for HZ12 to restore habitat connectivity, prioritising the planting of locally indigenous groundcover plants that form a thick, matted, complex growth form that creates thermally buffered microclimates favoured by Glossy Grass Skink, to be implemented as soon as works are completed in this area.

Local Landcare groups may have landscape restoration projects that the project could contribute to.

Residual risk

The linear corridor of vegetation within the McLoughlins Beach-Seaspray Coastal Reserve is avoided by HDD.

The linear corridors along roadsides are not avoided and creation of gaps in the canopy is unable to be mitigated. The primary locations where these gaps will affect linear corridors are:

- 40m gap in Woodside H28 Bushland Reserve/private adjacent (KP 12.25 to KP12.50).
- 50 m gap in patch of forest on private land (KP 21.45 to KP 21.55)
- 40 m gap in Stringy Bark Lane and Giffard Road roadsides.
- 60 m gap in roadsides including Dewars Road, Four Mile Creek Road and Giffard West Road (Giffard West Road only relevant to Option D).

Disruption to movement of fauna is unlikely to be significant because most species likely to utilise the roadsides are mobile and able to persist in fragmented landscapes. Some of the roadside vegetation is already discontinuous in places or, in some instances, does not connect through to patches of native vegetation east of the project area. The project has selected a route that avoids large tracts of remnant vegetation. The residual risk of fragmentation is low

10.3.2. Degradation or loss of retained native vegetation and habitat (FFM-R010)

Construction may result in indirect loss or degradation of retained native vegetation and fauna habitat adjacent to the project area.

Potential impact

Without appropriate controls, construction works have the potential to impact on vegetation and habitat adjacent to the project area through means such as:

- Inadvertent clearance of native vegetation outside the project area by construction works if construction boundary is not clearly identified on site.
- Inappropriate placement of construction stockpiling resulting in the smothering of native vegetation.
- Soil compaction or excavation causing structural root damage and vegetation loss within, or adjacent to, the project area, leading to impacts to native trees within 15 m of the area.
- Dust generated during construction settling on, and impacting the health of, vegetation.
- Introduction or spread of weeds, pathogens or pest animals resulting in a decline in the quality of adjacent native vegetation and habitat and localised infestations may increase the availability of shelter for pest animals. Introduction or spread could occur through processes such as the inadvertent spread on construction vehicles (particularly tyre treads) and/or through use of contaminated fill, leading to the spread and establishment of environmental weeds and/or pathogens at new locations. This is of particular concern within conservation reserves and roadsides that contain high-quality native vegetation. Introduction and/or spread of Cinnamon Fungus that could result in a decline in the quality of adjacent native vegetation. Introductions could occur through similar processes that could
- Introduction and/or spread of Chytrid Fungus that could impact local frog populations within any of the waterways or wetlands within or adjacent to the project area. It is unknown whether chytrid fungus is present in or adjacent to the project area, but it is assumed present unless testing

proves otherwise. Humans may contribute to the spread of the fungus from one area to another through movement of infected footwear, clothing, equipment and vehicles.

- Encouraging occurrence of pest animals through or facilitating access of pest animals. Creation of additional 'edges' in areas of remnant vegetation may facilitate access by introduced predators.
- Surface water run off carrying pollution and/or sediment into waterways or areas subject to seasonal flooding. Construction activities result in local environments where bare earth is exposed. Bare earth is prone to erosion events due to a lack of vegetation and ground cover to stabilise the soil surface. During rainfall events, areas of exposed earth can result in increased runoff, sediments loads and contaminants entering waterways and wetlands, causing pollution events. Operation of machinery near waterways can also result in contamination of waterways with fuels and chemicals.
- Noise and light pollution during construction may result in disturbance to the populations of threatened fauna in, or adjacent to, the project area through restricted ability to communicate, and disruption to foraging, roosting and breeding activities for the duration of construction. Species particularly vulnerable to disturbance from light include nocturnal species, including the Powerful Owls.
- Changes to groundwater that affect availability of water to vegetation that may be groundwater dependent. This risk (FFM-R013) is discussed in Section 10.3.5.

Management and mitigation

A Construction Environmental Management Plan (CEMP) will be prepared by the project that describes construction-specific management, including erosion and sedimentation control and discharge points, and management of hazardous materials and waste (FFM-M003). Measures more specific to the protection and management of flora and fauna will be outlined in sub-plans to the CEMP such as a Flora and Fauna Management Plan (FFMP) (or equivalent) (FFM-M005) and Biosecurity Management Plan (BMP) (FFM-M007). Furthermore, a specific protocol for how these measures would be implemented in conservation reserves will be developed, with site-specific requirements where necessary (FFM-M009).

The CEMP and subplans will integrate and expand upon measures such as:

- No-Go Zones on the boundary of the project area to protect other areas of known significant ecological values (native vegetation and threatened species habitat) adjacent to the project area (FFM-M005). No-Go Zones are areas where works are not permitted and will not be revised or altered unless advised by a project arborist in relation to Notional Root Zones. Determination of the locations and extents of these No-Go Zones will be completed on a final design. The No-Go Zones will be documented in the project GIS and incorporated on site plans included in the CEMP and relevant sub-management plans prepared in consultation with DEECA (FFM-M011). They will be defined on ground with temporary fencing and signage prior to construction commencing. Given the linear nature of the project, fencing of No-Go Zones will occur in a staged manner as construction progresses along the alignment.
- Best-practice erosion protection, sediment and erosion control and monitoring will be in accordance with the Victorian Environmental Protection Authority (EPA). The Surface Water report (Technical Appendix I), details mitigation measures to be implemented during construction works.
- Covering exposed stockpiles, watering down access tracks and construction areas during dry conditions to reduce dust affecting adjacent native vegetation and waterways (FFM-M008).

- Scheduling construction works to avoid the breeding season of threatened fauna species (Table 10- in Section 10.3.4) in areas of habitat for those species, where practicable (FFM-M006).
- Prioritise completing construction works during daylight hours to reduce impacts of noise and light on nocturnal animals in retained areas of habitat (FFM-M006). Although construction will occur during daylight hours for most of the works, some discrete works outside normal working hours would be required (e.g. the shore crossing and any other areas of trenchless drilling), where it can be justified that it is not reasonably practicable to constrain the works to normal working hours (refer to Technical report W: Noise and vibration for further details). Any works will be undertaken in accordance with EPA Victoria Publication 1834.2 and with implementation of all reasonably practicable mitigation measures. A framework to justify the necessity of out-of-hours works will be developed.
- Design any lighting (if required) to avoid/minimise light spill into adjacent habitat in general accordance with guidance in the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) where these do not conflict with construction safety (FFM-M006). Placement of site compounds that may require security lighting away from areas of habitat would mitigate the risk.
- Implementing measures to prevent the introduction and spread of weeds (FFM-M007).
- Scheduling construction across or adjacent to waterways or wetland areas to avoid wet periods to minimise erosion and sedimentation risk (FFM-M003).

An experienced and qualified trenchless construction contractor (e.g. horizontal direction drilling – HDD contractor) will be employed to undertake any trenchless works and will employ practices to prevent losses of drilling fluids as part of detailed design (SOL-M006). Detailed design will include frac out modelling to identify the lowest risk drilling path and methods to reduce risk of loss to the environment.

Implementation of trenchless installation methods at the Reeves Beach shore crossing is identified as a mitigation in Technical Report E – Offshore Ornithology and Bats Technical Report to minimise impacts to the beach and dune shorebird habitat. Engage a suitably trained ecologist to check the breach for signs of nesting habitat for Hooded Plover. Should any nests be found, signage and designate no-go areas will be established to ensure impacts are avoided (OFF-M05).

Residual risk

Impacts to retained native vegetation and habitat from works inadvertently extending outside the project area are not anticipated provided the mitigation measures are implemented.

There remains a risk of disturbance to wildlife adjacent to the project from noise and light during construction. Although most works will occur during normal working hours and therefore mostly within daylight, some works may occur outside those times at discrete locations where it is not reasonably practicable for the works to be constrained.

The risk of lighting affecting local fauna (if required) is low with mitigation.

Noise may affect wildlife in some habitats adjacent to the project area, but the risk is minor due to the short term, temporary nature of the works. Technical report W: Noise and vibration that considered changes to noise levels at conservation reserves and concluded the following:

- Noise from the surf along McLoughlins Beach is louder than predicted levels from shore crossing works (trenchless drilling) or the nearest batching plant (for concrete or other products). Therefore, it is not anticipated wildlife occupying the McLoughlins Beach - Seaspray Coastal Reserve or the Ninety Mile Beach will be affected by noise. This means that if Grey-headed Flying-

fox were to roost in the reserve they would be unlikely to be affected by noise associated with the project. Any shorebirds that could occur on the Ninety Mile Beach would be unlikely to be affected by noise from the shore crossing either. The Ninety Mile Beach was found to support a low diversity and abundance of shorebirds during surveys conducted for the project and documented in the *Technical Report E – Offshore Ornithology and Bats Technical Report*.

- Wildlife in Woodside H27 Bushland Reserve may experience a change in noise levels for up to 7 months due to a batching plant located 800 metres from the reserve. Noise protocol limits for batching plant operation are 46 dB, 41 dB and 36 dB during the day, evening and night respectively and compliance with these limits is expected for the project. Those noise limits are at levels that are less than normal human speech (60 dB based on Newport et al., 2014). Predicted noise level 800 m from the batching plant (at the edge of the reserve) is 38 dB which is less than normal human speech. The source of the noise is likely to be reasonably constant which means wildlife are more likely to habituate to the sound. Batching plants will operate during normal working hours and, as such, are unlikely to affect the activity of nocturnal species. Many diurnal species are mobile and woodland vegetation should attenuate noise levels further into the reserve.
- Wildlife in Woodside H28 Bushland Reserve and along roadsides would experience noise from cable construction as it passes through those areas. The construction activity that represents the loudest noise level is conduit installation which would occur at approximately ~120 m per day per work crew with 4 crews. The project area extends approximately 2 km adjacent to Woodside H28 Bushland Reserve that would equate to approximately 17 days conduit installation (for 4 conduits).

10.3.3. Introduction or spread of weeds, pathogens and pest animals (FFM-R011)

Construction of the project will require soil excavation and trenching within the project area extending from the onshore shore crossing area to the VicGrid hub. It will also require the clearance of land for joint bays and the creation and/or upgrade of roads. Construction activities proposed and the methods for construction may result in increased impacts on biodiversity from threats including weeds, pathogens and pest animals (FFR143).

Potential impacts

Weeds

Weeds, particularly environmental weeds declared noxious weeds under the CaLP Act (Table 7-9) can invade and degrade native vegetation if unmanaged. Once established, weeds such as African Boxthorn, African Love-grass, Blackberry and Gorse can become difficult to eradicate. Ragwort is a common weed in agricultural systems that degrades crops and pastures and can cause local infestations if not controlled. Other weed species such as Spear Thistle are opportunistic, disturbance-loving weeds that can easily establish and spread during construction when soil is overturned and exposed.

The introduction and/or spread of weeds within the project area has the potential to contribute to FFG Act threatening processes including invasion of native vegetation by Blackberry *Rubus polyanthemos* and invasion of native vegetation by 'environmental weeds'. Invasion by high threat weeds is of particular concern within conservation reserves and roadsides that contain high-quality native vegetation. Introduction and spread of weeds may occur during construction through processes such as the inadvertent spread of weed seed and propagule material on construction vehicles (particularly tyre treads) and/or the introduction of weed seed and propagule material through use of contaminated fill, leading to the spread and establishment of environmental weeds at new locations.

The introduction and/or spread of weeds into these areas may result in a decline in vegetation quality and localised infestations may increase the availability of shelter for pest animals (also listed as a threatening process).

Pathogens

Chytrid fungus

Chytrid Fungus is a threatening process listed under the EPBC Act and FFG Act. It is an infectious disease that causes Chytridiomycosis in amphibians and has been found throughout the cool and wet areas of Australia. The fungus invades the surface layers of the frogs' skin disrupting the normal function of the skin leading to 100% mortality in frog populations in eastern Australia and fewer deaths in other populations in western areas of Australia (DoEE 2016). Humans may contribute to the spread of the fungus from one area to another through movement of infected footwear, clothing, equipment and vehicles. It is unknown whether chytrid fungus is present in or adjacent to the project area but is assumed present unless testing proves otherwise. Spread of chytrid fungus may impact local frog populations within any of the waterways or wetlands identified within the project area.

Cinnamon fungus (Root-rot)

Cinnamon fungus or 'Root-rot' is a threatening process listed under the EPBC Act and FFG Act. The disease caused by a soil-born pathogen that results in the infection and subsequent dieback of plants. Plant families susceptible to the disease include the Proteaceae, Fabaceae, Dilleniaceae and Epacridaceae families (DSE, 2008). These plant families contribute to the understorey component of ecological communities within the project area including Heathy Woodland (EVC 48), Damp Sands Herb-rich Woodland (EVC 3) and Lowland Forest (EVC 16). Ecological communities infected with Root-rot can undergo major declines in health which also results in declines in some insect, bird and animal species due to the loss of shelter, nesting sites and food resources (DoEE, 2018). Humans have been implicated in the spread of Cinnamon fungus as a result of soil adhering to vehicles, machinery, tools and footwear.

Cinnamon fungus was noted within Merrimans Creek Flora and Fauna reserve during assessments. Although Merrimans Creek is no longer in the current project area, Cinnamon Fungus is known to be present in the general area. The project therefore has the potential to exacerbate this threatening process through spread of soil. Control of *Phytophthora cinnamomi* will form part of the CEMP for the project.

Pest animals

Deer

Species of deer are widely introduced around Australia. They have significant negative impacts for flora species and indirectly affect fauna species. Deer have become overabundant and have been described as invasive ecosystem engineers (Davis et al. 2016). A particular problem for southeast Gippsland, Sambar Deer *Rusa unicolor* and Hog Deer *Axis porcinus* contributes to habitat modification and interspecific competition with native fauna. Tracks of Hog Deer and footage of Sambar Deer were recorded within the study area.

Rabbits

Competition and land degradation by rabbits is a key threatening process listed under the EPBC Act and FFG Act. Rabbits are widespread in Australia and contribute to degradation of many habitats for native wildlife as a result of intensive grazing. They also directly compete for food and resources with many native animals (Williams 1995). Rabbits were regularly observed during field surveys within the study area.

European Red Fox and Feral Cats

Predation by feral cats and predation by European Red Fox are key threatening processes listed under the EPBC Act and FFG Act (FFR198). European Red Fox and feral cats have established in most habitats throughout Australia and feed on small mammals and reptiles (Woinarski 2018; Stobo-Wilson et al. 2021). Numerous native animal populations are in decline as a result of predation by cats and foxes. They have detrimental impact on native wildlife through direct predation, competition and disease transmission (Murphy et al. 2019; Coates & Wright 2003). Both cats and European Red Fox were observed in the study area a number of times during field surveys are almost certainly contributing to the decline in small mammal or reptilian populations in the area.

Management and mitigation

Measures to manage and control impacts on indigenous fauna and flora values from biosecurity threats (weeds, pathogens, and pest animals) will be outlined in a Biosecurity Management Plan (BMP) and include site hygiene protocols to prevent the introduction and spread of biosecurity threats (FFM-M003, FFM-M004, FFM-M007, FFM-M009). The BMP will be developed in consultation with, and to the satisfaction of, DEECA.

Residual risk

The residual risk of weeds and/or pathogens being introduced or spread into areas of ecological sensitivity is medium. Although strict hygiene protocols reduce the risk, some threat remains. The proposed works are unlikely to encourage the occurrence, or increase the population, of pest animals in or near the project area above current levels in the environment.

Impacts on flora and fauna from the spread of weeds and pathogens during construction should be managed to acceptable levels through implementation of controls under a Biosecurity Management Plan and CEMP. Measures to reduce the spread of these threats would align with the objectives of the national threat abatement plans to protect biodiversity assets and susceptible landscapes.

10.3.4. Fauna injury and mortality (FFM-R012)

Habitat removal may lead to direct injury and mortality of fauna through trauma caused by machinery, entrapment in open trenches and vehicle-wildlife collisions. The onshore transmission system comprises underground cables therefore potential wildlife collision and electrocution risks associated with overhead transmission lines are avoided.

