Regional Rail Revival Gippsland

PREPARED FOR RAIL PROJECTS VICTORIA

GLU-AJM-PWD-PWD-MPL-XLP-NAP-0000905 PAKENHAM TO LONGWARRY EAST (EPBC 2019/8563) SOUTHERN BROWN BANDICOOT OFFSET MANAGEMENT PLAN

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AJM Joint Venture

Aurecon, Jacobs, Mott MacDonald

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222 Exhibition Street
Melbourne VIC 3000

PO Box 23061 Docklands VIC 8012 Australia

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Name	[redacted]	**Name**	[redacted]

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1 Executive Summary

Aurecon Jacobs Mott MacDonald Joint Venture (AJM JV) on behalf of Rail Projects Victoria (RPV) has prepared Preliminary Documentation for the proposed Gippsland Line Upgrade – Pakenham to Longwarry East, Victoria (EPBC Ref: 2019/8563). On 9 September 2020, the Commonwealth Department of Agriculture, Water and the Environment (DoAWE) ('the Department') deemed that the project works require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) ('the Act') through the assessment of Preliminary Documentation. The proposed works have been assessed to be a controlled action by the Department under the EPBC Act, as it is likely to have significant impact on listed threatened species and communities (section 18 and 18A of the Act).

Only one threatened species, the Southern Brown Bandicoot *(Isoodon obesulus obesulus),* is proposed to have potential to be significantly impacted by the proposed action. This species is listed as Endangered under the EPBC Act. The project results in a residual impact of 0.901 ha of habitat to be removed that has been identified as core habitat for the Southern Brown Bandicoot. This document forms the Offset Management Plan component of the Preliminary Documentation and demonstrates how the environmental offsets will compensate for the loss of Southern Brown Bandicoot habitat.

An offset has been proposed to account for the removal of this habitat. The offset site is located at Loch Sport approximately 150km to the east of the proposed impact site. A 5 ha portion of a larger offset site located at Loch Sport will be allocated to the Gippsland Line Upgrade project. The Southern Brown Bandicoot has been confirmed in the broader offset property as well as specifically within the 5 ha portion that will be allocated to the Gippsland Line Upgrade Project. Two separate records of the species were taken from infrared cameras within the EPBC Offset site (from 23rd July and 18th August 2020) with two additional records recently being provided within the broader offset property (near to the EPBC offset site) from the 16th and 22nd December 2020. Southern Brown Bandicoot presence is further supported by a historical record in the VBA on the property from 1993.

The Environmental Outcome to be achieved by the offset site is no net loss in habitat for the Southern Brown Bandicoot within Victoria as a result of the Gippsland Line Upgrade – Pakenham to Longwarry East project. This Offset Management Plan describes how the offset site will be secured, managed and monitored to meet the Environmental Outcome. The offset site will be secured through a Trust for Nature Covenant. Management actions to be completed at the offset site include reducing the presence and extent of pest plants and animals and prohibiting pedestrians from entering the site. Based on the EPBC Act offset calculator the retention and management of 5 ha of confirmed Southern Brown Bandicoot habitat within the proposed offset site achieves a direct offset of 137.44% of the impact.

2 Introduction

2.1 Context

This EPBC Act Offset Management Plan (OMP) for Loch Sport has been prepared to offset residual impacts of the Gippsland Line Upgrade – Pakenham to Longwarry East, Victoria (the Project) to Southern Brown Bandicoot (*Isoodon obesulus obesulus).*

Southern Brown Bandicoot impacts constitute an impact on a listed Matter of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Referral number EPBC 2019/8563).

The Project Works span approximately 24 kilometers from Pakenham to Longwarry. The Project area is inclusive of the Cardinia and Baw Baw Local Government Areas (LGAs).

Further information on the impact of the Project on MNES, proposed avoidance and mitigation measures, and the overarching approach to offsets is provided in the Preliminary Documentation (GLU-AJM-PWD-PWD-REP-XLP-NAP-0000817, (AJMJV, 2020a)).

In line with the request for additional information from the Department of Agriculture, Water and Environment (DAWE), a separate Offset Strategy and Offset Management Plan have been prepared for the Gippsland Line Upgrade – Pakenham to Longwarry.

The Offset Strategy (GLU-AJM-AJM-PWD-PWD-REP-XLP-NAP-000906, (AJMJV, 2020b)) details the following:

- A description of the Offset Site including the location, size, condition and environmental values
- Details of surveys undertaken to confirm the presence of the Southern Brown Bandicoot at the Offset Site in accordance with the survey guidelines for the species
- Details of the quality of the offset site and habitat characteristics for the Southern Brown Bandicoot
- Ongoing threats to the Southern Brown Bandicoot at the Offset Site
- Comparison of the environmental values at the Offset Site to the Impact Site
- Justifies how the Offset meets the EPBC Act Environmental Offsets policy.

2.2 Purpose

The purpose of the Southern Brown Bandicoot Offset Management Plan is to:

- Identify the specific environmental outcomes to be achieved at the offset site
- Detail how the offset will be secured, managed and monitored to meet these environmental outcomes, including:
  - » Management actions, performance targets, monitoring methodology and review criteria.

» Responsibility and timing for implementation of the actions.

2.3 Matters of National Environmental Significance

Only one threatened species, the Southern Brown Bandicoot *(Isoodon obesulus obesulus),* is proposed to have potential to be significantly impacted by the proposed action. This species is listed as Endangered under the EPBC Act. The project results in a residual impact of 0.901 ha of habitat to be removed that has been identified as core habitat for the Southern Brown Bandicoot.

2.4 Environmental Outcome to be achieved

The Environmental Outcome to be achieved for the Southern Brown Bandicoot through the security, protection and enhancement of the identified offset site, is no net loss in habitat for the Southern Brown Bandicoot within Victoria as a result of the Gippsland Line Upgrade – Pakenham to Longwarry East project.

This Environmental Outcome is to be achieved by securing an area of freehold land at Loch Sport that is known to support habitat for the Southern Brown Bandicoot. Loch Sport is a coastal holiday destination and securing the property for conservation will prohibit any future clearing of known Southern Brown Bandicoot habitat at the site to allow for development. Habitat for the Southern Brown Bandicoot at the offset site will also be improved though completing the following management actions:

- Preventing illegal pedestrian access to the site (including 4WD and motorbike users)
- Controlling weeds including woody weeds, particularly targeting Ragwort and Spear Thistle
- Controlling pest animals that predate on or degrade habitat values for the Southern Brown Bandicoot, including foxes, cats and deer.

Based on the EPBC Act offset calculator the security, protection and enhancement of the identified offset site of 5 ha of confirmed Southern Brown Bandicoot habitat within the proposed offset site at Loch Sport, achieves a direct offset of 137.44% of the impact.

3 Loch Sport Offset Site

3.1 Offset Site Details

Table 3-1 below summarises the location, planning restrictions, and proposed security and management arrangement for the Loch Sport Offset site.

