



## Offset Proposal

Reserve 26912 - "Roberts Swamp"  
Shire of Esperance Strategic Purpose Permit CPS 9524/1



Report compiled by Shire of Esperance Environmental Team:  
Julie Waters – BEnvSc (Hons), Environmental Coordinator  
Katherine Walkerden– BSc, MEnvSc, Environmental Officer

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## 1 Summary

Reserve 26912 'Roberts Swamp' is a large (1661.7 ha) and ecologically diverse reserve with a range of vegetation types, including old growth Salmon gum woodlands, yate swamp and mallee woodlands. The majority of the reserve is in pristine or excellent condition. The reserve provides potential habitat for both Chuditch and Malleefowl, as well containing poorly reserved vegetation communities. Approximately 60% of Reserve 26912 was burnt in an intense bushfire in November 2015, which has created a mosaic of fuel ages. Roberts Swamp itself is a freshwater swamp fed by at least three seasonal watercourses, the main tributary draining the catchment to the north east and east of the reserve. Roberts Swamp seasonally inundates and then slowly empties, possibly through cavities in the underlying soil profile, which results in little accumulation of salts.

## 2 Area Description

<b>Reserve name:</b>	Un-named Reserve Crown Reserve	<b>Reserve number</b>	26912
<b>Named Features:</b>	Roberts Swamp	<b>NRM Region:</b>	South Coast
<b>Location number:</b>	Lot: 1536 on Plan: 209681	<b>Shire:</b>	Esperance
<b>Vesting:</b>	Shire of Esperance	<b>Nearest towns:</b>	Grass Patch
<b>Current Purpose:</b>	Recreation & Parklands	<b>Nearest roads:</b>	Rollond Road, Williams Road, Belgian Road
<b>Zoning:</b>	Environmental Conservation	<b>Map reference:</b>	351455m E 6327461m N
<b>Area of Reserve:</b>	1661.7 ha	<b>IBRA Sub Region:</b>	Eastern Mallee

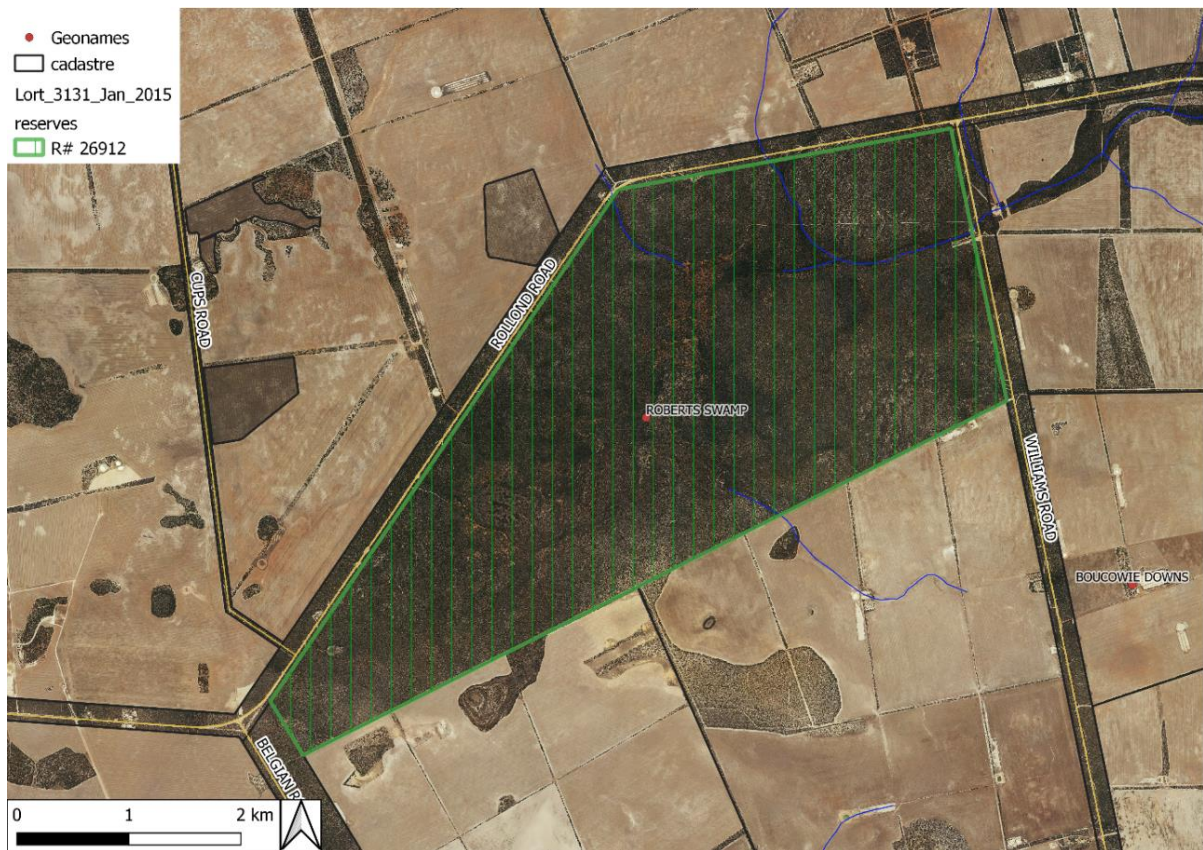


Figure 1. Map of Reserve 26912, with 2015 aeriels.