Potential impacts

Vegetation removal may lead to direct injury and mortality of fauna through trauma caused by machinery. Open/exposed trenches may potentially trap fauna, increasing the risk of predation and exposure related mortality. Increased vehicle traffic in the construction area will likely increase the risk of vehicles colliding with fauna.

Species most at risk are hollow-dwelling birds and mammals, canopy and shrub-nesting birds, ground-dwelling small mammals, reptiles and frogs. This includes threatened and non-threatened species. Threatened species which may occur in the project area are discussed in Section 10.2.5.

There is potential for wildlife to be killed or injured during construction due to:

- Removal of hollow-bearing trees while hollow-dependent species are nesting or sheltering.
- Removal of trees or shrubs with nests while eggs and chicks are in the nest.

- Entrapment in open trenches or pits: small ground-dwelling animals are most at risk of being killed or injured in trenches or pits by falls, predation, exposure, starvation, drowning and/or burial.
- Trauma caused by machinery: habitat removal may lead to direct injury and/or mortality of fauna. Habitat removal includes hollows, tree and shrub canopy, and fallen timber.
- Vehicle collisions: increased occurrence of traffic associated with construction activity poses an increased risk of animal-vehicle collisions. Widening of gaps in habitat may force animals to move across roads in order to move through the landscape increasing the risk of being killed on roads.
- Entanglement in fences around construction areas: aerial species, bats and gliding mammals are most at risk (van der Ree 1999).

Construction works may also unintentionally disturb and displace fauna occupying retained habitat adjacent to the project area. Species most at risk are those which are more sedentary such as possums, frogs and lizards, as they are less likely to move away from the construction works, or species that breed and shelter in hollows.

These impacts have the potential to disrupt the short-term behaviour and function of a population of threatened fauna species.

Management and mitigation

A Flora and Fauna Management Plan will be prepared by the project and in consultation with DEECA, which outlines measures to minimise impacts on non-threatened and threatened fauna from construction works (FFM-M005, FFM-M006) (see Section 14.1). The plan will include measures to reduce the risk of fauna being injured or killed including measures to reduce the risk of fauna becoming entrapped in trenches or pits, fauna occupying hollows or nesting or resting in vegetation being injured or killed when trees are felled including pre-construction surveys of habitat to be removed and the need to engage appropriately qualified and experienced wildlife spotters to salvage fauna when habitat is removed (if required by regulators). It is recommended that all potential habitat hollows be checked on the day of removal, as hollows are often utilised by multiple individuals of multiple species.

Reduced speed limits will be considered in areas of extensive habitat, such as in conservation reserves and access routes, where dense vegetation is adjacent to roads to minimise the risk of vehicle collision with wildlife.

Construction program will consider reducing duration or avoiding construction in areas known to be suitable habitat for threatened species (Section 10.2.1) in accordance with the timing listed in Table 10-17, to reduce the risk of removing habitat during breeding seasons or disturbing individuals in adjacent retained habitats. Works will be minimised during these times as much as is practicable.

A qualified and experienced fauna spotter/catcher or salvage specialist who is qualified to work at heights will be engaged to be present during the removal of habitat. Salvage will be required any time of year as threatened and non-threatened fauna could be occupying hollows or hollow logs and ground vegetation and not be able to move to avoid habitat removal. Where fauna species that are both sedentary and threatened are known to occur (i.e. Glossy Grass Skink at HZ12), any salvage will need to be conducted according to a salvage and translocation plan that will be drafted once it is certain that impacts to their habitat cannot be avoided.

Table 10-17 Timing of construction works necessary to avoid threatened fauna breeding seasons

Species	Timing to avoid construction in areas of suitable habitat	Area of suitable habitat
Threatened owls	August to October (breeding season)	Areas of potential habitat identified on Figure 8-6 and comprise: Woodside H28 Bushland Reserve and extension of patch onto adjacent private land Forest and woodland patches adjacent to the alignment Private property at KP 21.50-22.60 located adjacent to large continuous extent of native vegetation Roadsides and streamsides with woodland vegetation.
Small ground-dwelling mammals	Late winter to early summer (breeding season)	Areas of potential habitat identified on Figure 8-9 and mainly comprise: Woodside H28 Bushland Reserve and extension of patch onto adjacent private land Forest and woodland patches adjacent to the alignment Remnant forest on private land between KP 21.45 and KP 22.6
Chestnut-rumped Heathwren	July to January (breeding season)	Areas of potential habitat are identified on Figure 8-3 and are namely: Woodside H28 Bushland Reserve and adjacent private land Woodside Beach Road and Lyons Road and around Giffard West Road
Gang-gang Cockatoo	September to March (breeding season)	All forest and woodland patches, scattered native and planted trees (Figure 8-4)
Lace Monitor	September to May (active period)	All forest and woodland patches, scattered remnant trees and planted trees (Figure 8-10)
Glossy Grass Skink	Salvage to be completed according to a salvage and translocation plan if HZ12 not avoided using HDD	Known habitat for the species in the project area is confined to HZ12. This is a patch of Swamp Scrub that occurs along the unnamed waterway UFI: 42806331, where it intersects with the project area.
Southern Toadlet / Martin's Toadlet	Salvage required any time of year	Areas of potential habitat are identified on Figure 8-11. Waterways and low-lying areas adjacent to forest and woodland habitat. Those areas include: Woodside H28 Bushland Reserve Private land between KP 21.45 and KP 22.6

Additionally, contractors will be trained on the locations of important habitat and movement corridors so that they are aware of potential interactions with wildlife (FFM-M004), informed by the finalised environmental line list (FFM-M002).

Residual risk

Residual impacts relate to the injury or death of individuals unable to be found and salvaged and/or salvaged individuals that require euthanasia as release is not possible, and vehicle – wildlife interactions. This risk relates to both non-threatened and threatened fauna species. All wildlife is protected under the *Wildlife Act 1975*.

Residual risk of loss of individuals is considered to be low. This is based on a negligible consequence due to a low magnitude (based on localised scale, medium term, reversible for local population) and low sensitivity of the receptor. For individual animals directly affected, the consequence would be severe. Loss of individuals is unlikely to significantly affect the species' persistence.

10.3.5. Groundwater Dependent Ecosystems (FFM-R013)

Potential impacts – Terrestrial GDEs

This assessment of potential impact on terrestrial GDEs has been based on EVCs that are considered to have a high potential to be a GDE based on Jacobs (2015). The assessment draws on information contained in Technical report H: Groundwater and should be read in conjunction with that document as it outlines the assumptions that underpin the groundwater drawdown predictions.

EVCs that occur within the project area that have a high probability of being a GDE, as indicated in Jacobs (2015), are outlined in Section 7.6. EVCs with a high potential to be a GDE that may intersect the project area are Coast Banksia Woodland, Estuarine Wetland, Riparian Scrub, Swamp Scrub and Coastal Dune Scrub. Topographically these EVCs generally occur in low-lying coastal relief, low-lying depressions or in association with gullies and drainage lines. The location of those EVCs in the project area is shown in Figure 10-1.

Dewatering of trenches and joint bays during construction will lower the groundwater level at the pumped location forming a temporary and localised 'cone of depression' (area of reduced groundwater level). The cone of depression refers to the process by which the greatest drawdown occurs closest to the groundwater extraction point and reduces with distance from the extraction point. Following cessation of dewatering activities, groundwater levels are then expected to rebound to previous levels. Dewatering therefore has potential to temporarily reduce groundwater depth underneath EVCs that are potential GDEs.

The project excavation types that may require dewatering if they intersect with groundwater are:

- Transition joint bays that will be housed the transition joints that are needed to connect the three separate land cables to a single offshore export cable. The transition joints will be located in the shore crossing area.
- Joints that will be housed in bays along the underground cable system on the landward side of the shore crossing.
- Cable trenches for installation of the underground transmission line on the landward site of the shore crossing and transition point.

The excavation depth, dewatering duration and estimated distance from the excavation edge that drawdown may occur for each of the excavation types is summarised in Table 10-18 from Technical report H: Groundwater. The depths reflect the cone of depression whereby the likely drawdown is greatest (deepest) closer to the excavation edge and shallowest further from the excavation edge. The estimated distance from excavation edge is provided for drawdown of 0.5 m and 0.1 m. A water table decline of <0.1 m represents a minor consequence in the 2015 *Ministerial guidelines for groundwater licensing and the protection of high value groundwater dependent ecosystems*.

Table 10-18 Project excavation types that involve dewatering, the duration and estimated distance from excavation edge (from Technical report H: Groundwater)

Excavation type	Dewatering duration	Estimated distance from excavation edge	
		Drawdown 0.5 m	Drawdown 0.1 m
Trench	1.5 days	6 m	10 m
Joint Bays	30 days	33 m	63 m
Shore crossing works and transition jointing	90 days	103 m	161 m

The groundwater model assumes groundwater to be at the surface to present a conservative estimate of potential impacts associated with drawdown. However, existing groundwater depths are likely to be lower than 'at surface' in reality, otherwise the vegetation types (other than wetlands) would be unlikely to persist. Regional water modelling of water table depth presented in Technical report H: Groundwater indicates that groundwater is shallowest near the coastline and adjacent to present-day streams. Groundwater is deeper elsewhere and more than 20 m deep in some places.

As dewatering of the excavations for trenches, joint bays and transition joint bays will only be required if the excavation depth intersects the water table, the risk of groundwater drawdown affecting EVCs that may be GDEs is only relevant where the water table is less than 5 m from the surface for the transition joint bays at the shore crossing and less than 3 m from the surface for the joint bays and cable in the onshore. A depth of 3 m is adopted for the onshore transmission rather than distinguishing between trench and joint bay to be conservative as there will be joint bays along the length of the cable trench and they represent the greater of the two potential impacts.

Groundwater levels are likely to be <5 m below surface for much of the shore crossing area, and >5 m below the surface for much of the remaining onshore transmission corridor. Beyond the shore crossing area, most of the geotechnical investigation locations recorded a depth to groundwater of > 5 m and one point recorded groundwater at < 5 m. A groundwater depth of > 5 m suggests that EVCs that are high potential GDEs occurring along the onshore transmission corridor are unlikely to be impacted by excavation associated with trenches or joint bays at 3 m excavation depth. EVCs more likely to occur in association with existing creeklines where groundwater may be closer to the surface and may be intersected by excavation are Riparian Scrub and Swamp Scrub. EVCs that occur closer to the coast where groundwater may also be closer to the surface may also be affected.

Groundwater wells assessed in the shore crossing area suggest the existing groundwater depth ranges from 0.2 m to 3 m. This means that areas of Coast Banksia Woodland, Coastal Dune Scrub and Estuarine Wetland may be affected by excavation associated with the transition joint bay if they occur within the area.

EVCs identified as high potential GDEs by Jacobs (2015) that are known, or likely, to be intersected by the excavations based on where they are located within the project area is presented in Table 10-19.

Table 10-19 EVCs that are high potential GDEs which interact with project components and modelled groundwater drawdown distance and duration

Component	High potential GDE (EVC)	Area that EVC may be affected: (drawdown distance from excavation edge)		Duration of potential impact: (max. duration of dewatering)
		Drawdown of 0.5 m	Drawdown of 0.1 m	
Transition Joint Bays (shore crossing area)	Coast Banksia Woodland	103 m	161 m	90 days
	Coastal Dune Scrub			
	Estuarine Wetland			
Joint Bays (onshore transmission)	Coast Banksia Woodland	33 m	63 m	30 days
	Riparian Scrub			
	Swamp Scrub			
Trenches (onshore transmission)	Coast Banksia Woodland	6 m	10 m	1.5 days
	Riparian Scrub			
	Swamp Scrub			

As the groundwater levels are likely to be deeper than the 'at surface level' used to estimate distance from the excavation edge that drawdown may extend, these impact areas are likely over estimated.

Groundwater levels can also fluctuate naturally in response to rainfall events and seasonal conditions. This means that EVCs that are potential GDEs are likely already being exposed to variability in the water table and therefore may not be affected by groundwater drawdown should it occur. Temporary reductions in water table depth may not be dissimilar from fluctuations currently experienced by EVCs in those areas.

Transition joint bays

EVCs with a high potential to be a GDE that occur in the shore crossing part of the project area (KP 0 – 1.07) are Coast Banksia Woodland, Coastal Dune Scrub and Estuarine Wetland. If transition joint bay excavation intersects groundwater in the area, then these EVCs may be affected by drawdown if they are within the area where drawdown may occur (up to 161 m from excavation edge).

Estuarine Wetland may be susceptible to groundwater drawdown if reliant on surface expression of groundwater. The vegetation is avoided by HDD and therefore will not be cleared for construction of the project. However, the potential for this area of Estuarine Wetland to be affected by groundwater drawdown may warrant further consideration once the design and construction planning for the transition joint bays is complete.

Estuarine Wetland is located on an ephemeral drainage line and is therefore unlikely to be solely reliant on groundwater discharge as a source of water (if at all).

Joint bays

If joint bays intersect with habitat zones consisting of Riparian Scrub and Swamp Scrub EVCs, these habitat zones may be affected by drawdown if excavation depth intersects groundwater in those areas. These EVCs are considered most susceptible to reduced soil moisture availability due to the shallow root system of species that characterise these EVCs (*Leptospermum continentale*, *Melaleuca squarrosa* and *Kunzea ericoides* s.l.) and the typically moist ground conditions in which they occur.

The underground transmission system is to be contained within a nominally 40 m-wide cable easement, with a nominal 60 m-wide temporary footprint during construction. Removal of native vegetation for construction is already accounted for as native vegetation loss in Section 10.2.1 and shown in Figure 10_1 and Figure 10_2. Therefore, potential impacts on EVCs that may be groundwater dependent (high potential GDEs - Riparian Scrub and Swamp Scrub) only relate to occurrences (if any) of those EVCs outside the construction footprint and within 60 m of the joint bay excavation areas.

The estimated duration of groundwater change (30 days) is anticipated to be within the range of natural variability of water availability. This, coupled with the expectation that groundwater is not actually at the surface and may therefore be less likely to be intersected and/or amount of dewatering will be less than the estimated 3 m, suggests groundwater drawdown is unlikely to significantly affect these EVCs as potential GDEs.

Cable trench(es)

Impacts associated with cable trench(es) are covered by the joint bay impact assessment.

Acid Sulphate Soil generation

Technical report H: Groundwater describes a potential impact pathway whereby the exposure of particular soils (Coastal Acid Sulphate Soils – CASS) may result in chemical reactions causing the generation of acids in the soil and groundwater of affected areas. Changes in the pH of soils and aquatic environments may result, with the former potentially modifying the community of plant species that best grows in affected areas. The latter potentially adversely impacts the ability of freshwater fish, invertebrates, and other aquatic organisms (particularly those with calcareous parts) to survive in affected areas. The ability of frogs to survive may be adversely affected by pH changes in either soil or aquatic environments they depend on.

Potential impacts – Aquatic GDEs

The unnamed waterway in the shore crossing area has been inferred to be a potential aquatic GDE that may receive groundwater discharge when groundwater levels are elevated, as discussed in Section 7.6.2. The unnamed waterway is located approximately 120-150 metres from the proposed dewatering required for the construction of the transition joint bays. Based on this distance and the construction dewatering described in Technical report H: Groundwater and summarised above, the potential groundwater level reduction at the waterway is estimated to be between 0.1 and 0.5 metres (refer to **Table 10-19**).

There is no time series groundwater level data available for the shore crossing area to put this water level change into the context of natural variability. Additional groundwater and surface water baseline monitoring will be undertaken as part of the Dewatering Plan, as outlined in the mitigation below. It is noted that the transition joint bay dewatering will be temporary (in the order of several months).

Four waterways crossing the onshore route (Morris Creek, Warrigal Creek, Hoddinott Creek, and Sunville Creek) have been identified as potential aquatic GDEs that may receive groundwater discharge, as described in Section 7.6.2. Based on the dewatering estimates, there is a potential for joint bay dewatering to impact these aquatic GDEs if the bays are located within approximately 60 metres of the waterways. Joint bays will be located at approximately one-kilometre intervals along the onshore

transmission route; however, the joint bay locations have not yet been finalised. If any joint bays are located within 60 metres of a waterway, joint bay dewatering impacts would be temporary (in the order of several weeks). A mitigation measure to address the potential for joint bays to impact aquatic GDEs is included in the mitigation below.