TABLE 3-1 OFFSET SITE SECURITY AND MANAGEMENT

ITEM	DETAILS
Landholder	Bush Blocks Pty Ltd
Address/ Lot details	Beach Road, Ocean Grange 3880 (Lot 9 LP217552)
Parcel identifier (SPI)	EPBC Offset Site: 9\LP217552 Property also includes: 8\LP217552, 7\LP217552 & 6\LP217552
Local Government Area	Wellington Shire
Catchment Management Authority	West Gippsland
Bioregion	Gippsland Plain
Total Offset Area	386 hectares
EPBC Offset Area required	5 hectares
Planning Zones and Overlays	Rural Conservation Zone (RCZ1) Environmental Significance Overlay (ESO1 and ESO2) Bushfire Management Overlay (BMO) Floodway Overlay (FO) Land Subject to Inundation Overlay (LSIO)

3.2 Offset Site Location

The Loch Sport estate is located south-east of the Loch Sport township and comprises over 386 hectares of remnant coast woodland and saltmarshes on two Titles (comprising four allotments). The EPBC Offset Site includes 5 hectares out of a total 39.7 hectare area of Coast Banksia Woodland present within the Loch Sport estate on the north side of Beach Road, Ocean Grange, 3880. An on title covenant will be placed on the entire property making credits available for both Federal and State Offset schemes.

The land is largely undisturbed and situated within Ocean Grange, which is a strip of land that separates Bass Strait to the south-east from Lake Reeve to the north-west. The land is accessible via Beach Road that connects to the township of Loch Sport, located on the north-western edge of Lake Reeve.

The property is located within the Wellington Shire Council, within Victoria's broader Gippsland Plain bioregion, and entirely within a Rural Conservation Zone (RCZ1). Several overlays also apply including an Environmental Significance Overlay (Schedule 1) (ESO1), Environmental Significance Overlay (Schedule 2) (ESO2), Bushfire Management Overlay (BMO), Floodway Overlay (FO) and Land Subject to Inundation Overlay (LSIO) (DELWP, 2020b). The land is located within an area of Aboriginal cultural heritage sensitivity.

The property is currently un-encumbered and there are no conservation covenants on the property. The landowner is committed to providing offsets and is prepared to enter into an agreement secured under a Trust for Nature offset covenant.

3.3 Site Context

The proposed offset site is located in an area of contiguous native vegetation, much of which forms known or potential habitat for Southern Brown Bandicoot. The offset property, which is currently privately held land, is located between the beach and Lake Reeve, 1.5 km from the town of Loch Sport. Lake Reeve, a tidal lake forming part of the Gippsland Lakes complex, separates the site from Loch Sport. The property of which the offset is part is contiguous with the Gippsland Lakes Ramsar site and the Gippsland Lakes Coastal Park.

A local dirt road (Beach Road) and an easement for gas pipelines (connecting offshore platforms to the Longford Gas Plant) bisect the property but are not included within the EPBC Offset Site.

The Strategic Biodiversity Value (SBV) of the proposed offset site ranges from 86 to 99 (out of 100), as modelled by the Victorian Department of Environment, Land, Water and Planning (DELWP). A high SBV is indicative of high biodiversity value, with the high scores for the proposed offset site rating the area very highly for general biodiversity, and also specifically for the Southern Brown Bandicoot (DELWP, 2020a).

3.4 Historic Land Use and Disturbance

The offset site is characterised by dense vegetation with little evidence of historic land use. Beach Road runs to the south of the offset site. A cleared easement is also present to the south of the offset site.

3.5 Vegetation present

Vegetation within the EPBC Offset Area is characterised as Coast Banksia (*Banksia integrifolia*) woodland with a dense, structurally complex understorey suitable for Southern Brown Bandicoot habitation. Much of the understorey retains a vegetation structure with 50-80% average foliage density in the 0.2-1 m height range – considered to be the optimal range for supporting Southern Brown Bandicoot (DSEWPC 2011; Claridge & Barry 2000) – interspersed with more open areas dominated by graminoids, offering foraging opportunities within close proximity to cover.

Canopy cover within the Offset Area is relatively uniform, with an open canopy of Coast Banksia (*Banksia integrifolia*) (10% cover, 10m tall). Gippsland Red-gum (*Eucalyptus tereticornis* subsp. *mediana*) and Rough-barked Manna Gum (*Eucalyptus viminalis* ssp. *pryoriana*) (<1% cover, 15m tall) are also present as a secondary canopy species, however eucalyptus cover is restricted to one small area within the EPBC Offset Site. The canopy species mix within the EPBC Offset Site and across the wider property varies in response to sandy soils and (likely) historical fire regimes.

Mid-storey vegetation within the EPBC Offset Area is variable and includes open areas where the mid-storey is sparse to absent, and higher density areas where shrub species form loose thickets (25% cover, 2m tall). This layer is dominated by Coastal Tea Tree (*Leptospermum laevigatum*) and Heath Tea Tree (*L. myrsinoides*), but includes a number of other shrubs including Common Boobialla (*Myoporum insulare*), juvenile Coast Banksia (*Banksia integrifolia*), as well as a number of herbaceous climbers including Angled Lobelia (*Lobelia anceps*) and Love-creeper (*Comesperma volubile*).

Understorey vegetation comprises a species-rich, structurally complex assemblage of graminoids, herbs and shrubs. This layer is primarily characterised by a dense cover of Spiny-headed Mat-rush (*Lomandra longifolia* subsp. *longifolia*), various rushes (*Hypolaena fastigata*, *Ficinia nodosa*, *Cladium procerum*), tufted grasses (*Rytidosperma* spp. and *Austrostipa* spp.), small shrubs including Seaberry Saltbush (*Rhagodia candolleana* subsp. *candolleana*), and Austral Bracken (*Pteridium esculentum*) (70% cover, 0.5 – 1m tall). Openings in this dense cover reveal a ground layer of grasses and prostrate forbs including Shiny Swamp-mat (*Goodenia radicans*), Weeping grass (*Microlaena stipoides*), and Kidney weed (*Dichondra repens*).

Weed cover across the EPBC Offset Site is relatively low (<1% cover across the site), however two high-threat weeds, Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*), have been recorded. These weeds are to be controlled within the Offset Area as a part of this OMP.

FIGURE 3-1 COAST BANKSIA WOODLAND PRESENT WITHIN THE OFFSET SITE

The EPBC Offset Site (5 ha) is a relatively small component of a much larger area of remnant native vegetation (386 ha) that will be protected and managed with an Offset covenant. The remnant native vegetation on the property comprises several EVCs which are also considered to qualify as the EPBC listed Subtropical and Temperate Coastal Saltmarsh vegetation community; listed as Vulnerable under the EPBC Act. Table 3-2 provides a summary of EVCs assessed and mapped across the property, with descriptions to follow below.

TABLE 3-2 EXISTING VEGETATION AND EVCS AT LOCH SPORT

ECOLOGIOCAL VEGETATION CLASSES	DESCRIPTION	TOTAL AREA AVAILABLE (HA)	AREA REQUIRED FOR OFFSET (HA)
Coast Banksia Woodland (EVC 2)	Occupies secondary and tertiary dunes behind Coastal Dune Scrub. Dominated by a woodland overstorey of Coast Banksia *Banksia integrifolia* (up to 10m tall), with Gippsland Red-gum *Eucalyptus tereticornis* subsp. *mediana* and Rough-barked Manna Gum *Eucalyptus viminalis* ssp. *pryoriana* (up to 15m tall) present over a medium shrub layer. The understorey comprises of a number of herbs, graminoids and sedges, including scramblers.	166.04	5 hectares (additional area available if required)
Coastal Dune Scrub (EVC 160)	Closed scrub to 5m tall dominated by Coast Tea-tree (*Leptospermum laevigatum*) 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.	27.68	Not required
Wet Saltmarsh Herbland (*Sarcocornia quinqueflora* herbland) & Estuarine Flats Grassland (EVC 914) mosaic	Closed to open grassland (to 1.5m tall) with occasional shrubs occurring on estuarine flats, grading into *Sarcocornia* dominated saltmarsh herbland (to 0.5m tall). Occupies sand sheets that are occasionally inundated by high tides and areas on marginally higher ground inland from saltmarsh. Ecotonal with estuarine scrub.	61.74	Not required
Estuarine Scrub (EVC 953)	Closed scrub to 6m tall growing on the edge of estuarine waterbodies such as creeks, rivers and lagoons with intermediate salinity and poor drainage conditions. Dominated by Swamp Paperbark (*Melaleuca ericifolia*) with a halophytic (succulent) ground layer dominated by graminoids and herbs. Ecotonal with Coastal Dune Scrub and found as intermittent patches within Coast Banksia Woodland.	106.60	Not required

Only a small portion (5 ha) of the available 166.04 ha of Coast Banksia Woodland on the property is required for the Project; the remaining 161 hectares will be managed as an 'Advanced Offset' in accordance with the *EPBC Environmental Offsets Policy* (DSEWPaC 2012). It is expected that the larger area of contiguous remnant vegetation will also contribute niche habitat requirements for Southern Brown Bandicoot and the region's other threatened and significant vegetation communities, flora and fauna, as well as mitigate against the impacts commonly associated with edge effects.

3.6 Matters of National Environmental Significance Habitat Suitability

A number of studies indicate that bandicoots prefer structurally complex sites with a dense shrub and ground cover layer. Coarse woody debris is also a key habitat element for the Southern Brown Bandicoot (Brown and Main, 2010). As demonstrated in Figure 3-1, Figure 3-2 and Figure 3-3 the offset site provides high quality habitat for the Southern Brown Bandicoot with a dense mid and lower storey and ample coarse woody debris.

To date survey results have confirmed the presence of Southern Brown Bandicoot with two infrared records within the EPBC Offset Site (Figure 3-4). Southern Brown Bandicoot presence is further supported by a historical record in the Victorian Biodiversity Atlas (VBA) on the property (July 1993 observation (DELWP, 2020d) and two within 5km of the site (May 1997 observed on Wattle Grove, Loch Sport, and October 2017 infrared camera record within a nearby New Holland Mouse (*Pseudomys novaehollandiae*) reference site). Conical diggings, associated with Southern Brown Bandicoot foraging activity within sandy soils have been regularly observed within the proposed offset site (Figure 3-5).

Potential threats to the Southern Brown Bandicoot at the Loch Sport Offset Site are predation by foxes and cats, entitled land-uses, deer, unauthorised access, and weed infestations (Figure 3-6). This Offset Management Plan has been prepared to address these potential threats and support the persistence of the Southern Brown Bandicoot at the site.

FIGURE 3-2 AREAS OF THE OFFSET SITE SUPPORT AN OPEN WOODLAND OF COAST BANKSIA WITH A DENSE UNDERSTOREY OF SPINY-HEADED MAT-RUSH (*LOMANDRA LONGIFOLIA* SUBSP. *LONGIFOLIA*) AND AUSTRAL BRACKEN (*PTERIDIUM ESCULENTUM*)

FIGURE 3-3 IN SOME AREAS A MID STOREY IS DOMINATED BY COASTAL TEA TREE (*LEPTOSPERMUM LAEVIGATUM*) AND HEATH TEA TREE (*L. MYRSINOIDES*), WITH A DENSE GROUND COVER OF AUSTRAL BRACKEN (*PTERIDIUM ESCULENTUM*) AND WOODY DEBRIS PROVIDNG HIGH QUALITY HABITAT FOR THE SOUTHERN BROWN BANDICOOT

FIGURE 3-4 SOUTHERN BROWN BANDICOOT AT OFFSET SITE RECORDED 23/07/2020.

FIGURE 3-5: LIKELY SOUTHERN BROWN BANDICOOT DIGGINGS AT OFFSET SITE.

FIGURE 3-6 RAGWORT IS PRESENT WITHIN THE OFFSET SITE.

4 Offset Management

This section discusses the EPBC Offset management obligations at Loch Sport. These obligations are discussed in detail in sections 4.1 to section 4.12. In summary, the key focus of the management obligations, and therefore key gains for the offset site, include:

- The protection of the Offset site with an Offset covenant with Trust for Nature under the *Victorian Conservation Trust Act 1972* (Vic).
- Control of feral deer including Sambar Deer (*Rusa unicolor*; previously *Cervus unicolor*) and Hog Deer (*Axis porcinus*) to prevent habitat degradation by these species.
- Control of feral predators; in particular European Fox (*Vulpes vulpes*) and feral cat (*Felis catus*).
- Control of high threat weeds associated with the maintenance and improvement of understorey habitat suitable for Southern Brown Bandicoot breeding cover and foraging requirements.
- Long-term monitoring of the Southern Brown Bandicoot population at the offset site.

4.1 In Perpetuity Security

The property is currently un-encumbered, and there are no conservation covenants that would prohibit agricultural land-use that is consistent with a Rural Conservation Zone, including grazing by stock and cultivation. A key component of securing offsets at this site therefore will be the establishment of a Trust for Nature Deed of covenant for the conservation of land pursuant to section 3A of the *Victorian Conservation Trust Act 1972* (Vic). The conservation covenant will enact this EPBC Offset Management Plan and the management and monitoring requirements set out below. Annual reports will be supplied to both the DAWE and to RPV.

Appendix A identifies the extent of the offset site and to be included in the conservation covenant to be placed on Title, this is inclusive of all areas of habitat that is to be made available for EPBC Southern Brown Bandicoot Offset Credits. Note that the total on-ground area of the site is in excess of 380 hectares, of which only 5 hectares is required for Southern Brown Bandicoot Offset Credits.

4.2 Habitat Condition

Habitat values within the Coast Banksia Woodland are in excellent condition; this site scored 91/100 in a Vegetation Quality Assessment (VQA) (DSE, 2004). The high quality habitat is attributable to the long-term undisturbed nature of the Offset Site. Understorey habitat is highly varied (see Appendix C for a site flora list) and retains a mosaic of dense, shrubby thickets, interspersed with more open areas dominated by graminoids. The more dense thickets provide 50-80% average foliage density in the 0.2-1 m height range, which is considered to be the optimal range to support Southern Brown Bandicoot (DSEWPC 2011; Claridge & Barry 2000). Southern Brown Bandicoot is known to occupy suitable sites as long-term residents even when these occur in close proximity to residential areas (Maclagan 2016), or within proximity to roadways or slashed areas as is present within the pipe-line easement (authors personal experience).