The cable trench dewatering is unlikely to impact aquatic GDEs based on the limited drawdown extent (10 metres) and short duration (on the order of days). On this basis, no mitigation measures are considered necessary for cable trench construction activities.

Potential impacts – Subterranean GDEs

No site-specific stygofauna surveys have been undertaken for the project. However, based on the geology and water table depth, it is assumed that stygofauna are likely to exist within the relevant aquifer in the study area, particularly within coarser grained lenses within saturated sediments.

The worst case for stygofauna is the transition joint bay dewatering which could result in a drawdown up to 0.5 metres to a radius of up to approximately 100 metres and lasting for several months.

The Quaternary Aquifer (that is, the assumed stygofauna habitat) is a widespread regional aquifer and it is assumed that the stygofauna taxa that could be impacted are endemic across the aquifer. Therefore, based on the localised and temporary nature of the drawdown, and the extensive nature of the aquifer, it is unlikely that impact to stygofauna will be significant at a broad taxa level.

Management and mitigation

Mitigation may be required if excavation depth intersects groundwater and EVCs (native vegetation) that are potential terrestrial GDEs occur within the area that may be affected by drawdown (161 metres from transition joint bays, 63 metres from joint bays and 10 metres from trenches) that are not removed for construction.

Timing of dewatering to avoid the driest periods may assist in mitigating any changes in moisture availability for any EVCs that may be terrestrial GDEs.

If required, consider artificial irrigation of EVCs that are potential terrestrial GDEs to maintain soil moisture levels and plant moisture availability. Requirements for artificial irrigation should be triggered by regular monitoring of soil moisture within and around these potential terrestrial GDEs where excavation intersects groundwater and dewatering is required. A Dewatering Plan will be developed as a sub-plan to the CEMP.

A CASS management plan will be included as a sub-plan to the CEMP. This will prevent impacts relating to CASS. More information on this matter may be found in Technical report H: Groundwater.

Following micro-siting of joint bays, and if any of the identified potential aquatic GDEs (Morris Creek, Warrigal Creek, Hoddinott Creek, and Sunville Creek) are located within 60 metres of a joint bay, a site-specific impact assessment will be undertaken and additional mitigation measures identified, if required.

Following micro-siting of the transition joint bays, a Dewatering Plan will be developed as a sub-plan to the CEMP that will include baseline groundwater and surface water monitoring in the shore crossing area (refer to FFM-M014).

Residual risk

EVCs occur at discrete locations along the project area as shown in Figure 7-2. The underground transmission system is to be contained within a nominally 40 m-wide cable easement with a nominal 60 m-wide temporary footprint during construction. Removal of native vegetation for construction is

accounted for as native vegetation loss in Section 10.2.1 and shown in Figure 10_1. Potential impacts on EVCs that may be groundwater dependent (high potential GDEs - Coast Banksia Woodland, Estuarine Wetland, Riparian Scrub, Swamp Scrub and Coastal Dune Scrub) only relate to occurrences (if any) of EVCs outside the project area and within 60 m of the joint bays excavation areas along the onshore transmission corridor and within 160 m of the transition joint bays excavation area at the offshore crossing.

Potential impacts to aquatic GDEs may occur if any joint bays are located within approximately 60 metres of Morris Creek, Warrigal Creek, Hoddinott Creek, or Sunville Creek; however, these impacts would be localised and temporary (on the order of several weeks) and will be assessed and managed following micro-siting of joint bays.

Potential impacts to the unnamed waterway in the shore crossing area may occur if the transition joint bays are located within approximately 160 m of the waterway. This impact will be assessed and managed through the preparation and implementation of a Dewatering Plan.

No significant impacts to stygofauna are expected to occur.

The consequence of this residual impact would be minor because the impact would be negligible magnitude (localised, short term and reversible) and on receptors of high sensitivity. With mitigation the likelihood of GDEs being impacted by dewatering is unlikely therefore the risk of residual impact is low.

10.3.6. Threatening processes (FFM-R014)

Potential impact

The potential for the project to initiate or exacerbate threatening processes forms part of the impact assessment and scoping requirements for the project (Section 6.4)

Removal of native vegetation by the project has the potential to exacerbate listed threatening processes, particularly land clearance (destruction of the above ground biomass of native vegetation) (FFM-I001, FFM-I002, loss of hollow-bearing trees (FFM-I003), and habitat fragmentation (FFM-R009). In addition to clearing of native vegetation (land clearing), other potential threatening processes include weeds, pest animals, pathogens (FFM-R011) and impacts to rivers and riparian areas (FFM-I008).

These threatening processes are recognised as threats under the EPBC Act and/or FFG Act. Threatening processes of relevance to the project and the potential for the project to initiate or exacerbate those threatening processes are summarised in Table 10-20.

Table 10-20 EPBC and/or FFG Act-listed threatening processes relevant to the project

EPBC Act listed	FFG Act listed	Potential to initiate / exacerbate threatening process	Rationale
Land clearance	-	Yes	The project involves clearing native vegetation, as quantified in Section 10.2.1. The project will exacerbate this threatening process.
-	Habitat fragmentation as a threatening process for fauna in Victoria.	Yes	Fragmentation of habitats has the potential to reduce the availability of dispersal across the proposed alignment. This may increase the risk of flow on effects, such as a reduction in connectivity to resources, and initiation or exacerbation of edge

EPBC Act listed	FFG Act listed	Potential to initiate / exacerbate threatening process	Rationale
			effects which alter the structure and function of the habitat. Fragmentation of habitat consistently degrades ecosystems, reducing species diversity, and reduces ecological resources and services. The project has potential to initiate and exacerbate this threatening process on a small scale in Woodside H28 Bushland Reserve, on private land (KP 21.50-22.60) and along roadsides / streamsides with riparian vegetation – see Section 10.3.1.
-	Loss of hollow-bearing trees from Victorian forests.	Yes	Conservation reserves, namely Woodside H28 Bushland Reserve, support high densities of large trees. Outside of conservation area, patches of native vegetation and scattered trees within private land also support large trees (both within patches and scattered trees) with hollow features. The project will exacerbate this threatening process – see Section 10.2.2
-	Alteration to the natural flow of rivers and streams	No	The project is not anticipated to exacerbate this threatening process as engineering controls such as temporary flow diversions, short construction and reinstatement timeframes and timing of construction during no or low flow conditions will be adopted.
-	Degradation of native riparian vegetation along Victorian rivers and streams	Yes	Impacts to riparian vegetation along designated waterways may occur as a result of clearance and/or runoff from construction activities and changes to groundwater levels. The project has potential to exacerbate this threatening process – see Section 10.2.1 (native vegetation removal) and Section 10.3.5 (GDEs).
-	Increase in sediment input into Victorian rivers and streams due to human activities	Yes	Increase in sediment input into Victorian rivers and streams has been considered as part of the Surface Water Technical Study (AECOM 2020).
-	Invasion of native vegetation by 'environmental weeds'	Yes	Environmental weeds including Blackberry have been recorded within the project area (Section 7.10). The project has the potential to exacerbate this threatening process through spread of seed and propagule material during construction - see Section 10.3.3.

EPBC Act listed	FFG Act listed	Potential to initiate / exacerbate threatening process	Rationale
-	Invasion of native vegetation by Blackberry <i>Rubus fruticosus</i> L. agg	Yes	
Infection of amphibians with Chytrid Fungus resulting in chytridiomycosis	Infection of amphibians with Chytrid Fungus, resulting in chytridiomycosis.	Yes	Chytrid Fungus <i>Batrachochytrium dendrobatidis</i> causes Chytridiomycosis in amphibians. Chytridiomycosis an infectious disease that has been found throughout the cool and wet areas of Australia. The fungus invades the surface layers of the frogs' skin disrupting the normal function of the skin leading to 100% mortality in frog populations in eastern Australia populations and fewer deaths in other populations in western areas of Australia (DoEE 2016). It is unknown whether chytrid fungus is present in or adjacent to the project area. As a precaution, all water and damp soil should be assumed to be infected, unless testing shows otherwise. The project therefore has the potential to exacerbate this threatening process.
Dieback caused by the root-rot fungus (<i>Phytophthora cinnamomi</i>)	The spread of <i>Phytophthora cinnamomi</i> from infected sites into parks and reserves, including roadsides under the control of a state or local government authority	Yes	<i>Phytophthora cinnamomi</i> was noted in the surrounding area during the assessments and so is known in the general area. The project has potential to exacerbate this threatening process through spread of soil.
-	Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing	No	A DEECA Mapped Wetland was recorded in the project area (Section 7.2.3). The DEECA Mapped Wetland is avoided by the project.
Predation by European Red Fox	Predation of native wildlife by the introduced Red Fox <i>Vulpes vulpes</i> .	No	Red Fox occurs in the area. The proposed works are unlikely to encourage the occurrence or increase the population of Red Fox in or near the project area above current levels in the environment.
Predation by feral cats	Predation of native wildlife by the cat, <i>Felis catus</i> .	No	Feral cats are likely to occur in the project area. The project is unlikely to encourage the occurrence of cats above current levels in the environment.

EPBC Act listed	FFG Act listed	Potential to initiate / exacerbate threatening process	Rationale
-	Reduction in biomass and biodiversity of native vegetation through grazing by the Rabbit <i>Oryctolagus cuniculus</i> .	No	Rabbits were regularly observed during field surveys. The project is unlikely to encourage the occurrence of rabbits above current levels in the environment.
-	Reduction in biodiversity of native vegetation by Sambar (<i>Cervus unicolor</i>).	No	Sambar Deer was recorded during field surveys. The project is unlikely to encourage the occurrence of Sambar Deer above current levels in the environment.

Management and mitigation

Measures to manage and mitigate impacts around native vegetation loss, hollow-bearing tree removal and habitat fragmentation are outlined in detail in Sections 10.2.1, 10.2.2 and 10.2.4, respectively.

For the remaining threatening processes that the project has the potential to initiate or exacerbate, the primary means of managing and mitigating impacts is through the development of detailed measures stipulated in a CEMP and sub-plans such as the Flora and Fauna Management Plan (FFMP) and Biosecurity Management Plan (BMP). These plans will be prepared in consultation with DEECA. For further detail of what each plan will address, see a summary of recommended measures to be included in the FFMP and BMP in Section 14. Measures to reduce the spread of these pathogens and pest animals would align with the objectives of national threat abatement plans to protect biodiversity assets and susceptible landscapes.

Residual risk

Residual impacts associated with native vegetation loss, hollow-bearing tree removal and habitat fragmentation are outlined in Sections 10.2.1, 10.2.2 and 10.3.1, respectively. It is likely that, even with mitigation, those threatening processes will be exacerbated by the project because removals are unavoidable. However, the losses of native vegetation will be localised as they are comprised of removal of numerous patches of vegetation at discrete locations in the landscape. Whilst artificial hollows do not fully mitigate loss of natural hollows, loss of hollow-bearing trees is unlikely to represent a significant residual impact in the context of availability in the surrounding landscape and protected in conservation reserves (FFM-M009). Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes.

Other threatening processes including the introduction or spread of weeds, pathogens and pest animals (Section 10.3.3), and degradation of riparian vegetation should be able to be managed through implementation of measures to be defined in the CEMP and relevant sub-plans. Residual risk is low.

10.3.7. Downstream impacts on Ramsar site (FFM-R015)

Potential impact

The Project selected a shore crossing point to avoid the Corner Inlet Ramsar Site. However, the risk of the Project affecting the downstream environment and therefore the Ramsar site has been considered. The risks of impact are associated with the temporary causeway proposed to be constructed over unnamed waterway UFI 4282679 in the shore crossing area (Section 10.2.7). This waterway forms a connection between Freshwater Swamp, approximately 1.2 kilometres north of the site, and the Corner Inlet Ramsar Site located approximately 3 kilometres to the south of the site at the mouth of Bruthen Creek estuary. The waterway may also be affected by groundwater drawdown that may occur if the transition joint bays are located within approximately 160 m of the waterway if it is reliant on surface expression of groundwater (Section 10.3.5). The waterway is likely to be in connection with groundwater given the shallow depth to water table in this area although there is no evidence available on the nature of this connection. Waterways in shallow groundwater environments such as the shore crossing area can fluctuate between being losing (following a large rainfall event) to gaining (at other times).

Mitigation

The surface water report recommended environmental mitigation measures to prevent any significant impact on water quality and flow volumes in waterways.

A Designated Waterway Crossing Management Plan will be prepared to allow site-specific mitigations to be developed and implemented including measures to retain the waterways' hydrology and flow regime and measures to maintain bank stability.

Measures that will form part of waterway management for the project include those outlined in Section 10.2.7 in relation to waterways.

Following micro-siting of the transition joint bays, a Dewatering Plan will be developed as a sub-plan to the CEMP that will include baseline groundwater and surface water monitoring in the shore crossing area (refer to FFM-M014).

Residual risk

The Corner Inlet Ramsar Site is located 3 kilometres downstream of the Project. The risk of the Ramsar site being affected by the Project is low with implementation of mitigation measures to prevent any significant impact on water quality and flow volumes in unnamed waterway UFI 4282679 in the shore crossing area and implementation of a Dewatering Plan for the transition joint bays. The Ramsar site is unlikely to be impacted by the Project.

10.4. Summary of residual impacts and risks - construction

Residual impacts are those that remain once mitigation measures have been implemented. Table 10-21 describes potential residual impacts during the construction phase of the project, once mitigation measures have been considered and applied.