Open areas adjacent the understorey thickets offer excellent foraging habitat opportunities for Southern Brown Bandicoot, with cover on hand nearby for protection against predators. These areas are dominated by graminoids and conical diggings, associated with Southern Brown Bandicoot foraging activity within the sandy soils of these sites, and were regularly observed during the site assessments.

Table 4-1 below provides the assessment details for the EPBC Offset Site.

TABLE 4-1 EPBC OFFSET SITE VQA VALUES

HABITAT ZONE			EPBC OFFSET SITE	JUSTIFICATION
Benchmark criteria		Max. Score	Coast Banksia Woodland	
			EVC 2	
Site condition	Large Old Trees	10	10	Exceeds benchmark for large trees (10 per hectare: eucalyptus spp. 70cm / banksia spp. 50cm)
	Canopy cover	5	5	Exceeds benchmark canopy cover (15%)
	Understorey	25	25	All lifeforms present / none modified
	Lack of weeds	15	11	Low (1%) weed cover; of two high threat species
	Recruitment	10	10	All woody species are recruiting well
	Organic litter	5	5	Organic litter cover is at 40-60%
	Logs	5	5	Large logs are abundant and well in excess of benchmark
Condition total:		1x	71	
Multiplier		100%	1	
	Patch Size		8	Patch is over 20ha but disturbed by roadway and pipeline
	Neighbourhood		8	Neighbourhood predominantly indigenous but disturbed
	Distance to Core		4	Patch is contiguous with disturbed core area (total Offset Site exceeds 380 ha)
Landscape total:			20	
Habitat quality score		100	91	
Habitat score as above = #/100			0.91	

The control of high threat weeds, and subsequent improvement in the weed score will contribute to the EPBC Offset Gains for Southern Brown Bandicoot at this location.

The EPBC Offset Site is also a part of a much larger area of contiguous habitat with connectivity to a broad range of habitat typologies including woodlands, saltmarsh and coastal sand-dune scrubs. Connectivity to a range of habitat types, as well connectivity to a regional population of Southern Brown Bandicoot, is recognised as key aspects for the support of a meta-population for this species (Coates, T., Nicholls, D. & Willig, R. 2008). On-going, long-term monitoring is proposed within the Offset Site in order to ascertain the fecundity of Southern Brown Bandicoot at this site, and in order to support the hypothesis that a meta-population of Southern Brown Bandicoot exists in this region. Survey results have confirmed the presence of Southern Brown Bandicoot, with two separate records of the species taken from infrared cameras within the EPBC Offset site (from 23rd July and

18th August 2020). Two additional records of Southern Brown Bandicoot have recently been provided from infrared cameras within the broader offset property (near to the EPBC offset site) from the 16th and 22nd December 2020. Southern Brown Bandicoot presence is further supported by a historical record in the VBA on the property (July 1993 observation) and two within 5km of the site (May 1997 observed on Wattle Grove, Loch Sport, and October 2017 infrared camera record within a nearby New Holland Mouse (*Pseudomys novaehollandiae*) reference site).

The maintenance of connectivity to habitat variables within the property will contribute to the EPBC Offset Gains for Southern Brown Bandicoot at this location. Habitat connectivity will be maintained and improved through the implementation of an EPBC Offset Management Plan for the whole property, and the establishment of an 'in perpetuity' Offset covenant on Title.

4.3 Fencing

There is little to no risk of stock inadvertently entering the property from the open beach foreshore or from across the Lake Reeve inlets. There is a fence at the southern end between the Offset Site and the neighbouring property, however, there is little to no evidence of grazing at this location and the chances of stock entering from this point is deemed to be very low; the existing fence at this location can be upgraded at a later date if required to manage stock. There is no fence at the northern end of the property, however, the neighbouring property at this point is heavily vegetated (providing contiguous Coast Banksia Woodland habitat for Southern Brown Bandicoot) and it is unlikely that a fence would be required at this location in the future. A 6m buffer has been applied to all shared property boundaries in order to accommodate fencing if required. The gas pipeline easement, which transects the property, has regular fences, locked gates and signage to prohibit vehicle (and stock) access; it is deemed to be unlikely that additional fencing will be required.

The roadway, which also transects the property, is also unfenced and there is evidence of unauthorised vehicular access to parts of the easement and to the beach. These access points are to be fenced and gated to prohibit access to the property and to prohibit illegal rubbish dumping. We note however that there is little to no chance of unauthorised access to the EPBC Offset Site area, attributable to the dense vegetation cover at this site, presence of numerous, large ground logs (up to 1m DBH), and because there is no access to the beach through this location (being north of the roadway). Monitoring for unauthorised access is a requirement of this EPBC Offset Site Management Plan.

4.4 Access and Signage

As noted above there is evidence of illegal access to the property, however, the EPBC Offset Site area remains undisturbed and is considered unlikely to be disturbed in the near future. Signage identifying this as private property will be erected and maintained by the landowner. Illegal activity and trespass on the property will be reported to the Victorian Police Force and perpetrators will be prosecuted.

4.5 Weed Control

The control of woody and herbaceous weeds are mandatory management actions under a Trust for Nature offset covenant, and a key component of the production of EPBC Offset Credits for Southern Brown Bandicoot. Weed control within the Offset Site is to focus on the management of two high threat weeds, Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*), which were recorded invading from the pipeline easement. These species will be controlled primarily by hand (plants are easily pulled out of the sandy soils) and the off-site removal and responsible disposal of Ragwort flowers. Spot-spraying, taking extreme care to avoid off-

target impacts associated with spray-drift, may also be applied as appropriate using Grazon Extra (or equivalent) in accordance with labelled application rates. The weed control works are to be conducted by a contractor that is licenced (ACUP) and experienced with working in high quality habitat environments (and who are also familiar with flora species found within the Coast Banksia Woodland EVC).

No woody weeds were recorded within the Offset Site, however, it is expected that Blackberry (*Rubus fruticosus* spp. agg.), which was observed within roadside reserves nearby (outer bounds of Loch Sport), may be encountered as germinant plants. Monitoring for woody weeds, with rapid control actions, will therefore be required for the Offset Site.

Woody and herbaceous weed management requirements will therefore include (at minimum):

- Maintain woody weeds at less than 1% projected foliage cover within the Offset area whilst simultaneously facilitating, through natural recruitment and/or supplementary revegetation, successional establishment of EVC appropriate species and Southern Brown Bandicoot understorey habitat;
- Control Ragwort (*Senecio jacobaea*) and Spear Thistle (*Cirsium vulgare*) annually, with monitoring of control sites to ensure re-emergence is minimised;
- Control herbaceous and grassy weeds and ensure that weed cover does not increase within the offset site area;
- Monitor for and control new and emerging woody and herbaceous weeds.

All weed control works are to be accompanied with natural recruitment and successional establishment of indigenous flora and EVC appropriate canopy structures.

The spread of high threat herbaceous weeds is to be managed within the offset site and, where practicable to do so, infestations are also to be eliminated. This will involve treatment of all herbaceous weeds on site through careful and judicious use of herbicides and the application of manual control methods wherever practicable. Emphasis is to be placed on ensuring that herbaceous weed cover levels do not increase within the offset site, and that infestations are not able to spread into neighbouring areas.

All care must be taken to avoid off-target impacts and the loss of native vegetation or habitat, and to ensure that there is no spill or inadvertent drift of chemical into neighbouring wetland areas or the offset site. The use of herbicides is to be in accordance with the manufacturer's instructions (label instructions) and is to be minimised wherever practicable, with preference given to manual control techniques. If possible, herbicide spraying should also be avoided during particularly sensitive periods of the Southern Brown Bandicoot breeding period.

TABLE 4-2 WEEDS RECORDED IN THE OFFSET SITE, CONTROL METHOD AND TIMING.

COMMON NAME	SCIENTIFIC NAME	THREAT STATUS	% COVER	METHOD	TIMING	TARGET COVER
Blackberry	**Rubus fruticosus* spp. agg.	high	<<1%	Control small plants by hand; spot-spray large patches	Active growing season in spring to summer	<1%
Sweet Vernal-grass	**Anthoxanthum odoratum*	low	<1%	Spot-spray patches and monitor for recruitment of EVC appropriate flora	Active growing season in spring to summer	<1%
Spear Thistle	**Cirsium vulgare*	high	1%	Hand-pull small plants (taking care to remove tap-roots); spot-spray with Grazon Extra	Active growing season in spring to summer	<1%

COMMON NAME	SCIENTIFIC NAME	THREAT STATUS	% COVER	METHOD	TIMING	TARGET COVER
Cocksfoot	*Dactylis glomerata	low	<1%	Spot-spray patches and monitor for recruitment of EVC appropriate flora	Active growing season in spring to summer	<1%
Ragwort	*Senecio jacobaea	high	1%	Hand-pull small plants (taking care to remove tap-roots); spot-spray with Grazon Extra	Active growing season in spring to summer	<1%

4.6 Pest Control

Control programs to reduce ecological pressures associated with grazing and degradation of habitat areas, and the predation of Southern Brown Bandicoot by introduced predators have been devised. Feral animals include (but are not limited to) grazers – Sambar and Hog Deer – and predators – fox and feral cat. Deer, particularly Hog Deer and Sambar Deer, have been identified as a relatively prominent feral species in the offset site and surrounding area, being captured by infrared camera 51 times across the broader offset property during the survey period (namely 22 times between 9th July – 17th November 2020, 11 times between 18th November – 8th December 2020 and 18 times between 8th -28th December 2020). These two deer species have therefore been identified as a key potential source of habitat degradation. The intent of the control programs are to prevent the spread of, and as far as possible eradicate any established pest animals within the Offset Site. Successful pest control, particularly control of deer, often requires a broader landscape approach to limit the movement of pest animals back into site from neighbouring land. The approach to pest animal control, particularly deer control, will include consultation with adjoining landowners with the aim to achieve effective control at the offset site and in the local region. Successful control of pest animals will result in reduced predation and material gains in the habitat conditions on site, which will directly benefit the Southern Brown Bandicoot population and its long-term population viability.

An integrated approach to pest animal management is outlined in Table 4.3 below. A combination of control techniques will achieve the best outcomes since different methods will target different sections of the pest populations at different times. All care must be taken to avoid off-target impacts or inadvertent harm to native fauna. Regardless of the control option(s) used, these must be the most effective, safe and humane methods available.

Any new or emerging pest animal threats identified during the monitoring program is to be treated promptly by the landowner, with responsive control measures are to be promptly implemented within the EPBC Offset Area and wider property should other feral species be identified during the monitoring programs.

TABLE 4-3 PEST ANIMALS CONTROL METHOD AND TIMING.

COMMON NAME	METHOD	TIMING	PERFORMANCE TARGET
Foxes	Remove dens or disperse surface harbour taking care to ensure no impacts to Southern Brown Bandicoot Engage qualified and licenced trapper / shooter; ensure Southern Brown Bandicoot are not impacted Investigate use of Canid Pest-ejectors on the property	Ongoing	Reduced fox numbers recorded during SBB infrared monitoring programs

COMMON NAME	METHOD	TIMING	PERFORMANCE TARGET
Cats	Engage qualified and licenced trapper / shooter; ensure Southern Brown Bandicoot are not impacted	Ongoing	Reduced cat numbers recorded during SBB infrared monitoring programs
Sambar and Hog Deer	Engage qualified and licenced trapper / shooter; ensure Southern Brown Bandicoot are not impacted Undertake consultation with neighbouring landowners to achieve a broader landscape approach to the control of deer	Ongoing	Reduced deer numbers recorded during SBB infrared monitoring programs
Foxes & cats	Monitor and control as necessary	Ongoing	
Deer	Monitor and control as necessary	Ongoing	
New & emerging pest animals	Monitor and control as necessary	Ongoing	

4.7 Monitoring and Reporting

This EPBC Offset Management Plan requires the landowner to submit a report to Trust for Nature annually for each year of the ten years of this EPBC Offset Management Plan (see Section 4.11– Management Actions) and thereafter at the reasonable request of DAWE or RPV. The monitoring report is to be provided annually and is to include details of the monitoring and management works conducted within the offset site.

4.7.1 POPULATION MONITORING

The intent of this EPBC Offset Management Plan is to conserve and maintain the existing Southern Brown Bandicoot population within the EPBC Offset Site area and wider property. Monitoring of the Southern Brown Bandicoot population is therefore a requirement of this EPBC Offset Management Plan.

The results of the monitoring will also be used to assess the efficacy of other actions conducted on site, and will inform responsive, adaptive management actions if required (see Section 4.9). The monitoring will also be conducted against the baseline Southern Brown Bandicoot population currently present on site and as detailed above.

The specific monitoring programs are to be in general accord with EPBC survey guidelines for Southern Brown Bandicoot and as set out below. Monitoring methods are based on the survey guidelines in the *EPBC Act draft referral guidelines for the endangered southern brown bandicoot (eastern), Isoodon obesulus obesulus* (DSEWPaC 2011), and includes the use infra-red remote cameras.

4.7.2 TARGETED SURVEY MONITORING FOR SOUTHERN BROWN BANDICOOT

Targeted survey monitoring for Southern Brown Bandicoot is to be conducted at intervals of years 1, 2 ,3, 5 and 10, and is to be conducted by a suitably qualified and experienced ecologist. A minimum of five cameras are to be set up for each deployment, with a minimum of two deployments of 14 days at least one month apart (NB: DSEWPaC (2011) guidelines require that for affected areas >30 ha 1 camera per 5 ha are required, however, we recommend at minimum five cameras).

At each site, an infra-red remote camera baited with peanut butter, oats, golden syrup and truffle oil will be placed for a two-week period at one monitoring point. The camera location will be mapped, permanently marked (if practicable), bearing of the camera direction recorded (south-facing recommended), and photographs taken

such that the precise setup can be replicated in future monitoring events. Monitoring locations should be selected based on habitat suitability, presence of active diggings, and with some consideration of camera security.