Table 10-21 Summary of residual impacts - construction

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
Residual impacts			
Native vegetation - patches	Option AB – 15.009 ha across 78 HZs. Option C – 16.142 ha across 93 HZs Option D - 15.531 ha across 74 HZs	Major	Residual impacts on native vegetation will be long term and permanent. However, the losses of native vegetation will be localised as it is comprised of removal of numerous patches of vegetation at discrete locations in the landscape. Losses will be small relative to the extent of native vegetation remaining in the Gippsland Plain Bioregion and in Victoria following the 2019/2020 bushfires therefore the magnitude of the impact is low.
Native vegetation – large trees in patches	Option AB – 54 Option C – 66 Option D - 65		
Native vegetation – scattered trees (large)	Option AB – 28 Option C – 53 Option D – 42		Localised discrete loss (<1 ha) of an endangered EVC. Swamp scrub may be able to recover (temporary loss) following removal.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
Native vegetation – scattered trees (small)	Option AB – 12 Option C – 31 Option D - 12		
Endangered EVCs	0.957 ha Swamp Scrub		
Hollow-bearing trees/habitat trees	Option AB – 82 Option C – 119 Option D - 107	Major	Whilst removal of habitat trees cannot be avoided, and artificial hollows do not fully mitigate loss of natural hollows it is unlikely to represent a significant residual impact in the context of availability in the surrounding landscape and protected in conservation reserves.
Threatened ecological communities	No residual impacts. No EPBC Act or FFG Act listed threatened ecological communities occur in the project area.	Not applicable	Significant impact unlikely as no TEC occur in the project area.
Threatened flora species – EPBC Act	Option AB – 2.901 ha potential high-quality patches of Plains Grassy Forest habitat for Thick-lipped Spider Orchid. Option C – 4.201 ha potential high-quality patches of Plains Grassy Forest habitat for Thick-lipped Spider Orchid ; 0.101 ha potential Heathy Woodland habitat for Dense Leek-orchid.	Moderate	Not likely to be a significant impact under the EPBC Act.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
	Option D – 4.201 ha potential high-quality patches of Plains Grassy Forest habitat for Thick-lipped Spider Orchid.		
Threatened flora species – FFG Act	Pale Swamp Everlasting - Loss of 0.653 ha habitat along Lyons Road in Swamp Scrub EVC and a known population of 10 individuals. Coast Grey-box – removal of 22 individuals not able to be avoided with NGZs. Comprised of 3 large and 18 small trees in patches and 1 small, scattered tree. Dune Wood-sorrel – removal of 0.106 ha Coast Dune Scrub habitat and 20 known individuals. Option AB - Cobra Greenhood - loss of 3.197 ha potential habitat. Option C – Cobra Greenhood – loss of 4.497 ha potential habitat Option D – Cobra Greenhood – loss of 4.497 ha potential habitat Option AB – 2.901 ha potential high-quality patches of Plains Grassy Forest habitat for Spiral-leaved Sun-orchid. Option C – 4.201 ha potential high-quality patches of Plains Grassy Forest habitat for Spiral-leaved Sun-orchid; 0.223 ha potential Heathy Woodland habitat.	Minor	Localised loss of individuals unlikely to result in a significant impact to the species as a whole but will possibly result in the loss of a local population within the project area at discrete locations where suitable habitat occurs.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
	Option D – 4.201 ha potential high-quality patches of Plains Grassy Forest habitat for Spiral-leaved Sun-orchid		
Protected flora – FFG Act	Generally protected flora species	Minor	Localised loss of individuals unlikely to result in a significant impact to the species.
Threatened fauna species – EPBC Act	Loss of potential habitat for: Swift Parrot Latham's Snipe Grey-headed Flying Fox New Holland Mouse	Minor	Not likely to be a significant impact under the EPBC Act. The action represents a loss of habitat availability but is limited in extent to the site level. Any effect is considered a short-term disruption, reversible as any individuals move into new areas, and a minimal impact on population viability.
Threatened fauna species – FFG Act	Loss of potential habitat for: Gang-gang Cockatoo # Black Falcon Chestnut-rumped Heathwren Little Eagle Powerful Owl White-bellied Sea-eagle White-footed Dunnart Lace Monitor Glossy Grass Skink	Minor	Potential impacts on FFG Act-listed fauna are localised and small in extent (i.e. limited to small discrete locations of habitat) when compared with the availability of habitat in the broader region. As such, removal of habitat by the project is unlikely to compromise the survival of FFG Act-listed fauna species in the region.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
	Southern Toadlet Martin's Toadlet Australian Mudfish		
Other fauna	Loss of potential habitat for: Blue-winged Parrot (listed EPBC Act after referral decision) Koala (Strzelecki population)	Minor	Potential impacts are localised and small in extent. As such, removal of habitat by the project is unlikely to compromise survival of these species in the region.
Waterways	Residual impacts on waterways are likely to be minimal with mitigation	Low	Significant impact unlikely
Residual risks			
Habitat fragmentation (threatening process)	40m gap in Woodside H28 Bushland Reserve/private adjacent (KP 12.25 to KP12.50). 50 m gap in patch of forest on private land (KP 21.45 to KP 21.55) 40 m gap in Stringy Bark Lane and Giffard Road roadsides. 60 m gap in roadsides including Dewars Road, Four Mile Creek Road and Giffard West Road.	Minor	Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes.
Indirect impacts on retained native vegetation and habitat	No residual risk with implementation of mitigation measures to protect retained vegetation and habitat.	Minor	Low residual risk. Significant impact unlikely.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
Introduction and spread of weeds, pathogens or pest animals (threatening process)	No residual impact anticipated as measures to prevent the introduction and spread of weeds, pathogens and pest animals are standard protocols and are expected to be effective.	Minor	Low residual risk. Significant impact unlikely.
Fauna injury and mortality	Some residual risk remains with implementation of mitigation measures as not all wildlife will be found and salvaged.	Negligible	Low residual risk. Significant impact unlikely.
Exacerbating threatening processes	Residual impacts associated with land clearance (native vegetation loss), hollow-bearing tree loss and habitat fragmentation. It is likely that, even with these mitigation measures, those threatening processes will be exacerbated by the project.	Refer to native vegetation, hollow-bearing trees, habitat fragmentation rows.	
	No residual impact anticipated for other threatening processes therefore unlikely to be exacerbated by the project.	Minor	Low residual risk. Significant impact unlikely.
Groundwater Dependent Ecosystems	Potential impacts on EVCs that may be groundwater dependent (high potential GDEs - Coast Banksia Woodland, Estuarine Wetland, Riparian Scrub, Swamp Scrub and Coastal Dune Scrub) only relate to occurrences (if any) of EVCs outside the project area and within 60 m of the joint bays excavation areas along the onshore transmission corridor and within 160 m of the transition joint bays excavation area at the offshore crossing.	Moderate	Significant impact unlikely. Potential impacts mitigatable.

Ecological value	Residual impact/risk	Consequence of the residual impact	Context of the impact
	Potential impacts to aquatic GDEs will be localised and temporary. Impacts to subterranean GDEs unlikely.		
Corner Inlet Ramsar Site	No residual impact anticipated.		Negligible residual risk with mitigation. Significant impact unlikely.

listed under the EPBC Act after the referral decision

11. Operation assessment

This section discusses the potential impacts and risks associated with the operation of the project. It also discusses the associated mitigation measures that aim to minimise its impacts. The mitigation measures referred to are defined in Section 14.1.

Impacts to ecological values may occur during operation of the project as a result of the following routine maintenance activities:

- controlling vegetation within the cable easement. Vegetation impacts would be confined to the 40-m cable easement where trees would not be permitted to regrow.
- routine vehicle movements along the corridor for inspection and maintenance purposes utilising existing public access roads and private farm infrastructure and access tracks. Access will not be via the temporary access tracks installed for construction as those tracks will be rehabilitated. New access tracks are not proposed to be installed.

11.1. Project parameters that form the basis of impact assessment

Table 11-1 specifies the maximum design scenario that has been assessed for project operation. The project does not anticipate that the underground cable systems would require regular access to normally operate the system. The infrastructure would be consistently monitored remotely via control and condition monitoring systems. Easements would be periodically inspected and tested.

Periodic inspection of the cable easement would be undertaken to monitor and control vegetation.

Table 11-1 Maximum design scenario – project operation

Risk	Key parameter values	Justification
FFM-R016, FFM-R017, FFM-R018, FFM-R019.	The works and infrastructure are located within the onshore operation project area, which is defined by the area required for the following: • Onshore transmission infrastructure: ▪ Up to 8 underground cable circuits with the following upper limit easement footprints: ◆ Operation easement width between shore crossing and VicGrid Connection hub: 40 m width ◆ Access to easement via existing farm infrastructure and access tracks on each farm not via temporary access tracks installed for construction.	The onshore operation project area defines the maximum land area to be utilised by the operation of the project.

To assess potential impacts associated with the project, the operational assessment has also considered the following key assumptions:

- Shallow-rooted vegetation (for example, shrubs, herb, grasses) will be permitted to grow within the cable easement during operation, however deep-rooted species (such as trees) will not be permitted to grow. Within existing grazed areas, it is assumed that grazing animals will prevent the growth of vegetation. In previously forested areas, such as the Woodside H28 Bushland Reserve, vegetation within the easement will be periodically slashed to avoid growth of deep-rooted plant species.
- Annual or bi-annual testing would be undertaken requiring access to the link pits located at each joint bay location. This type of testing would be undertaken by accessing the system via the hole

covers. Disturbance related to this activity is anticipated to be limited to gaining access to the location with light vehicles.

- Routine access for maintenance vehicles would be required during normal operations. This would typically be limited to light vehicles.
- Maintenance activities on existing private access tracks and infrastructure will be undertaken by landowner and is therefore not attributable to not the project.
- All maintenance works will be contained within the project area that was disturbed to construct the onshore transmission infrastructure. As such, removal of additional native vegetation and habitat is not identified as a risk associated with operation of the project.

11.2. Impacts

All the potential risk pathways are risks rather than an impacts as they do not involve the direct removal of native vegetation or habitat.

11.3. Risks (FFM-R016 to FFM-R019)

Potential impacts

Operation of the project has the potential impact on vegetation and habitat through means such as:

- Prevention of regrowth of vegetation in previously forested areas which limits opportunities for re-establishment of habitat for fauna and also contributes to ongoing habitat fragmentation.
- Continued opportunity for weed or pathogen spread through regular vehicular traffic and associated personnel and equipment.
- Indirect impacts leading to degradation or loss of retained native vegetation and habitat including:
 - Loss of native vegetation by incursions of maintenance activity beyond the 40 m wide operation easement.
 - Ongoing 'edge effects' which, in turn, may allow for increased opportunity for predation and weed or pathogen incursion.
 - Noise during maintenance activities along the easement that may result in temporary disturbance to local fauna species.
 - Dust generated during maintenance settling on, and impacting the health of, vegetation.
 - Surface water run off carrying pollution and/or sediment into waterways or areas subject to seasonal flooding. Operation activities may result in local environments where bare earth is exposed. Operation of machinery near waterways can also result in contamination of waterways with fuels and chemicals.
- Increased vehicle traffic along the access routes will likely increase the risk of vehicles colliding with fauna. These impacts have the potential to disrupt the short-term behaviour of nearby fauna.
- Removal of regenerating native vegetation if emergency works for breakdown are required in the easement. Such occurrences are anticipated to be rare.

Management and mitigation

While the cable easement will be kept clear to prevent tree roots from interfering with underground infrastructure, the medium to long-term ecological impacts of the project will be much less than would be the case for an overhead transmission line of equivalent power carrying capacity. This is due to the requirement to maintain vegetation in the proximity of overhead powerlines, which would not be required

for most of the transmission easement as the transmission cable is buried underground. This represents a significant mitigation measure that ultimately minimises the permanent impact of the project on native vegetation and associated biodiversity.

An Operation Environmental Management Plan (OEMP) will be prepared and implemented by the project (FFM-M011). The plan will contain measures to protect retained biodiversity values during operation which will include:

- Inductions to ensure awareness of values and measures to be implemented to protect those values.
- Defining the extent of permitted maintenance and inspection works such as periodic slashing including No-Go Zones to protect retained native vegetation and threatened flora and fauna habitat.
- Weed and pathogen hygiene measures and control, in accordance with the same post-completion prevention and control procedures and methods outlined for the construction phase of the project.
- Minimisation of, and speed restrictions on, vehicular traffic to reduce risk of fauna collisions and disturbance to adjacent fauna populations.
- Rehabilitation of maintenance works areas where earth is disturbed to minimise risk of sediment and erosion.
- Undertaking works during daylight hours to avoid disturbance of nocturnal fauna.

Residual impacts

No impact on retained native vegetation as no works are proposed outside the 40 m wide easement already disturbed during construction and No Go Zones will be implemented.

Ongoing residual impacts associated with the operation phase primarily relate to maintenance of the 40 m-wide cable easement through regular slashing to remove regrowth. The easement will therefore continue to represent a gap in habitat connectivity for some fauna species. The absence of a tree canopy for the 40 m wide easement is unlikely to disrupt habitat connectivity for more mobile species such as gliders and birds as they readily glide or fly across gaps of tens of metres within and between tree canopies. Ground cover vegetation will likely re-establish in the construction area post-construction but will be subject to regular slashing/removal to maintain the cable easement. At times between maintenance works, the ground layer vegetation reestablishing will assist in the movement of small ground-dwelling species by providing cover. Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes.

Removal of native vegetation from the 40 m wide easement is accounted for in relation to construction impacts (Section 10.2.1) and therefore does not represent an additional impact on native vegetation or an additional offset requirement. Regardless, maintenance of regrowth under 10 years old is an exemption under the Guidelines (DEECA 2025a) and would therefore not constitute native vegetation loss.

The frequency of vehicle movement and maintenance activities during the project operation phase is not expected to lead to excessive or extensive risks of inadvertent impacts on retained native vegetation or disturbance to wildlife. Residual risks are therefore considered to be low.

11.4. Summary of residual impacts - operation

Table 11-2 summarises potential residual impacts during the operation phase of the project, once mitigation measures have been applied.

All the potential risk pathways are risks rather than an impacts as they do not involve the direct removal of native vegetation or habitat.

Provided maintenance work is confined to the area cleared for the cable easement, including vegetation trimming and vehicle movements then the residual risks are not anticipated to be of concern.

Table 11-2 Summary of residual risks - operation

Ecological value	Residual risk	Residual risk rating
Indirect impacts on retained native vegetation and habitat	Low residual risk with implementation of mitigation measures to protect retained vegetation and habitat.	Low
Introduction or spread of weeds, pathogens and pest animals.	Low residual risk of impact anticipated as measures to prevent the introduction and spread of weeds, pathogens and pest animals are standard protocols and are expected to be effective.	Low
Habitat fragmentation	The impact of creating the gap is not attributed to operation, however the maintenance schedule and operational requirements mean this impact is ongoing for the life of the project.	Medium
Fauna injury and mortality	Some residual risk of increased vehicle – wildlife interactions due to movements of maintenance vehicles and equipment	Low

12. Decommissioning assessment

This section discusses the potential impacts and risks associated with the project as a result of decommissioning activities and the associated mitigation measures that aim to minimise impacts. The mitigation measures referred to are summarised in Section 14.1.

12.1. Project parameters that form the basis of impact assessment

Table 12-1 specifies the maximum design scenario that has been assessed for project decommissioning. Decommissioning activities primarily relate to the removal of link and fibre pits at each joint bay location and signage. Below-ground infrastructure is not proposed to be removed.

Table 12-1 Maximum design scenario – project decommissioning

Risk	Key parameter values	Justification
FFM-R020, FFM-R021, FFM-R022, FFM-R023 .	The works and infrastructure are located within the onshore decommissioning project area, which is defined by the area required for the following: - Onshore transmission infrastructure: - Up to 8 underground cable circuits with the following upper limit easement footprints: - Operation easement width between shore crossing and VicGrid Connection hub: 40 m width - Access to easement via existing farm infrastructure and access tracks on each farm not via temporary access tracks installed for construction.	The onshore operation project area defines the maximum land area to be utilised during decommissioning of the project.

To assess potential impacts associated with the project, the decommissioning assessment has also considered the following key assumptions:

- Vehicles required during decommissioning would be limited to light vehicles.
- All decommissioning works will be contained within the operation project area that was previously disturbed to construct the onshore transmission infrastructure. Based on this assumption, removal of additional native vegetation and habitat is not identified as a risk associated with decommissioning of the project.
- Some degree of regrowth would have occurred that may need to be removed during decommissioning.

12.2. Impacts

All the potential impact pathways are risks rather than an impacts as they do not involve the direct removal of native vegetation or habitat.

12.3. Risks (FFM-R020 to FFM-R023)

Potential Impact

Decommissioning has the potential impact on vegetation and habitat adjacent to the project area through means such as:

- Removal of small, discrete areas of native vegetation that may have re-established at the joint bay locations.

- Opportunity for weed or pathogen spread through increased vehicular traffic and associated personnel and equipment.
- Other indirect impacts that may lead to degradation of retained native vegetation and habitat:
 - Noise that may result in temporary disturbance to local fauna species.
 - Dust generated during decommissioning settling on, and impacting the health of, vegetation.
 - Bare earth exposure that may be prone to erosion due to a lack of vegetation and ground cover to stabilise the soil surface. Given the limited extent of each joint bay, these areas will be small.
- Vehicle traffic along the access routes increasing the risk of vehicles colliding with fauna.

These impacts are anticipated to be short in duration relative to the impacts associated with the construction and operational phase of the project. The extent of these impacts is anticipated to be localised but would be dependent on the level of native vegetation regrowth/recolonisation and whether any fauna return to and utilise regrowth habitat. A conservative approach has been used to outline the potential impacts to biodiversity during the decommissioning phase. It is assumed that some degree of regrowth will occur that may need to be removed during decommissioning.

Management and mitigation

To inform management and mitigation measures during decommissioning, a survey of biodiversity values present at the time of decommissioning will be undertaken to inform the preparation of a Decommissioning Environmental Management Plan (DEMP) outlining measures to address the potential impacts on ecological values during decommissioning (FFM-M012). The DEMP will be developed in consultation with DEECA.

A Rehabilitation and Reinstatement Plan (RRP) to be prepared to guide the approach to rehabilitation following the completion of construction should also be relevant to decommissioning.

Residual impacts

A low risk remains that fauna would be struck by decommissioning vehicles using the easement. However, loss of some individuals is unlikely to represent a significant impact on the local fauna populations.

A low risk remains that weeds, pathogens may be spread by vehicles during decommissioning. Vehicles required during decommissioning would be limited to light vehicles. Decommissioning activities primarily relate to the removal of link and fibre pits at each joint bay location and signage. Below-ground infrastructure is not proposed to be removed. Therefore, earth disturbance will be minimised.

Provided the project area is effectively rehabilitated and, where relevant, revegetation efforts are guided by the relevant EVC (vegetation lifeform and species) and in consultation with DEECA residual impacts associated with decommissioning are not anticipated to be significant.

It is expected that native vegetation and fauna habitats affected by the project ultimately would regenerate and most species currently present would recolonise those restored areas. Residual impacts will therefore be limited to the 40m wide easement until all vegetation components have grown to their full height. Hollow tree availability is expected to be constrained for decades given the time taken for hollow formation in eucalypts.