At the end of the two-week period, the camera will be removed for one month. After one month a camera will be installed at each site and a second round of monitoring conducted to maximise the likelihood of detecting Southern Brown Bandicoot.

Setup and camera settings will be as follows:

- Cameras to be baited with 5:1:2 mixture of rolled oats, golden syrup and peanut butter, plus approx. 20 ml/kg of truffle oil, secured in an inaccessible bait holder.
- Camera to be approx. 50 cm above ground level.
- Bait to be set up 1-3 m in front of each camera. Trim vegetation between the camera and bait and around bait if required.
- Sensitivity: high.
- Quiet period: 15 seconds.
- 5 photographs per trigger.

Daily presence/absence and the cumulative number of nights that Southern Brown Bandicoot are detected are to be recorded for each site and the results included in the annual monitoring reports. Fox and cat activity detected on cameras are to be similarly recorded. This will also inform actions conducted around pest animal controls set out in Section 4.6.

The quality of the Southern Brown Bandicoot habitat will also be assessed once per monitoring season, using a consistent proforma, and with photographs taken. Where relevant, any additional works required to improve habitat quality (particularly within areas identified for weed control and successional establishment of indigenous habitat) will be identified.

The habitat assessment proforma will include scoring of:

- Ground layer density (vegetation at the 0.2-1m height range).
- Shelter availability (i.e. presence of low shrubs, scrub piles, logs etc).
- Plant species and structural canopy diversity.
- Patch size (size of patch of habitat of similar quality).
- Connectivity.
- Presence of native vegetation (given a low weighting as the species is known to utilise suitable exotic vegetation, however this is worth scoring as habitat improvement should aim to use native species).

The above habitat assessment features are based on published habitat preferences of the species (as summarised in the species' DAWE profile) and local studies (Maclagan, Coates & Ritchie 2018; Masters, Taylor & Maclagan 2019; Maclagan 2019). The habitat monitoring points will be identified by a short wooden stake, located nearby each of the camera bait locations. Habitat characteristics and quality will be scored for a 5 m radius of the point and a photograph of the stake taken facing south.

The results of the Southern Brown Bandicoot monitoring will be used to inform variation / adaptation of the monitoring program in the event that Southern Brown Bandicoot are not detected or detected at low numbers. Under such circumstances the implementation of additional monitoring sites should be considered, with regard for processes set out in the responsive / adaptive management procedures in Section 4.9 below.

4.7.3 HABITAT ASSESSMENT

Habitat assessments are to focus on monitoring of vegetation cover and density within the 0.2 – 1 m range to ensure that suitable habitat is available for Southern Brown Bandicoot. The intent is to maintain 50-80% average understorey foliage cover in areas where medium shrubs are currently present, and to maintain weed free sites where the groundstorey is more open and dominated by graminoids. These ecotonal habitat types will meet the ecological requirements for Southern Brown Bandicoot breeding, foraging and movement.

Habitat assessments and monitoring efforts should also focus on areas where weed management, natural regeneration, and revegetation have occurred to determine if supplementary planting is required. If there is no natural succession of EVC appropriate flora, then selective planting, using tube-stock propagated from local provenance indigenous seed sources, may be required as part of the responsive / adaptive management program (see Section 4.9 for details).

4.7.4 PHOTOPOINTS

Permanent photo-points are to be established within the EPBC Offset Site at locations that are representative of the management area of habitat for Southern Brown Bandicoot. Photographs taken from these points are to be representative of the annual habitat conditions and are to provide a visual and temporal assessment of the effectiveness of meeting objectives set out in this EPBC Offset Management Plan. Photographs are therefore to be taken from each photo-point annually and will use the same general direction, trajectory and camera settings as is practicable. The location of photo-points is to be permanently marked on site using painted star-pickets (or equivalent) and as recorded on an aerial map of the offset site.

Photographs and annual monitoring reports are to be submitted at least two months prior to the anniversary date of the execution of the covenant to allow time for compliance to be assessed before the anniversary date.

4.8 Annual Reporting

The annual monitoring reports are to detail progress made against the commitments set out in this EPBC Offset Management Plan. Annual monitoring reports should therefore provide enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of/progress against the commitments for each management action.

Details of the monitoring reports are to include (but not be limited to):

- Results of monitoring conducted on site of fencing, weed control programs and pest/feral animal control actions;
- Management works completed within the EPBC Offset Site including the results of weed control programs and successional recruitment of Coast Banksia Woodland flora, and the maintenance of 50-80% average understorey foliage cover in areas where medium shrubs are currently present, and to maintain weed free sites where the groundstorey is more open and dominated by graminoids;
- Results of the Southern Brown Bandicoot population monitoring programs including any findings on population dynamics;

- Details of any events or impacts that have affected the Offset Site such as water pollution events, changes to natural hydrology and water flow regimes, illegal access by pedestrians, and any associated impacts, or any events that have had a material impact on the Southern Brown Bandicoot populations and their long-term viability on site.

The results of the monitoring programs are to be reported to Trust for Nature and RPV. Any major breaches of the management programs and/or impacts on the target species is to be reported immediately to Trust for Nature and RPV by the landowner and/or their appointed contractors.

4.9 Responsive / Adaptive Management

The monitoring program is required to identify any significant failings in the implementation or outcomes of the EPBC Offset Management Plan, and any new or emerging threats that require an immediate and adaptive response. The development of an appropriate and responsive addition or variation of the EPBC Offset Management Plan will be developed in consultation with the landowner, Trust for Nature and RPV, and, if necessary, is to be endorsed by DAWE.

Examples of significant failings in the implementation or outcomes of the EPBC Offset Management Plan would include bushfire, habitat and/or water contamination due to chemical spills, significant population decline of the target species, major fence failures and/or stock impacts within habitat areas, or events that are considered to be significant enough to warrant an adaptive management approach within the offset areas.

In the event of a significant detrimental impact within the offset area and/or failing of the EPBC Offset Management Plan, the landowner will:

- Promptly notify Trust for Nature, RPV and DAWE, and, in consultation with these parties;
- Develop responsive management plan to address impacts; and,
- Update the EPBC Offset Management Plan and/or review implementation period (i.e. extend if required to address impacts).

The intent of a responsive, adaptive management action provision in this EPBC Offset Management Plan is to provide a mechanism for the landowner and RPV that facilitates considered and scientifically based variations to management of the EPBC Offset Site area. This flexible approach can be beneficial in that it enables a 'change of plan' if the Southern Brown Bandicoot population is not increasing, and/or habitat quality for the species is not improving on site. Variations of this nature however must be undertaken in consultation with ecologists, RPV, DAWE and, where appropriate, other government Agencies with expertise in the management of threatened species and habitat.

4.10 Performance Targets

Table 4-1 outlines the 10-year performance targets for the actions identified within this Offset Management Plan and the year that they will be achieved.

TABLE 4-1 10-YEAR PERFORMANCE TARGETS

MANAGEMENT ACTION	RESPONSIBILITY	NO.	PERFORMANCE TARGET	YEAR TO BE ACHIEVED
Security Agreement	Landowner & broker / TfN	once	TfN conservation covenant placed on Title	Process to commence immediately following approval by DAWE

MANAGEMENT ACTION	RESPONSIBILITY	NO.	PERFORMANCE TARGET	YEAR TO BE ACHIEVED
Habitat Condition monitoring	Landowner	Annual	Annual report to TfN & RPV; with copies sent to DAWE where a condition of the EPBC approval	Within 3mth annually of placement of covenant on Title
Fencing	Landowner	Responsive	Fencing upgraded promptly in response to stock accessing the Offset Site	Promptly; if/as required
Access management and Signage	Landowner	Responsive	Gates, fencing and/or signage installed to prohibit / manage access	Promptly; if/as required
Weed Control	Landowner	Annual	Control of herbaceous weeds, maintenance of woody weed cover at <1%	First year; on-going
Pest Control	Landowner	Annual	Control of feral animals	On-going
SBB targeted survey monitoring	Landowner or contractor	Years 1, 2, 3, 5 & 10	Improving SBB population	Years 1, 2, 3, 5 & 10
Monitoring and Reporting	Landowner and RPV	Annual	Annual reports provided	On-going

4.11 10-Year Management Plan

Table 4-2 provides a summary of the management action, responsible personnel and timing of each action to be implemented over the 10-year management period.

TABLE 4-2 10 YEAR MANAGEMENT ACTIONS, RESPONSIBILITY AND TIMING.

ACTION	MANAGEMENT ACTION	DESCRIPTION	RESPONSIBILITY	TIMING OF ACTION	PERFORMANCE TARGET
Security Agreement	Offset covenant lodged on Title	Ensure offset secured via TfN conservation covenant and that agreement is signed by Landowner and lodged on Title.	Landowner / contractor	At commencement of agreement	Ensure Offset secured via covenant
Fencing	Fencing upgrades	Stock exclusion from offset area.	Landowner / contractor	Within 3 months of commencement of the agreement	No stock within the Offset area
Monitoring of fences		No threats to the offset site currently exist, if a new or emerging threat arises erect a fence immediately to ensure that the new threats are controlled.	Landowner / contractor	Immediately on identification of new or emerging threat	Construct and/or upgrade fencing as required to control new and/or emerging threats.
Access and Signage	Installation of gates, fences and signage as required to prohibit illegal access	Ensure there is no illegal trespassing by the public.	Landowner / contractor	Within first year and as required in response to incursions.	No illegal access; no 4WD impacts within Offset area
Weed Control	Woody weed control	Monitor for and minimise all woody weeds. Monitor for any re-sprouting or seedlings and eradicate (either spot spray or hand pull)	Landowner / contractor	Ongoing	Maintain <1% projected foliage cover of woody weeds, with no mature plants present. Current levels are at <1% projected foliage cover or less. Minimise off-target damage; avoid impacts to remnant vegetation and habitat.
Weed Control	Control of Ragwort and Spear Thistle	Conduct annual control of Ragwort and Spear Thistle. Monitor for any re-sprouting or seedlings and eradicate (either spot spray or hand pull)	Landowner / contractor	Ongoing	No spread of Ragwort or Spear Thistle Minimise off-target damage; avoid impacts to remnant vegetation and habitat.
Weed Control	Monitoring	Monitor for and control all woody weeds and herbaceous weeds.	Landowner / contractor	Ongoing	No increase in cover of herbaceous weeds beyond current levels. Minimise off-target damage; avoid impacts to remnant vegetation and habitat.
Pest Control	Fox and cat control	Monitor for and control foxes and cats. Refer to Section 4.6 for a list of control methods and timing of actions	Landowner / contractor	Ongoing	Participation in regional control programs. Investigate use of Canid Pest Ejectors (CPEs) and/or shooting control methods. Controlled foxes and cats.
Pest Control	Deer control	Monitor for and control deer. Refer to Section 4.6 for a list of control methods and timing of actions	Landowner / contractor	Ongoing	Participation in regional control programs. Controlled deer, reduced habitat impacts.

ACTION	MANAGEMENT ACTION	DESCRIPTION	RESPONSIBILITY	TIMING OF ACTION	PERFORMANCE TARGET
Pest Control		Monitor for and control all new and emerging pest animals	Landowner / contractor	Ongoing	Control numbers of any new & emerging pest animals
Monitoring and Reporting	Targeted SBB monitoring	Conduct seasonal monitoring of Southern Brown Bandicoot generally in accordance with *EPBC Act draft referral guidelines for the endangered southern brown bandicoot (eastern), Isoodon obesulus obesulus* (DSEWPaC 2011a)	Landowner as directed by RPV	Years 1, 2 ,3, 5 and 10	Monitoring of Southern Brown Bandicoot population. Reporting of Southern Brown Bandicoot population dynamics within the Offset Site. Reports are to be submitted to Trust for Nature, RPV and DAWE as outlined below.
Reporting	Annual landowner reporting	Prepare and submit an annual report	Landowner and RPV	Submit at least two months prior to agreement anniversary date	Annual report is signed, dated and submitted to Trust for Nature, RPV and DAWE by the landowner at least two months prior to the anniversary date of the agreement. Report provides enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of / progress against the commitments for the EPBC Offset Site area. Obligations of the landowner have been met and the obligations form is read, signed, dated and submitted with the annual report. Progress and actions, as well as failings or any new and emerging threats, are submitted to Trust for Nature and RPV, and reported to DAWE.

4.12 In Perpetuity Management

This OMP outlines the management actions and targets to be achieved at the offset site to improve the quality of potential habitat for the Southern Brown Bandicoot over the 10 year time period. At the completion of the time period, the landowner is required to continue to undertake management actions to retain the population of the Southern Bandicoot and the quality and extent of habitat for the species at the Loch Sport offset site in perpetuity. Table 4-3 identifies the in -perpetuity performance targets for the Loch Sport Offset site.

TABLE 4-3 OFFSET SITE PERFORMACE TARGETED TO BE MAINTAINED IN PERPETUITY

MANAGEMENT ACTION	RESPONSIBILITY	PERFORMANCE TARGET
Security Agreement	Landowner and TfN	Offset covenant remains on Title
Habitat Condition	Landowner	Maintained at improved level
Fencing	Landowner	Installed or upgraded if required
Access and Signage	Landowner	Illegal access prohibited
Weed Control	Landowner	Woody and herbaceous weeds controlled
Pest Control	Landowner	Pests managed
Monitoring and Reporting	Landowner	No reporting required after 10 years

5 References

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Appendix A

Mapping of Offset Site

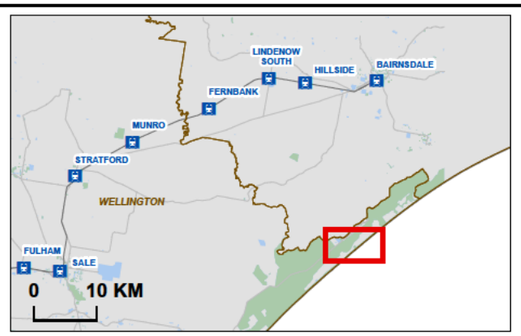
LAKE VICTORIA
VICTORIA PARADE
CENTRE ROAD
PROGRESS ROAD
WAVERLEY TRACK
LAKE REEVE
OCEAN GRANGE TRACK
BEACH ROAD
BASS STRAIT
LONGFORD-LOCH SPORT ROAD
LANGHAM ROAD