12.4. Summary of residual impacts – decommissioning

Table 12-2 summarises potential residual impacts during the decommissioning phase of the project, once mitigation measures have been considered and applied.

All the potential impact pathways are risks rather than an impacts as they do not involve the direct removal of native vegetation or habitat.

It is expected that native vegetation and fauna habitats affected by the project ultimately would regenerate and most species would recolonise those restored areas. Residual impacts will therefore be limited to the 40 m wide easement until all vegetation components have grown to their full height. Hollow tree availability is expected to be constrained for decades given the time taken for hollow formation in eucalypts.

Table 12-2 Summary of residual risks - decommissioning

Ecological value	Residual risk	Residual risk rating
Indirect impacts on retained native vegetation and habitat	No residual risk with implementation of mitigation measures to protect retained vegetation and habitat.	Very low
Introduction or spread of weeds, pathogens and pest animals.	No residual impact anticipated as measures to prevent the introduction and spread of weeds, pathogens and pest animals are standard protocols and are expected to be effective.	Very low
Fauna injury and mortality	Some residual risk of increased vehicle – wildlife interactions due to movements of decommissioning vehicles.	Low

13. Cumulative impact assessment

This section provides an assessment of cumulative impacts from the project in combination with other proposed developments in the region. The method used to assess cumulative impacts is described in Section 6.8 and Chapter 6 - Assessment Framework within both the EIS and EES.

13.1. Projects within zone of influence

For the purpose of evaluating cumulative impacts, this assessment has identified other projects that are located within the zone of influence of this study. The zone of influence for this study has been defined as the project area and areas within 50 km of the project area, or any linear infrastructure project within the Gippsland Plains bioregion of similar scale to the project.

The long list of projects that fall within the zone of influence are presented in Table 13-1. Each of the projects in Table 13-1 have been evaluated against the cumulative assessment criteria to determine whether there is the potential for cumulative impacts with the project and sufficient information available to undertake a meaningful assessment.

In assessing the potential cumulative impacts for the project, it is important to consider that some developments, predominately those 'proposed' (referred) or identified in development plans, may not actually be taken forward or fully built. There is, therefore, a need to build in some certainty (or uncertainty) with respect to the potential impacts that may arise from such proposals, which is done by allocating projects into 'tiers'. This approach allows appropriate weight to be given to each tier when considering the potential cumulative impacts.

Two potential projects within the zone of influence of the project were assessed as Tier 1 (high certainty) projects, and two projects were assessed as Tier 2 (medium certainty):

- Golden Beach 2 Gas Project – Tier 1
- Marinus Link – Tier 1
- Gelliondale Wind Farm – Tier 2
- Gippsland Offshore Wind Transmission 2GW Project (VicGrid) – Tier 2
- Seaspray Solar Farm – Tier 2

Nine projects identified within the zone of influence were assessed as Tier 3 (low certainty) projects.

Table 13_1 lists the projects considered and whether the project was screened in to be taken forward for the cumulative impact assessment.

Two projects assessed as Tier 1 (high certainty) and one project assessed as Tier 2 (medium certainty) were screened into the cumulative impact assessment. None of the Tier 3 projects were screened into the cumulative impact assessment due to insufficient information.

Table 13-3 describes the projects screened in for the cumulative impact assessment.

The potential for the project to result in cumulative impacts when combined with these projects has been considered in the following sections with respect to severity, extent and duration.

Table 13-1 Cumulative impacts - projects within the zone of influence

Project or action	Data confidence	Scale parameter	Receptor impact	Temporal overlap	Conclusion
(within the zone of influence)	Certainty tier	Is the project or action of sufficient scale to warrant inclusion?	Will the project / action adversely affect the same receptors as the project? And have a spatial overlap	Will the project / action result in adverse impacts to the same receptors as the project at the same time or on a timescale that could result in cumulative impact?	Is the long list project / action shortlisted for assessment of cumulative impacts?
Aurora Green (Iberdrola)	Tier 3 - Proposed				Screened OUT - due to insufficient data available
Blue Mackerel North (Parkwind)	Tier 3 - Proposed				Screened OUT - due to insufficient data available
CarbonNet	Tier 3 - Proposed				Screened OUT - due to insufficient data available
Gelliondale Wind Farm (Synergy Wind Pty Ltd)	Tier 2 – seeking approval	Yes – medium scale onshore windfarm.	Potentially – native vegetation, threatened fauna and flora	Currently unknown	Screened OUT – due to insufficient data available
Gippsland Offshore Wind Farm 1 (Ørsted)	Tier 3 - Proposed				Screened OUT – due to insufficient data available

Project or action	Data confidence	Scale parameter	Receptor impact	Temporal overlap	Conclusion
Gippsland Offshore Wind Farm 2 (Ørsted)	Tier 3 - Proposed				Screened OUT – due to insufficient data available
Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	Tier 2 – Seeking approvals	Yes – onshore impacts considered to be of a similar scale to Star of the South	Yes – native vegetation, threatened flora and fauna within the Gippsland Plains bioregion	Yes – construction periods may overlap, and operational periods will overlap	Screened IN
Golden Beach 2 Gas Project	Tier 1 - Approved	Yes – impacts considered to be of similar scale to Star or the South	Yes – native vegetation, threatened flora and fauna	Yes – project approved with timeline of 40 years	Screened IN
Great Eastern Offshore Windfarm (Corio)	Tier 2 – Seeking approvals	Yes – onshore impacts considered to be of a similar scale to Star of the South	Yes – native vegetation, threatened flora and fauna within the Gippsland Plains bioregion	Yes – construction periods may overlap, and operational periods will overlap	Screened IN
High Sea Wind (Ocean Winds)	Tier 3 - Proposed				Screened OUT – due to insufficient data available
Marinus Link	Tier 1 – Approved by Minister for Planning 18 May 2025; EPBC Act approval received July 2025.	Yes - impacts considered to be of similar scale to Star of the South	Yes – native vegetation, TECs, threatened flora and fauna	Yes – project anticipated to start in 2024 and will extend until 2071	Screened IN

Project or action	Data confidence	Scale parameter	Receptor impact	Temporal overlap	Conclusion
Seaspray Solar Farm	Tier 2	No – smaller scale project	No – project located within cleared private land	Yes – construction to start in 2023	Screened OUT – due to smaller scale and lack of receptor impact.

Table 13-2 Projects assessed for cumulative impact

Project	Stage	Project description	Relevance to this assessment	Certainty	Assessment assumptions
Golden Beach Energy Storage Project	EES Completed	Golden Beach Energy Storage Project involves the development of the Golden Beach offshore gas field in the Gippsland Basin to provide gas supply and a gas storage facility for Australia's east coast gas markets. The project would comprise the construction, operation and eventual decommissioning of two offshore wells (approximately 3.8 km offshore), a 3.8 km subsea and shore crossing pipeline, an 18.8 km buried onshore pipeline, and pipeline facilities including a compressor station.	Spatial relevance: 18.8 km buried onshore pipeline, and pipeline facilities including a compressor station would be within approximately 30 km of the onshore transmission alignment for the Star of the South Offshore Wind Farm. The offshore component of the Golden Beach Energy Storage Project would be approximately 50 km from the offshore wind farm at the nearest point. According to the Resources Victoria website, initial geotechnical and geophysical investigations were completed in 2020. An appraisal well was drilled in 2023. Geotechnical and geophysical investigations are scheduled to commence in February 2026 and are expected to take approximately 10 to 12 days to complete. Offshore drilling is scheduled for the second half of 2026. Production is expected to be being in 2028-2029 with a lifespan of 40 years. The current indicative timeframe for construction of onshore components of Star of the South is 2026 but timing	Tier 1	Data available from project EES.

Project	Stage	Project description	Relevance to this assessment	Certainty	Assessment assumptions
			may change subject to the assessment approvals timeline. Assuming construction commences in 2026, there is likely to be overlap in the timing between the two projects.		
Marinus Link	EES exhibited	Marinus Link is a proposed undersea electricity connection between Victoria and Tasmania. Marinus Link requires the construction of a high voltage direct current electricity interconnector between Tasmania and Victoria including a subsea cable and onshore cable and converter facilities. The shore crossing is proposed to be located at Waratah Bay. The onshore cable would extend underground for approximately 90 km to the converter station adjacent to the existing terminal station at either Driffield or Hazelwood.	Spatial relevance: The project would be of similar scale to Star of the South and in the same bioregion. There is overlap in the habitats to be impacted (coastal and near-coastal habitat).	Tier 1	Data available from project EES.
Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	Referred	The proposed Gippsland Offshore Wind Transmission 2GW Project is a new overhead transmission line from the Latrobe Valley to a new onshore connection hub in Giffard.	Spatial relevance: the projects will be directly adjacent. Temporal relevance: based on the project timeframes, it is possible that	Tier 2	There is uncertainty around whether construction of the VicGrid connection hub in Giffard would occur at the same

Project	Stage	Project description	Relevance to this assessment	Certainty	Assessment assumptions
		The proposed VicGrid connection hub would comprise a high-voltage substation plant and equipment, including transformers, synchronous condensers and switchgear. Construction is planned to commence in 2028 subject to planning and environmental approvals.	construction periods could overlap. Operational periods will overlap. Potential cumulative risk pathway: construction and operation of the VicGrid connection hub could impact on threatened fauna and native vegetation within the Gippsland Plains bioregion.		time as construction of the SOTS onshore transmission system (in the vicinity of the connection hub). It is assumed that there will be impacts to similar native vegetation threatened flora and fauna species.
Great Eastern Offshore Windfarm (Corio)	Referred	The proposed Great Eastern Offshore Windfarm is a fixed-bottom offshore wind farm approximately 22 km off the central Gippsland coast. The project is proposed to generate up to 2.5GW once operational. The onshore component of the project is proposed to connect to the same VicGrid connection hub as SOTS via an approximately 10km long transmission system.	Spatial relevance: the projects will connect to the same connection hub. Temporal relevance: based on the project timeframes, it is possible that construction periods could overlap. Operational periods will overlap. Potential cumulative risk pathway: construction and operation of the Corio project could impact on threatened fauna and native vegetation within the Gippsland Plains bioregion.	Tier 2	There is uncertainty around whether construction of the Corio project would occur at the same time as construction of the SOTS onshore transmission system. It is assumed that there will be impacts to similar native vegetation threatened flora and fauna species.

13.2. Cumulative impacts - ecology receptors

Information available in relation to impacts of the projects considered in the cumulative impact assessment is summarised in Table 13-3. The Star of the South Project will contribute to a cumulative impact on native vegetation and threatened species habitat. However, the contribution the project would make relative to the other projects is not feasible to indicate overall because the quantification of cumulative impacts is not possible in most instances for the following reasons:

- Golden Beach terrestrial and freshwater biodiversity impact assessment report (Practical Ecology 2020) describes some impacts in terms of species habitat units (SHUs). SHUs are generated by the DEECA Native Vegetation Removal tool and do not represent a habitat area that can be compared with extent of potential habitat loss. Other descriptions of impacts for Golden Beach are qualitative in relation to potential habitat.
- Marinus Link terrestrial ecology impact assessment report (Eco Logical 2024) describes the impacts on species habitat in terms of survey extent, pre-mitigation and post-mitigation. As the post-mitigation scenario is less certain, the pre-mitigation extent of habitat has been adopted as the impact extent. Impacts are quantified in relation to extent of priority habitat. Priority habitat is defined as 'high quality habitats containing features and resources which are consistent with threatened species preferred habitat requirements and also support a wide range of flora and fauna species' (Eco Logical 2024).
- Impacts associated with the Gippsland Offshore Wind Transmission 2GW Project (VicGrid) and Great Eastern Offshore Windfarm (Corio) are unknown at this stage. This means that it is not possible to quantify cumulative impacts.

Potential cumulative loss of native vegetation as a result of the projects could be at least 79 ha of native vegetation and over 400 large trees (based on assumed complete loss) plus additional impacts associated with the VicGrid project that are unquantified at this stage. Removals of this extent of native vegetation is likely to have a material impact on species dependent on remnant vegetation as a habitat resource in the regional landscape. Cumulative loss of large trees and hollow-bearing trees from the landscape is a recognised threat to woodland species. The Star of the South project would contribute approximately one quarter of the removals of native vegetation patches and one third of the removals of large trees associated with the cumulative impacts of SOTS, Golden Beach and Marinus Link.

Impacts on threatened species habitat are unable to be compared because some potential impacts are measured in species units of offset and others in extent of potential habitat removal.

Although all projects would be expected to compensate for these losses through offsets, the calculation of offset obligations will be done on a project-by-project basis and not on the cumulative loss of the projects. As such, offsets are likely to underestimate the offsets that would otherwise be required to compensate for the cumulative loss of native vegetation.

Ongoing design refinements and mitigations may reduce potential impacts of the projects and therefore the total impact and respective impacts. However, until those refinements are known the cumulative impacts considered can only be those stated in the available reports.

Table 13-3 Ecological receptors and cumulative impacts

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
Native vegetation - patches	40.22 ha	21.21 ha	Unquantified at this stage	Unquantified at this stage	17.725 ha	20.285 ha	19.585 ha	At least 79.15 ha
Native vegetation – trees in patches	167 large trees in patches 10 large, 4 small scattered trees	184 large trees	Unquantified at this stage	Unquantified at this stage	54 large trees in patches 28 large scattered trees 12 small scattered trees	66 large trees in patches 53 large scattered trees 31 small scattered trees	65 large trees in patches 42 large scattered trees 12 small scattered trees	At least 443 large trees (in patches and scattered) and 16 small scattered trees
Hollow-bearing / habitat trees	Not specifically identified. 177 large trees	Not specifically identified 184 large trees	Unquantified at this stage	Unquantified at this stage	82 large trees	119 large trees	107 large trees	At least 443 large trees in patches and scattered.
Threatened flora								
Thick-lipped Spider-orchid – EPBC Act	No individuals. Some possible habitat.	1.27 ha potential habitat	Unknown at this stage	Unknown at this stage	2.901 ha potential high-quality patches of	4.201 ha potential high-quality patches of	4.201 ha potential high-quality patches of	At least 4.17 ha potential habitat to be impacted

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
					Plains Grassy Forest habitat	Plains Grassy Forest habitat	Plains Grassy Forest habitat	
Dense Leek-orchid – EPBC Act; FFG Act	No habitat, no impact.	1.27 ha potential habitat	Unknown at this stage	Unknown at this stage	No habitat, no impact.	0.101 ha Heathy Woodland potential habitat	No habitat, no impact.	At least 1.37 ha potential habitat.
Pale Swamp Everlasting – FFG Act	No high quality habitat and low likelihood of occurrence	No high-quality habitat	Unknown at this stage	Unknown at this stage	0.653 ha habitat and a known population of 10 individuals.	0.653 ha habitat and a known population of 10 individuals.	0.653 ha habitat and a known population of 10 individuals.	Possible cumulative impact if species habitat identified for VicGrid.
Coast Grey-box – FFG Act	Not present	No high-quality habitat identified	Unknown at this stage	Unknown at this stage	22 (3 large and 18 small trees in patches and 1 small scattered tree)	22 (3 large and 18 small trees in patches and 1 small scattered tree)	22 (3 large and 18 small trees in patches and 1 small scattered tree)	Possible cumulative impact if species habitat identified for VicGrid.
Dune Wood-sorrel – FFG Act	23.347 species habitat units	Unlikely impact	Unknown at this stage	Unknown at this stage	0.106 ha Coast Dune Scrub habitat	0.106 ha Coast Dune Scrub habitat	0.106 ha Coast Dune Scrub habitat	At least 0.1 ha and 20 known

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
					and 20 known individuals.	and 20 known individuals.	and 20 known individuals.	individuals and 23.347 species habitat units.
Cobra Greenhood – FFG Act	Not identified as species of relevance to project.	1.27 ha potential habitat.	Unknown at this stage	Unknown at this stage	3.858 ha potential habitat.	5.202 ha potential habitat	5.202 ha potential habitat	At least 5.13 ha of potential habitat impacted
Spiral-leaved Sun-orchid – FFG Act; (EPBC Act listed after referral decision therefore not MNES)	Not identified as species of relevance to project.	Heathy Woodland condition suggests unsuitable for this species.	Unknown at this stage	Unknown at this stage	2.901 ha potential habitat	4.201 ha potential habitat	4.201 ha potential habitat	Possible cumulative impact if species habitat identified for VicGrid.
Threatened fauna								
Swift Parrot – EPBC Act; FFG Act	Limited suitable habitat present	Limited preferred foraging trees	Unknown at this stage	Unknown at this stage	~6.5 ha forest and woodland habitat.	~8.5 ha forest and woodland habitat.	~9 ha forest and woodland habitat.	At least ~6.5 ha of forest and woodland foraging habitat