- Southern Brown Bandicoot VBA Record
- Infrared Camera Locations
- Confirmed SBB infrared camera record
- Proposed EPBC Offset Site Area (2019/8563)

EnSym Offset Area

- GipP0002 - Coastal Banksia Woodland
- GipP0160 - Coastal Dune Scrub
- GipP0914 - Estuarine Flats Scrub
- GipP0953 - Estuarine Scrub

Data Sources:
AJMJV 2021
DELWP 2021
Vicmap 2020
Aerial photo: ESRI



RAIL PROJECTS VICTORIA
AJM Joint Venture
aurecon JACOBS MOTT MACDONALD

Regional Rail Revival
Gippsland Line Upgrade

Loch Sport Offset Site

Drawing Number:			Revision:
GLU-AJM-PWD-PWD-MAP-XEV-VIC-0719383			A.2
Drawn By: B. Blakley	Approved By: A. Michael	Date: 10/03/2021	Map Size: A3

0 500 1,000
Meters

Coordinate System: GDA 1994 MGA Zone 55

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Appendix B

Offset Assessment Calculations

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Southern Brown Bandicoot
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	SBB Habitat	Area	0.901	Hectares	GLU Ecology Report, Preliminary Documentation for EPBC referral
			Quality	7	Scale 0-10	
			Total quantum of impact	0.63	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Threatened species habitat																				
Area of habitat	Yes	0.63	Adjusted hectares	Loch Sport	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	5	Risk of loss (%) without offset	25%	Risk of loss (%) with offset	10%	0.75	90%	0.68	0.53	0.87	137.44%	Yes	$600,000.00	GLU Offset Strategy, GLU Offset Management Plan
									Future area without offset (adjusted hectares)	3.8	Future area with offset (adjusted hectares)	4.5								
					Time until ecological benefit	5	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	7	2.00	70%	1.40	1.32				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.6307	0.87	137.44%	Yes	$600,000.00	N/A	$600,000.00
Area of community	0				$0.00		$0.00
					$600,000.00	**$0.00**	**$600,000.00**

Appendix C

Flora Recorded within Offset Site

Appendix C Flora Recorded within Offset Site

'#'denotes native to Victoria but some stands may be alien
* denotes not native to Victoria
T – Tree
MS – Medium Shrub
SH – Small Herb
MH – Medium Herb
MTG – Medium Tufted Graminoid
SC – Scrambler/Climbver
MNG – Medium Non-tufted Graminoid
IT – Immature Tree
SS - Small shrub

TABLE C.1 FLORA RECORD

SCIENTIFIC NAME	COMMON NAME	LIFE FORM	CONSERVATION STATUS
Acacia longifolia	Sallow Wattle	T / MS	#
Acacia longifolia subsp. longifolia	Sallow Wattle	T / MS	#
Acacia mearnsii	Black Wattle	T / MS	
Acacia melanoxylon	Blackwood	T / MS	
Acacia paradoxa	Hedge Wattle	MS	
Acaena echinata	Sheep's Burr	SH	
Acaena novae-zelandiae	Bidgee-widgee	MH / SH	
Ammophila arenaria	Marram Grass		*
Austrostipa spp.	Spear Grass	MTG	
Banksia integrifolia subsp. integrifolia	Coast Banksia	T / MS	
Banksia serrata	Saw Banksia	T / MS	
Billardiera scandens s.l.	Common Apple-berry	SC	
Bursaria spinosa subsp. spinosa	Sweet Bursaria	MS / SS	
Cassinia aculeata subsp. aculeata	Common Cassinia	MS / SS	
Cirsium vulgare	Spear Thistle	*	*
Cladium procerum	Leafy Twig-rush	MNG	
Comesperma volubile	Love Creeper		
Coprosma quadrifida	Prickly Coprosma	MS / SS	
Corybas incurvus	Slaty Helmet-orchid	MH / SH	
Dianella longifolia s.l.	Pale Flax-lily	MTG	
Dichondra repens	Kidney-weed	MH / SH	
Distichlis distichophylla	Australian Salt-grass	MNG	
Drosera spp.	Sundew	MH / SH	
Eucalyptus tereticornis subsp. mediana	Gippsland Red-gum	IT	
Eucalyptus viminalis subsp. pryoriana	Coast Manna-gum	IT	
Ficinia nodosa	Knobby Club-sedge	MNG	
Gahnia radula	Thatch Saw-sedge	MTG	
Gahnia sieberiana	Red-fruit Saw-sedge	LTG / MTG	
Goodenia radicans	Shiny Swamp-mat	MH / SH	

SCIENTIFIC NAME	COMMON NAME	LIFE FORM	CONSERVATION STATUS
Hypolaena fastigiata	Tassel Rope-rush	SC	
Juncus spp.	Rush	MNG	
Lemna disperma	Common Duckweed	SH	
Lepidosperma laterale	Variable Sword-sedge	MTG	
Lepidosperma spp.	Sword Sedge	MTG	
Leptospermum continentale	Prickly Tea-tree	MS / SS	
Leptospermum laevigatum	Coast Tea-tree	#	
Leucopogon parviflorus	Coast Beard-heath	MS / SS	
Lobelia anceps	Angled Lobelia	SC	
Lomandra longifolia	Spiny-headed Mat-rush	LTG / MTG	
Melaleuca ericifolia	Swamp Paperbark	MS / SS	#
Myoporum insulare	Common Boobialla	MS / SS	#
Olearia lirata	Snowy Daisy-bush	MS / SS	
Oxalis perennans	Grassland Wood-sorrel	SH	
Phragmites australis	Common Reed	MNG	
Pimelea humilis	Common Rice-flower	MS / SS	
Poa labillardierei var. labillardierei	Common Tussock-grass	MTG	
Poa poiformis	Coast Tussock-grass	MTG	
Pomaderris aspera	Hazel Pomaderris	MS	
Pteridium esculentum subsp. esculentum	Austral Bracken	GF	
Pterostylis spp.	Greenhood	MH / SH	
Rhagodia candolleana subsp. candolleana	Seaberry Saltbush	MS / SS	
Rytidosperma spp.	Wallaby Grass	MTG	
Samolus repens var. repens	Creeping Brookweed	MH / SH	
Sarcocornia quinqueflora	Beaded Glasswort	MH / SH	
Senecio jacobaea	Ragwort	*	*
Senecio quadridentatus	Cotton Fireweed	LH / MH	
Senecio spp.	Groundsel	LH / MH	
Tetragonia spp.	Native Spinach	MS	
Tetragonia tetragonioides	New Zealand Spinach	MS	
Wahlenbergia gracilis	Sprawling Bluebell	MH / SH	
Wahlenbergia stricta subsp. stricta	Tall Bluebell	MH / SH	

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