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
Latham's Snipe-EPBC Act (migratory)	Unquantified. Short term displacement. Low overall risk as occasional visitor and similar or higher quality habitat in adjacent areas.	No priority habitat identified.	Unknown at this stage	Unknown at this stage	<0.1 ha of potential habitat	<0.1 ha of potential habitat	<0.1 ha of potential habitat	Cumulative impact unlikely.
Grey-headed Flying Fox – EPBC Act; FFG Act	Unquantified. Foraging habitat present. Short term impacts at local level.	4.17 ha foraging habitat.	Unknown at this stage	Unknown at this stage	~8 ha of potential forest and woodland habitat	~10 ha of potential forest and woodland habitat	~10.5 ha of potential forest and woodland habitat	At least ~12 ha of potential habitat impacted.
New Holland Mouse-EPBC Act; FFG Act	20.801 species units of habitat	Low likelihood of occurrence. No priority habitat identified.	Unknown at this stage	Unknown at this stage	~4 ha of potential habitat.	~2.5 ha of potential habitat.	~2 ha of potential habitat.	At least 2 ha of potential habitat and 20.801 species habitat units.
Gang-gang Cockatoo# - FFG Act; (EPBC Act	Not identified as species of	2.51 ha priority habitat	Unknown at this stage	Unknown at this stage	~7 ha of potential habitat	~9 ha of potential habitat	~9 ha of potential habitat	At least ~9.5 ha of potential

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
listed after referral decision therefore not MNES)	relevance to project.				including 19 large trees in patches 13 scattered habitat trees / hollow-bearing trees	including 36 large trees in patches 17 scattered habitat trees / hollow-bearing trees	including 36 large trees in patches 17 scattered habitat trees / hollow-bearing trees	habitat; at least 19 large trees in patches and 13 scattered trees affected.
Black Falcon – FFG Act	Unquantified. Present within the study area.	Unquantified. Foraging habitat present. Low likelihood of occurrence.	Unknown at this stage	Unknown at this stage	Unquantified but small proportion of potential foraging habitat. Nomadic species may occasionally occur when moving across the landscape in response to food resources.	Unquantified but small proportion of potential foraging habitat. Nomadic species may occasionally occur when moving across the landscape in response to food resources.	Unquantified but small proportion of potential foraging habitat. Nomadic species may occasionally occur when moving across the landscape in response to food resources.	Unquantified but nomadic species that may occasionally forage when moving across the landscape in response to food resources.
Chestnut-rumped Heathwren – FFG Act	Unquantified. Potential habitat being removed. Low risk of	No suitable habitat.	Unknown at this stage	Unknown at this stage	~4 ha of potential habitat.	~3 ha of potential habitat.	~3 ha of potential habitat.	Possible cumulative impact if species

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
	significant impact.							habitat identified for VicGrid.
Little Eagle – FFG Act	Not identified as species of relevance to project.	Priority habitat avoided.	Unknown at this stage	Unknown at this stage	~9 ha of potential habitat.	~10.5 ha of potential habitat.	~11 ha of potential habitat.	Possible cumulative impact if species habitat identified for VicGrid.
Powerful Owl – FFG Act	Unquantified. Some suitable habitat present.	4.58 ha priority habitat	Unknown at this stage	Unknown at this stage	~8 ha of potential habitat.	~10 ha of potential habitat.	~10.5 ha of potential habitat.	At least ~12.5 ha of potential habitat.
White-bellied Sea-eagle – FFG Act	Short term displacement.	1.27 ha priority habitat	Unknown at this stage	Unknown at this stage	The project will not remove any open water or treed habitats at the coast.	The project will not remove any open water or treed habitats at the coast.	The project will not remove any open water or treed habitats at the coast.	No cumulative impact associated with the Star of the South project
White-footed Dunnart – FFG Act	Not identified as species of	1.27 ha priority habitat	Unknown at this stage	Unknown at this stage	~8 ha of potential habitat.	~10.5 ha of potential habitat.	~11 ha of potential habitat.	At least ~9 ha of potential

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
	relevance to project.							habitat to be impacted
Lace Monitor – FFG Act	Unquantified. Suitable woodland habitat along much of the project area. Likely to occur at low densities.	4.17 ha priority habitat	Unknown at this stage	Unknown at this stage	~8 ha of potential habitat.	~10.5 ha of potential habitat.	10.5 ha of potential habitat.	At least ~12 ha potential habitat.
Glossy Grass Skink – FFG Act	Unquantified. Possible short to medium-term impacts at local level. Reduced to low risk in longer-term with habitat restoration. Not detected during targeted survey.	1.27 ha priority habitat	Unknown at this stage	Unknown at this stage	~2.5 ha of potential habitat	~2 ha of potential habitat	~2 ha of potential habitat	At least ~3 ha of potential habitat.

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
Southern Toadlet - FFG Act	Unquantified. Possible short to medium-term impacts at local level. Reduced to low risk in longer-term with habitat restoration. Not detected during targeted survey.	1.27 ha potential habitat in areas not yet accessed.	Unknown at this stage	Unknown at this stage	~4 ha of potential habitat.	~2.5 ha of potential habitat.	~2 ha of potential habitat.	At least ~3ha of potential habitat.
Martin's Toadlet – FFG Act (EPBC Act listed after referral decision therefore not MNES)	Unquantified. Not detected during targeted survey.	Not identified as species of relevance to project.	Unknown at this stage	Unknown at this stage	~6 ha of potential habitat.	~10 ha of potential habitat.	~10.5 ha of potential habitat.	At least ~6 ha of potential habitat.
Australian Mudfish – FFG Act	Not identified as species of relevance to project.	Not identified as species of relevance to project.	Unknown at this stage	Unknown at this stage	Temporary disturbance and reversable	Temporary disturbance and reversable	Temporary disturbance and reversable	Cumulative impact unlikely

Receptor	Golden Beach 2 Gas Project	Marinus Link	Great Eastern Offshore Windfarm (Corio)	Gippsland Offshore Wind Transmission 2GW Project (VicGrid)	SOTS			Cumulative impact
					Option AB	Option C	Option D	
Blue-winged parrot - Not listed (EPBC Act listed after referral decision therefore not MNES)	Not identified as species of relevance to project.	2.51 ha priority habitat	Unknown at this stage	Unknown at this stage	~9 ha of potential habitat Loss of 13 habitat trees	~10.5 ha of potential habitat Loss of 17 habitat trees	~11 ha of potential habitat Loss of 17 habitat trees	At least ~11.5 ha of potential habitat including at least 17 habitat trees.
Koala - Not listed but Strzelecki Ranges and South Gippsland population notable.	Unquantified. Species present.	Unquantified. Species present.	Unknown at this stage	Unknown at this stage	~8 ha of potential habitat, not including areas of eucalypt plantation.	~10 ha of potential habitat, not including areas of eucalypt plantation.	~10 ha of potential habitat, not including areas of eucalypt plantation.	At least ~8 ha of potential habitat including eucalypt plantations/artificial habitat.

14. Summary of mitigation, monitoring and contingency measures

14.1. Avoidance

The first step in the mitigation hierarchy (Figure 2-2 in Section 2.2) is avoidance. The project has avoided impacts on ecological values through design by adjusting the alignment to avoid sensitive ecological values, where practicable (Section 6.6).

14.1.1. Design

The evolution of project design and rationale for design decision on key project components are outlined in EIS Chapter 3 – Project development including the alternatives that were considered and discarded as well as alternatives that would be confirmed post-approval. Avoidance and minimisation of social and environmental impacts was central to the project's decision making.

Several factors were considered when selecting the location for the project. The location was influenced by the following main factors:

- The availability of a high-quality wind resource
- Proximity to the electricity network at a location where adequate transmission capacity exists
- Suitable water depth and geotechnical conditions
- Proximity to suitable port facilities to support construction and operation
- Proximity to key sensitive environmental and socio-economic resources.

The availability of a suitable shore crossing location was critical to the identification of potential offshore and onshore transmission corridor options for the project. The shore crossing was selected with consideration of the following sensitive areas:

- Corner Inlet Ramsar Site and tributary of Bruthen Creek.
- Nooramunga Marine & Coastal Park
- Jack Smith Lake Wildlife Reserve with significant environmental and Aboriginal cultural heritage values.
- Woodside Beach Wildlife Reserve.
- Woodside Beach township.
- Extensive coastal wetlands, waterways and dune systems and the Ninety Mile Beach barrier lake system.
- High profile reef near shore to be avoided.
- Lake Denison and Ninety Mile Beach Marine National Park.
- Existing infrastructure such as Basslink and a Saline Wastewater Outfall Pipeline.

Reeves Beach shore crossing location was selected as the least constrained option.

The onshore transmission corridor alignment was informed by the location of the proposed VicGrid connection hub. The alignment was selected to mainly be located within farmland and plantation areas which would enable potential impacts on native vegetation to be minimised. An iterative design phase

'avoid and minimise' exercise was undertaken to refine the location and width of the transmission corridor.

Underground cables or overhead transmission lines were considered as part of the design for onshore transmission. Underground cable was adopted as the preferred option. Although underground cables would be more expensive to install and maintain than overhead transmission lines, they would be less intrusive and have less impacts on native vegetation due to a narrower cable easement requirement.

Avoidance and minimisation during the design development process included decisions to design the shore crossing to not directly impact coastal areas by drilling under, use existing roads for construction site access wherever possible, selection of a route for the onshore transmission infrastructure that avoids large tracts of remnant vegetation.

Trenchless construction for underground cables (HDD) was explored by the project to avoid the Woodside H28 Bushland Reserve. However, the distances required and challenges of achieving cable ratings due to ground conditions meant this option was deemed unfeasible.

14.1.2. Additional avoidance

Additional locations where the project has avoided and minimised impacts to native vegetation and sensitive ecological values are:

- Avoidance of native vegetation and threatened species habitat in the McLoughlins Beach-Seaspray Coastal Reserve at the shore crossing by drilling below.
- Adjustment of the project area at KP 10.65-12.25 so that it is located within cleared private land and positioned 15 m from land parcel boundary to avoid impacts to tree NRZs. The Coast Grey-box recorded within this section of the project area and southern portions of Woodside H28 Bushland Reserve will therefore be protected from impacts during construction (FFM-M001). Minimisation of impacts to Plains Grassy Forest (endangered) within Woodside H28 Bushland Reserve by adjusting the alignment to avoid most of the bushland reserve.
- Adjustment of the project area at KP 12.50-12.80 to avoid the significant Coast Grey Box population within the northern portions of Woodside H28 Bushland Reserve and into private property to the east, minimising impact to the population. Coast Grey Box individuals are located within the neighbouring land parcel at a significantly lower density, minimising overall impact.
- Adjustment of the project area at KP 21.50-22.60 to minimise impacts to adjacent high-quality native vegetation which may provide habitat for threatened flora including Thick-lip Spider-orchid, Spiral-leaved Sun-orchid and Cobra Greenhood.
- Exclusion of Notional Root Zones from the project area where project area encroaches on the NRZ by more than 10% in accordance with AS 4970-2025 Protection of Trees on Development Sites.
- Implementation of No Go Zones within the project area to protect the Notional Root Zones of retained trees and patches of native vegetation.
- Exclusion of DEECA mapped wetland from the project area.
- Avoidance of Matted Flax-lily population along Stringy Bark Lane (closest KP 7.70). The project will clearly demarcate a vehicle turnaround point on Stringy Bark Lane to ensure no impacts to the population of Matted Flax-lily (FFM-M001, FFM-M002, FFM-M003, FFM-M005, FFM-M010).

- Avoidance of Dune Wood-sorrel populations and sensitive Coastal Dune Scrub EVC by drilling below the McLoughlins Beach - Seaspray Coastal Reserve at Reeves Beach (FFM-M010).
- Reduction in working width of the project area where it crosses key sensitive areas to minimise impacts on native vegetation, wetlands and habitat. Those reductions have been achieved by strategically removing the temporary construction area adjacent to the 40m cable easement at Stringy Bark Lane, Woodside H28 Bushland Reserve and private land adjacent, Giffard Road, and small patches on private land.

14.1.3. Future avoidance

Opportunities will continue to be sought to further avoid areas of biodiversity value during the detail design and construction planning phase. The reason such avoidance cannot be committed to at this stage is that the final design will be developed by construction contractor. As such the impact assessment represents a worst-case scenario.

Once a construction contractor has been appointed, decisions around constructability will be made that will determine whether additional avoidance can be achieved for the project. For example, further avoidance may be possible if HDD can be used to install the underground transmission cables under ecological features and micro-siting the associated drill sites to be located outside or mostly outside areas of the species' habitat. The ultimate location and width of the cable easement within the project area will be subject to final project design and whether a design that is less than 8 circuits is adopted. At that time, micro-siting can also be undertaken to further avoid environmental and heritages values where possible.

Targeted surveys to document the number of FFG Act protected flora (threatened and non-threatened) will also be undertaken at this stage to inform the FFG Act permit application. This means that the location of individuals of the threatened plants will be known and can therefore inform micro-siting decisions where relevant.

Features that will be prioritised for avoidance during detailed design and micro-siting include:

- Woodside H28 Bushland Reserve and adjacent private land that supports connected native vegetation and threatened species habitat. HDD was previously explored by the project to avoid this area and was deemed unfeasible due to the distances required and challenges of achieving cable ratings due to ground conditions. The feasibility will be revisited during further system design.
- Waterways known to support a population of Glossy Grass Skink.
- Lyons Road that is known to support a population of Pale Swamp Everlasting.
- Reeves Beach Road that is known to support a population of Dune Wood Sorrel (although the access point has already been selected to utilise an existing access track to minimise native vegetation clearance).

14.2. Mitigation measures

The mitigation measures that are proposed to avoid, mitigate or manage biodiversity impacts and risks associated with the project are summarised in Table 14-1. The location of No Go Zones to be implemented to protect retained ecological values during construction is shown on Figure 14-1 in Appendix 9.

Measures identified in surface water for sediment and erosion etc are not repeated here. All mitigations should be captured in the Environmental Management Framework for the project.

Table 14-1 Mitigation measures relevant to onshore ecology

Measure ID	Mitigation measure	Phase
FFM-M001	Avoidance of impacts to ecological values during the design phase Continue to seek opportunities to avoid and minimise impacts on ecological values during design and construction planning. Undertake on-ground ecology surveys, including Vegetation Quality Assessment of areas previously inaccessible prior to any native vegetation removal to inform design and construction planning	Prior to construction
FFM-M002	Prepare an Environmental Line List (ELL) Prepare an Environmental Line List (ELL) which identifies all ecological values that occur within the project area (including areas previously inaccessible) prior to construction commencing. The ELL will define all prescribed mitigation or management requirements associated with each identified value. The ELL will be incorporated in the detailed environmental management plans and will be referred to when completing detailed construction planning. The ELL will be prepared in consultation with the Department of Energy, Environment and Climate Action and reviewed on a regular basis.	Prior to construction (prepare ELL) Construction (implement ELL) Operation (implement ELL) Decommissioning (implement ELL)
FFM-M003	Prepare and implement a Construction Environmental Management Plan (CEMP) and sub-plans Prepare and implement a Construction Environmental Management Plan (CEMP) to define measures to manage biodiversity values, air quality, noise, site contamination, waste, water quality and monitoring to minimise construction activities impacting on the environment in consultation with the Department of Energy, Environment and Climate Action. An audit framework and emergency response procedure will be included in the plan. Specific controls for protecting ecological values not defined by the CEMP will be outlined in sub-plans to the CEMP including:	Prior to construction (prepare) Construction

Measure ID	Mitigation measure	Phase
	- Flora and Fauna Management Plan (FFM-M005, FFM-M006) to define measures to protect retained ecological values during construction and outline control measures to minimise risk of disturbance, injury or death of fauna. - Biosecurity Management Plan (FFM-M007) to define measures to manage and control biosecurity threats (weeds, pathogens, and pest animals). - Management plans to reduce erosion, sedimentation and contamination risk to retained vegetation and habitat including waterways (FFM-M008). - Protocol for works within Conservation Reserves (FFM-M009). - Protocol for incidental discovery of threatened flora and fauna species. - Designated Waterway Crossing Management Plan (FFM-M010) to describe how the project will manage and control impacts on designated waterways during construction. - Rehabilitation and Reinstatement Plan (FFM-M013) to guide the approach to rehabilitation following the completion of construction in conservation reserves and roadsides / streamsides that support remnant vegetation.	
FFM-M004	Contractor inductions and awareness Provide inductions and training to ensure contractors are aware of areas of ecological value along the alignment and the mitigation measures required for construction activities. Provide reference material such as environmental management plans and maps at the site office during construction.	Prior to construction (prepare) Construction Operation Decommissioning
FFM-M005	Prevent construction impacting on retained vegetation and habitat not approved for removal Prepare and implement a Flora and Fauna Management Plan (FFMP) to identify significant ecological values to be retained (native vegetation and threatened species habitat, Large Trees in Patches, Scattered Trees) including those in areas previously inaccessible and define measures to protect those values during construction. The FFMP will be developed in consultation with the Department of Energy, Environment and Climate Action and will include: No-Go Zones where works are not permitted to protect sites of known significant ecological values to be retained. No Go Zones to be placed on boundary of project area and around scattered trees, large patch trees and habitat trees where project area	Prior to construction (prepare) Construction

Measure ID	Mitigation measure	Phase
	encroaches > 10% of Notional Root Zones (NRZ) as per AS 4970-2025 <i>Protection of Trees on Development Sites</i>. ▪ Clear demarcation of No-Go Zones and NRZs on maps and construction drawings. ▪ Protection of No-Go Zones and NRZs with temporary fencing and signage; fencing will be installed and removed in a staged manner as construction progresses along the linear alignment. ▪ Pre-construction inspections by a Site Environmental Manager (or similar) to confirm that native vegetation and trees to be retained have been adequately protected from impact. ▪ Conduct regular inspection and maintenance of fencing during construction to ensure continued integrity. ▪ Performance targets and contingency measures	
FFM-M006	Minimise disturbance, injury, or death of wildlife Prepare and implement a Flora and Fauna Management Plan (FFMP) which outlines control measures to minimise risk of disturbance, injury or death of fauna. The FFMP will be developed in consultation with the Department of Energy, Environment and Climate Action and include measures to: ▪ Manage any open pits or trenches to reduce potential for fauna entrapment in accordance with the Australian Pipelines and Gas Association Code of Environmental Practice: Onshore Pipelines (AGPA, 2022) through measures such as: ▫ Minimising the length of trench open at a time. ▫ Minimising the amount of time trenches and other excavations are open. ▫ Scheduling trenching through watercourses during dry or low flow periods ▫ Constructing trench plugs (short section of trench left unexcavated to allow passage of stock or wildlife across the trench) with slopes less than 45° to provide exit ramps for fauna. Provide other exit ramps where practicable and safe to do so. Exit ramps to be installed at the ends of cable trenches. ▫ Creating 'ladders' to enable fauna to exit the excavations (e.g. branches, ropes, planks, floats).	Prior to construction (prepare) Construction

Measure ID	Mitigation measure	Phase
	▫ Daily inspections of open trenches by appropriately certified personnel to remove trapped fauna as required. ▫ Inspection prior to and during dewatering activities by appropriately experienced and licenced personnel to remove trapped aquatic fauna as required. ▫ Checking for fauna prior to backfilling trenches. ▪ Ensure fauna are discouraged from work areas by erecting barriers where practicable. ▪ Install signage along access routes through conservation reserves and patches of native vegetation to raise awareness of presence of wildlife crossing roads and reduce incidence of wildlife collision. ▪ Develop and implement a procedure for finding trapped and/or injured fauna. ▪ Design any fencing required to define construction boundaries or to protect No-Go Zones or Notional Root Zones (NRZ) in accordance with relevant DEECA guidelines to limit fauna strike and fauna mortality risk and/or maintain habitat connectivity. ▪ Schedule construction works to avoid the breeding season of threatened fauna species in areas of habitat for those species, where practicable. ▪ Time removal of vegetation (trees, shrubs, ground cover) to avoid the breeding season of nesting birds and mammals or times when arboreal mammals are less active and more likely to be inhabiting hollows (winter and spring) where practicable. ▪ Design and manage lighting to avoid/minimise light spill into adjacent habitat in general accordance with guidance in the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) where these do not conflict with construction safety. ▪ Minimise night-time works where practical to do so, to reduce impacts of noise and light on nocturnal animals. ▪ Develop an artificial hollow program in consultation with the Department of Energy, Environment and Climate Action. ▪ Avoid impacts on Hooded Plover by engaging a suitably trained ecologist to check the beach for signs of nesting habitat for Hooded Plover and, if nests are found, designating no go areas and installing signage (OFF-M05). ▪ Conduct pre-clearing survey at all sites where vegetation or aquatic habitat is being removed to assess presence of fauna. While this is particularly relevant for the removal of hollow-bearing trees due to potential occupancy of hollows, it is also relevant for	

Measure ID	Mitigation measure	Phase
	shrubs and ground layer habitat as this provides nesting and refuge opportunities for non-hollow dependent fauna. Engage a suitably qualified wildlife handler ('wildlife spotter'), holding a relevant and current authorisation under the <i>Wildlife Act 1975</i>, to salvage any wildlife encountered during site clearance works.	
FFM-M007	Control spread and/or introduction of weeds, pathogens and/or pest animals Prepare and implement a Biosecurity Management Plan (BMP) to define measures to manage and control impacts on indigenous fauna and flora values from biosecurity threats (weeds, pathogens, and pest animals) and set performance targets and contingency measures. The BMP will be developed in consultation with the Department of Energy, Environment and Climate Action and Wellington Shire Council and define measures to prevent the introduction and spread of weeds and pathogens including: - Use of fill that is preferably sourced locally to be compatible with the surrounding area or, if from offsite, needs to be determined as weed-free by a suitable service provider as per the Australian Pipelines and Gas Association <i>Code of Environmental Practice: Onshore Pipelines</i> (AGPA 2022). - Inspection and certification of machinery and materials upon arrival at site in accordance with <i>A Guide for Machinery Hygiene for Civil Construction</i> (CCF 2011). - Biosecurity hygiene protocols to mitigate the spread of weeds, Cinnamon Fungus and Chytrid Fungus. - Pre-construction weed mapping to determine locations of <i>Catchment and Land Protection Act 1994</i> listed weeds where weed treatment is required within the project land. - Monitoring during construction to identify any new outbreaks of weeds. - Management of any outbreak weeds within construction areas that occurs due to construction activity in accordance with the <i>Catchment and Land Protection Act 1994</i>. - Measures to minimise the risk of spread of weeds into adjacent land. - Measures to ensure pest animals are not encouraged in the area through the provision of food (e.g. garbage on-site), harbour or new burrowing opportunities (e.g. for rabbits, foxes).	Prior to construction (prepare) Construction Operation Decommissioning

Measure ID	Mitigation measure	Phase
	Measures to minimise the risk of spreading weeds and/or pathogens elsewhere in the region from machinery and vehicles leaving the project area.	
FFM-M008	Reduce erosion, sedimentation and contamination risk to retained vegetation and habitat (including waterways) Prepare and implement procedures to manage soil, erosion and sediment under the Construction Environmental Management Plan (CEMP) (FFM-M003) that define measures to manage erosion and sedimentation to minimise impacts on retained vegetation and habitat and aquatic environments. Erosion and sediment will be managed in accordance with current best practice environmental management and the Australian Pipelines and Gas Association <i>Code of Environmental Practice: Onshore Pipelines</i> (AGPA, 2022) to prevent sediment-laden water from entering retained vegetation and habitat, drainage systems and waterways (see also, SOL-M010). Prepare and implement measures and procedures to manage air quality such as management of stockpiles and materials which may become windborne (i.e. covering, spraying) in areas adjacent to retained vegetation and waterways (see also, AQM-M001). Prepare and implement measures and procedures to manage hazardous substances under the CEMP which define measures for storage and handling of hazardous substances in areas adjacent to retained vegetation and waterways (see also, SUM-M003).	Prior to construction (prepare) During construction (implement)
FFM-M009	Protect values within conservation reserves Prepare and implement a protocol for works within Conservation Reserves in consultation with Parks Victoria and the Department of Energy, Environment and Climate Action. Measures contained within the protocol will be based on those defined in the Flora and Fauna Management Plan (FFM-M005) and Biosecurity Management Plan (FFM-M007) components of the Construction and Operational Environmental management Plans but with site-specific requirements, where required.	Prior to construction (prepare) During construction (implement)
FFM-M010	Manage impacts on waterways Prepare and implement a Designated Waterway Crossing Management Plan (DWCMP) in consultation with the Department of Energy, Environment and Climate Action and the West Gippsland Catchment Management Management Authority to describe how the project will manage and control	Prior to construction (prepare) During construction (implement)

Measure ID	Mitigation measure	Phase
	impacts on designated waterways during construction. The DWCMP will define the construction method, timing and duration for construction works, and outline mitigations appropriate to the waterways such as diversion drains to maintain environmental water flows during construction. Designated Waterway Crossing Plan to be developed in alignment with the surface water elements of the project wide Construction Environmental Management Plan (FFM-M003) and measures to control the introduction and/or spread of weeds and/or pathogens (FFM-M007).	
FFM-M011	Prepare and implement an Operation Environmental Management Plan (OEMP) Prepare and implement an Operation Environmental Management Plan (OEMP) in consultation with the Department of Energy, Environment and Climate Action to define controls around the protection of retained biodiversity values including: ▪ An Environmental Line List (ELL) which identifies ecological values that occur within the project area and prescribed management requirements associated within each identified value. The ELL will be reviewed on a regular basis. ▪ Permitted maintenance activities (extent and type of activity) based on the ELL and defined based on the occurrence of native vegetation, threatened ecological communities and threatened species habitat. ▪ Accurate maps identifying 'No Go Zones' and/or maintenance zones based on restrictions associated with ecological values. ▪ Weed and pathogen control, in accordance with the same post-completion prevention and control procedures and methods outlined for the construction phase of the project. ▪ Dust control using the same methods used during the construction phase for routine vehicle movements (cf. large construction machinery movements) ▪ Waterway and wetland protection, including the use of stabilised waterway crossing points during dry conditions only, or the use of designated existing bridges to obtain access to the easement during wet conditions. ▪ An audit framework will be included in the plan. ▪ Corrective actions to be implemented if the outcomes of the OEMP are not achieved. The OEMP will be reviewed by the project annually and adaptive measures implemented (where required).	Prior to operation (prepare) During operation (implement)

Measure ID	Mitigation measure	Phase
FFM-M012	Prepare and implement a Decommissioning Environmental Management Plan (DEMP). Prepare and implement a Decommissioning Environmental Management Plan (DEMP). The DEMP will be developed following an updated survey of biodiversity values present immediately prior to the decommissioning phase. An audit framework will be included in the plan. The DEMP will be developed in consultation with the Department of Energy, Environment and Climate Action and reviewed by the project annually.	Prior to decommissioning (prepare) During decommissioning (implement)
FFM-M013	Site reinstatement and rehabilitation Prepare and implement a Rehabilitation and Reinstatement Plan (RRP) to guide the approach to rehabilitation following the completion of construction in patches of native vegetation and threatened species habitat in conservation reserves, on private land and roadsides. The RRP will be developed in consultation with the Department of Energy, Environment and Climate Action, relevant landowners, and with reference to the <i>Australian Pipelines and Gas Association Code of Environmental Practice: Onshore Pipelines</i> (APGA, 2017), and include measures such as: ▪ Details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas (noting the operational maintenance requirements). ▪ Topsoil removal and storage to protect the seed bank resource. ▪ Retention of proportion of trees felled in situ to provide additional habitat resources. Emphasis should be placed on retaining trees that contain hollows. ▪ Returning habitat features removed during construction such as large hollow logs and rocks if consistent with rehabilitation objectives at particular locations. ▪ Identification of flora species and plant and/or seed stock sources that may include salvage and replanting of plants where appropriate and reasonably practicable. ▪ Procedures, timeframes, measurable performance objectives, and responsibilities for monitoring the success of rehabilitation and/or reinstatement/stabilisation areas. Corrective actions to be implemented if the outcomes of rehabilitation and/or reinstatement/stabilisation do not achieve the objectives adopted.	Prior to construction (prepare) Post construction (implement)
FFM-M014	Prepare and implement a Dewatering Plan	Prior to construction (prepare)

Measure ID	Mitigation measure	Phase
	Following detailed design and prior to construction, prepare a Dewatering Plan as a sub-plan to the Construction Environmental Management Plan (CEMP) to outline whether potential Groundwater Dependent Ecosystems (GDEs) may be affected and measures to monitor and manage impacts of dewatering associated with transition joint bays at shore crossing and joint bays and cable trench(es) along the onshore transmission line will be managed as follows: - Confirm potentially affected GDEs – confirm presence of existing native vegetation and waterways within the area that may be influenced by groundwater drawdown. - Drawdown assessment (terrestrial GDEs) – assess potential for adverse dewatering impacts on the native vegetation in that area based on potential for water table to be intersected and likely reliance on groundwater of the vegetation community. - Drawdown assessment (aquatic GDEs) in shore crossing area – assess potential impact to the unnamed waterway from transition bay dewatering, including undertaking additional groundwater and surface water level and water quality monitoring. - Drawdown assessment (aquatic GDEs) near joint bays – site-specific impact assessment in the event that a joint bay is located within 60 m of Morris Creek, Warrigal Creek, Hoddinott Creek, or Sunville Creek. - Manage construction – time dewatering to avoid driest periods - Make good arrangements – irrigation of GDEs where excavation intersects groundwater and dewatering if regular monitoring around those potential GDEs identifies this is required.	Construction (implement)
FFM-M015	Targeted survey for protected flora on public land Undertake targeted surveys for threatened and protected flora on public land to inform application for <i>Flora and Fauna Guarantee</i> Act permit to take.	Prior to construction

14.3. Monitoring and contingency measures

Monitoring requirements and contingency measures will be defined by the project in the relevant plans to be prepared in consultation with DEECA.

Weed monitoring will be undertaken to identify high threat weeds prior to and during construction to inform weed control works. Other specific monitoring actions will depend on the alignment option selected and whether additional avoidance can be achieved during the detailed design stage (Section 14.1.3). Monitoring requirements will also depend on the actions defined in the management plans outlined in FFM-M003, FFM-M006, FFM-M007, FFM-M013, and FFM-M014 (which would be developed in consultation with DEECA as appropriate). As such, until final design is known and the management plans are prepared, details of specific monitoring (and contingency measures) are not able to be identified.

Regular review of mitigation measures will be conducted by the project to ensure continuing compliance with its environmental objectives and approval conditions and to ensure that the measures remain fit-for-purpose. If adverse residual effects on flora, fauna, ecological communities and other habitat values arise (outside of those being managed by the current suite of management and mitigation measures), or any new effects on fauna, flora or ecological communities are identified, they will be assessed on a case-by-case basis to determine an appropriate course of action to address the specific issue in consultation with DEECA where necessary.

15. Legislative implications

This study has assessed the impacts and risks of construction, operation and decommissioning of the project on onshore ecology assets and values to be protected.

The significance of the residual impacts and risks has been assessed in accordance with the evaluation framework, based on applicable legislation, policy and standards and the evaluation objectives and environmental significance guidelines arising from the government terms of reference established to guide the assessments. The following sections summarise these identified residual impacts and risks and the implications under relevant Commonwealth and Victorian legislation.

15.1. Commonwealth legislation

MNES relevant to the project and a summary of the potential for the project to have a significant residual impact on those MNES is assessed in Section 10.

Table 15-1 identifies the implications of residual impacts of the project under applicable Commonwealth legislation.

No significant residual impacts on MNES are identified for the onshore ecology component of the project.

Table 15-1 Legislative implications of residual impacts - Commonwealth legislation

Legislation	Requirement	Residual impact of project	Implication
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Any significant impacts on MNES protected under the EPBC Act require the approval of the Australian Minister for the Environment. Offsets are required under the EPBC Act Environmental Offset Policy for any significant residual impacts on MNES.	No significant residual impacts to threatened flora or fauna species or ecological communities.	No offsets required.

15.2. Victorian legislation

Table 15-2 identifies the implications of residual impacts of the project under applicable legislation and planning provisions.

Table 15-2 Legislative implication of residual impacts to state significant values – Victorian legislation

Legislation	Requirement	Residual impact of project	Implication
Victoria Government			
<i>Planning and Environment Act 1987</i>	Approval required to remove, destroy or lop native vegetation. Offsets required for in accordance with the Native Vegetation Removal Regulations and the <i>Guidelines for the removal, destruction or lopping of native vegetation</i> (DEECA 2025a) for any native vegetation removal.	Native vegetation protected under Clause 52.17 of the P&E Act will be impacted by the project (refer to Section 10.2.1).	Offsets required in accordance with Native Vegetation Removal Regulations. Offset obligations are outlined in Section 16 and Native Vegetation Removal Report is provided in Appendix 7. A Planning Scheme Amendment is proposed for the onshore transmission assets that will include a condition that a permit to remove any native vegetation is required. Native vegetation removal will be undertaken in accordance with the Guidelines (DEECA, 2025) as a condition of the Incorporated Document from the Planning Scheme Amendment .
<i>Flora and Fauna Guarantee Act 1988</i>	Protected flora permit required for public land A permit from DEECA is required to 'take' protected flora from public land. A permit is not required under the FFG Act for private land, unless listed species are present and the land is declared 'critical habitat' for the	Protected flora to be removed on public land include listed flora and generally protected flora.	Permit required for impacts on public land. Species and abundance (number of individuals) will be determined prior to application for permit to take under the FFG Act.

Legislation	Requirement	Residual impact of project	Implication
	species. No critical habitat has been identified in Victoria to date. A permit under the FFG Act is also required for activities relating to threatened fish.		
<i>Wildlife Act 1975 and Wildlife Regulations 2024</i>	Under the Wildlife Act, it is an offence to wilfully damage, disturb or destroy wildlife habitat, disturb protected wildlife or take or destroy take or destroy threatened or protected wildlife (including listed fish) without authorisation. Under the Wildlife Regulations 2024, a person does not commit an offence if they are authorised to damage, disturb or destroy wildlife habitat under any Act. This includes a permit to remove, destroy or lop native vegetation under the <i>Planning and Environment Act 1987</i>.	Fauna species protected under the Wildlife Act occur in the proposed works area and will be impacted by the project. This includes non-threatened and threatened wildlife.	No permit required to remove habitat provided approval for habitat loss granted under another Act. If salvage of wildlife is required, a suitability qualified fauna handler holding the appropriate permit must be engaged to conduct fauna salvage and relocation work and general wildlife handling.
<i>Catchment and Land Protection Act 1994</i>	Under the CaLP Act, landowners have a responsibility to avoid causing or contributing to land degradation. This includes taking all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and, where possible, eradicate established pest animals as declared under the CaLP Act.	No residual impact associated with the introduction or spread of weeds. Project will implement weed control measures.	The project has a responsibility to manage weeds in accordance with the enforceable management requirements for the weed category.

Legislation	Requirement	Residual impact of project	Implication
<i>Water Act 1989</i>	A Works on Waterways permit is required for any works on or within 30 metres of a designated waterway.	Project crosses several designated waterways (named and unnamed). Project will implement a Designated Waterway Crossing Management Plan.	A Works of Waterways Permit will be required.
Local Government - Wellington Shire Council			
Clause 52-17 – Native vegetation	In Victoria, a municipal planning permit is required for the removal of native vegetation. The Guidelines for the removal, destruction or lopping of native vegetation (The Guidelines) are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria under Clause 52.17.	Native vegetation protected under Clause 52.17 of the P&E Act will be impacted by the project (refer to Section 10.2.1).	Offsets required. A Planning Scheme Amendment is being prepared to address loss of native vegetation that would require a permit and offsets under Cl. 52.17 of the planning schemes and to address effects within the area of ESO1 that would require a permit.
Clause 42.01 - Environmental Significance Overlay	A permit is required to: - Construct a building or construct or carry out works. This does not apply if a schedule to this overlay specifically states that a permit is not required. - Remove, destroy or lop any vegetation, including dead vegetation. This does not apply: - If a schedule to this overlay specifically states that a permit is not required.	Area of ESO is mostly cleared of native vegetation. An area of Estuarine Wetland occurs along unnamed waterway (UFI 42824679) but is avoided by the project. The project protects the sensitive foreshore vegetation by drilling underneath.	Permit will be required to carry out works within the area of ESO1. The works avoid native vegetation therefore the permit relates to the works themselves. Decision guidelines suggest that consideration will be given to works avoiding construction in fragile or unstable areas, retains vegetation and fauna habitat and use indigenous species in revegetation programs.

Legislation	Requirement	Residual impact of project	Implication
	▪ If the table to Clause 42.01-3 specifically states that a permit is not required. Schedule 1 to Clause 42.01 Environmental Significance Overlay (ESO) for Coastal and Gippsland Lakes Environs states a permit is not required for any building with a height of less than 4.5 m in association with a minor utility installation, agricultural activities, river or lake shore management, works necessary to control flooding.		

16. Offsets

The project will result in unavoidable losses of native vegetation which in turn will affect threatened species habitat. These are considered as the 'residual impacts' as they are impacts that remain after the avoidance and mitigation measures are applied. Offsets to compensate for the loss of native vegetation area therefore required.

Removal of native vegetation will be offset in accordance with the Victorian Native Vegetation Removal Regulations and *Guidelines for the removal, destruction or lopping of native vegetation* (DEECA 2025a) which is an Incorporated Document within the Victoria Planning Provisions under Clause 52.17 (Native Vegetation). Under the Guidelines, state offsets are a requirement of the removal of native vegetation.

16.1. Offset requirements

Offset requirements have been determined for the current project design using the Native Vegetation Regulation Map (NVR Map) produced by DEECA. Residual impacts on native vegetation patches and trees were input following the specific requirements of the tool and a Native Vegetation Removal Report (NVR) generated for the project.

Offset requirements to compensate for this loss, as determined by the Native Vegetation Removal Report dated 01/07/2025 are outlined in Table 16-1 as well as in the NVR in Appendix 7. General offsets are required to compensate for the loss of native vegetation for the project. General offsets are required when the removal of native vegetation is not modelled to have a significant impact on a rare or threatened species. These offsets are expressed as General Habitat Units (GHU) when calculating offset obligations.

Table 16-1 Native vegetation offset requirements for the project

Option	Offset unit type	Number of units	Minimum SBV	Large trees (LT)	Credit location
Option AB	GHU	7.9300	0.3787	82	West Gippsland CMA or Wellington Shire LGA
Option C	GHU	8.1970	0.3943	119	West Gippsland CMA or Wellington Shire LGA
Option D	GHU	7.8990	0.3938	107	West Gippsland CMA or Wellington Shire LGA

16.2. Offset security and management

Offsets can be achieved as either first- or third-party offsets and must be protected in perpetuity (forever) with an on-title security agreement. First party offsets are on land owned by the party removing the native vegetation. Third party offset sites are on land owned by another party for which native vegetation credits can be bought to meet offset requirements (DELWP 2019).

The biodiversity offset for the Project will be achieved via a third party offset on land owned by another party (a native vegetation credit owner). Third party offset sites are established by the landowner via a security agreement registered on the land title that runs in perpetuity. Security agreements can be via a section 69 agreement under the *Conservation, Forests and Lands Acts 1987* with the Secretary to DEECA

or an offset covenant agreement under the Victorian *Conservation Trust Act 1972* with Trust for Nature (DELWP 2019).

Native vegetation credit owners are responsible for complying with their obligations under the security agreement, actively managing the site to generate gains, and reporting progress of this management to the relevant statutory body (DEECA or Trust for Nature) (DEECA 2024b).

16.3. Offset availability

Secured offset sites are registered on the DEECA Native Vegetation Credit Register (NVCR). The NVCR lists the available offsets along with relevant contact/s to discuss the third party offset arrangements.

A search of the NVCR demonstrates that sites that meet the entire offset obligation are currently available in West Gippsland Catchment Management Authority (CMA) or Wellington Shire local government area (LGA). The NVCR report is provided in Appendix 8.

Star of the South Wind Farm intends to satisfy the offset obligation by purchasing the necessary offset credits directly via the NVCR and an Accredited Offset Broker. Priority will be given to offsets located closest to the project area.

A summary of current offset credit availability in West Gippsland CMA and Wellington Shire LGA is provided in Table 16-2, based on a NVCR on-line search dated 1 July 2025 (Appendix 8). The sites available currently on the credit register can individually fulfil the entire offset obligation of the project.

Table 16-2 Summary of Offset Availability

Credit site ID	GHU	LT	CMA	LGA
Option C				
BBA-0138	12.119	419	West Gippsland	Wellington Shire
BBA-0759	18.868	659	West Gippsland	Wellington Shire
BBA-2875	32.869	1037	West Gippsland	Wellington Shire
Option AB and Option D				
BBA-0138	12.119	419	West Gippsland	Wellington Shire
BBA-0759	18.868	659	West Gippsland	Wellington Shire
BBA-2875	32.869	1037	West Gippsland	Wellington Shire
VC_CFL_3797_01	7.997	941	West Gippsland	Wellington Shire

The NVCR will be consulted again, and quotes requested from relevant broker/s, once the project has reached the stage of needing to secure the offsets. The Project should request offset broker/s prioritise offset site/s available on the market that are closest to project area.

17. Conclusion

This report has been prepared to assess the potential onshore ecology impacts and risks associated with the Star of the South Wind Farm to inform the preparation of the EIS/EES required for the project.

Existing environment

The project area encompasses two distinct landforms, coastal and near-coastal zones and lowland plains, which support a mix of land uses including agriculture, commercial forestry (plantations), and biodiversity conservation reserves. The landscape has been historically cleared with remaining habitats predominantly comprised of grazing paddocks and plantations. Patches of forest and woodlands occur along roadsides, in conservation reserves and on private land. Numerous ephemeral waterways occur along the alignment including Morris Creek and Warragul Creek.

Native vegetation and habitat

Native vegetation is primarily restricted to roadsides and conservation reserves with scattered trees and smaller patches occurring in the agricultural areas. Native vegetation is represented by 10 Ecological Vegetation Classes, but the most dominant vegetation type is Plains Grassy Forest which is vulnerable in the Gippsland Plain Bioregion.

Trees within the forest and woodland areas provide habitat for wildlife by providing food, shelter and breeding sites. The larger trees provide more resources for wildlife in terms of food (leaves, blossoms and nectar), shelter (hollows, bark, perches, cover) and breeding sites (hollows).

Aquatic habitat along the waterways is mostly represented by terrestrial grasses and vegetation that become periodically inundated. Riparian vegetation is absent for most waterways with the exception of a patch of Estuarine Wetland on unnamed waterway 42824679 and area of Swamp Scrub on unnamed waterway UFI 42806331.

Threatened species

Three FFG Act listed flora species were recorded within the project area during surveys: Pale Swamp Everlasting (critically endangered), Coast Grey-box (endangered), and Dune Wood-sorrel (endangered). Four other threatened flora species were identified with potential to occur based on habitats present and previous records.

Four threatened fauna species were recorded during surveys: Gang-gang Cockatoo (endangered under FFG Act), Swift Parrot (critically endangered under EPBC Act and FFG Act), Glossy Grass Skink (endangered under FFG Act) and Lace Monitor (endangered under FFG Act). Several other species were identified with potential to occur and therefore considered in the impact assessment.

Avoidance and minimisation

Avoidance and minimisation of social and environmental impacts is central to the projects' decision making. Examples of avoidance and minimisation during the design development process include the decisions to design the shore crossing to not directly impact coastal areas by drilling under and the use of existing roads for construction site access wherever possible, along with selection of a route for the onshore transmission infrastructure that avoids large tracts of remnant vegetation.

Underground installation of the onshore transmission lines was adopted to be less intrusive and have less impacts on native vegetation due to a narrower cable easement requirement, despite being more expensive to install and maintain than overhead transmission lines. This decision also means that the risk of wildlife collision or electrocution is avoided.

Other avoidances achieved by the project through refinement of the project area to reduce widths where the project crosses patches of native vegetation on private land, between the two areas that comprise Woodside H28 Bushland Reserve and roadsides. These refinements reduce the extent of impacts to native vegetation patches and the number of trees (including FFG Act listed Coast Grey-box) to be removed.

The foregoing and potential additional impact avoidance and minimisation measures will be developed with the construction contractor during the construction planning phase. These will prioritise high quality native vegetation areas and habitats confirmed to support threatened ecological communities and species.

Mitigation and management

Implementation of No Go Zones on the project area boundary and around scattered trees where Notional Root Zones could be affected has reduced the extent of native vegetation impacted by the project.

Environmental management plans with subplans and protocols will be prepared and implemented to protect retained native vegetation and habitat and wildlife during construction, operation and maintenance. Plans related specifically to protection of ecological values (Flora and Fauna Management Plan, Biosecurity Management Plan, protocol for works in conservation reserves and protocol for wildlife encounters) will be prepared in consultation with DEECA.

Regular review of mitigation measures will be conducted by the project to ensure continuing compliance with its environmental objectives and approval conditions and to ensure that the measures remain fit-for-purpose. If adverse residual effects on flora, fauna, ecological communities and other habitat values arise (outside of those being managed by the current suite of management and mitigation measures), or any new effects on fauna, flora or ecological communities are identified, they will be assessed on a case-by-case basis to determine an appropriate course of action to address the specific issue in consultation with DEECA where necessary.

Residual impacts

Residual impacts are those that remain following avoidance and mitigation and therefore represent the impacts or risks that are unavoidable.

Removal of native vegetation is unavoidable but has been minimised as much as possible by the project. The project is considering three options (AB, C, and D) for the proposed route to the VicGrid connection and the worst case would result in the total quantum of loss (up to approximately 16 ha, 50 large scattered trees and 30 small scattered trees). This loss is substantial; however, the removal is not of one contiguous patch of vegetation and rather is represented by localised removals of numerous patches at discrete locations in the landscape along the approximate 30 km alignment. The extent of loss in the context of percent of native vegetation that is modelled by DEECA as remaining in Gippsland Plain Bioregion and in Victoria following the reduction in extent that occurred because of the 2019/2020 bushfires is unlikely to be significant (<0.001%).

The context of the landscape has also been considered with the removals occurring in an already substantially cleared landscape that is already highly fragmented. The project avoids most patches of native vegetation but intersects several roadside corridors. At those locations, the project area has been reduced to 40 m to minimise the gap needed for the cable easement. Disruption to movement of fauna is unlikely to be significant because most species are mobile and able to persist in fragmented landscapes. Removal of habitat is unlikely to represent a significant impact for EPBC Act listed threatened species. Threatened plants with potential to occur were not recorded during targeted surveys and there is a low likelihood an important population of those vulnerable species is present in the project area. In the case of fauna, potential habitat affected represents a small proportion of the habitat available in the region, with much of it protected in larger conservation reserves, and is not considered to be habitat critical to the species' survival.

Removal of habitat is unlikely to represent a significant impact for FFG Act listed threatened species. Impact on potential habitat or known occurrences of threatened flora would be localised. Removal of habitat for threatened fauna would also be localised with most species able to readily move or adapt to reduction in extent of habitat at the discrete locations along the alignment. More sedentary, territorial species (small birds, reptiles, frogs hollow-dwelling species) are more at risk of being impacted during habitat removal but mitigations to be implemented such as timing of construction work and salvage reduce this risk. Loss of individuals is unlikely to significantly affect the species' persistence.

Residual risks associated with inadvertent impacts on retained native vegetation, introduction and spread of weeds and disturbance, injury or death of wildlife are low with mitigation. Residual impacts on waterways are anticipated to be minor.

The Project will continue to look for opportunities to reduce the quantity of native vegetation and habitat (patches and trees) during the detailed design process.

Offsets

The project will offset the removal of native vegetation and habitat in accordance with the Victorian Native Vegetation Removal Regulations, specifically the Guidelines for the removal, destruction or lopping of native vegetation which is an Incorporated Document within the Victoria Planning Provisions under Clause 52.17 (Native Vegetation).

Third-party offset sites are currently available that meet the project's offset obligations within Wellington Shire and West Gippsland CMA areas.

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