### 3 Asset Values

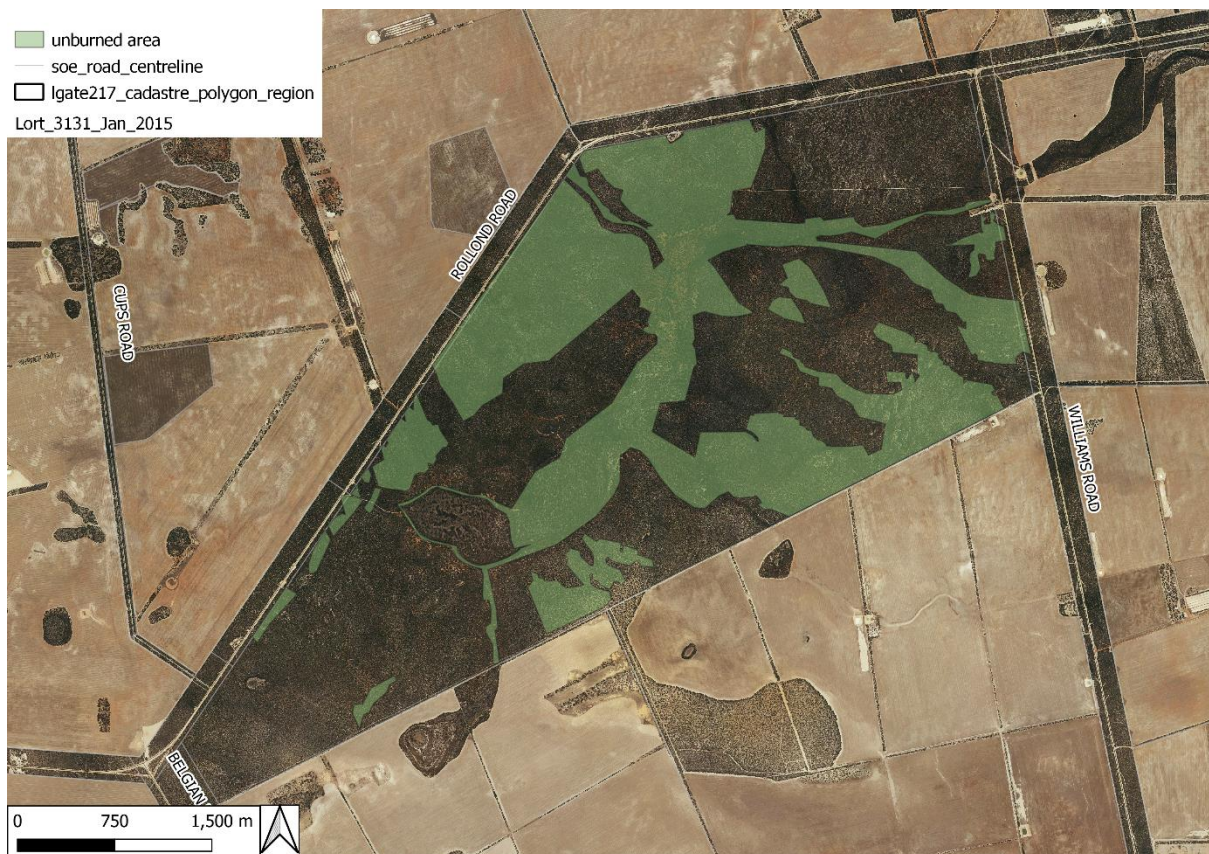
<p><b>Landform</b></p>	<ul style="list-style-type: none"> <li>• Very gently inclined scarp with external drainage via a well-developed network of incipient streams</li> <li>• Seasonally inundated generally fresh water swamps</li> <li>• Level to gently undulating plain with areas of gilgai microrelief.</li> <li>• Drainage is generally poorly developed and usually internal</li> </ul>
<p><b>Soils</b></p>	<ul style="list-style-type: none"> <li>• Alkaline grey shallow sandy duplex soils and calcareous loamy earths with minor non-cracking clays and bare rock</li> <li>• Grey non-cracking clays seasonally inundated</li> <li>• Alkaline grey shallow sandy duplex soils with associated pale deep sands and minor deep sandy duplexes, ironstone gravel soils and non-crack</li> </ul>
<p><b>Geology/Regolith</b></p>	<ul style="list-style-type: none"> <li>• Thin Tertiary sediments with additions of calcareous aeolian material over weathered bedrock</li> <li>• Lacustrine sediments over thin Tertiary sediments</li> <li>• Tertiary marine sediments with aeolian carbonate rich deposits in places</li> </ul>

<b>Threatened and Priority flora</b>	None identified in desktop survey as occurring within the reserve
<b>Threatened ecological communities</b>	May contain the EPBC listed 'Swamp Yate ( <i>Eucalyptus occidentalis</i> ) woodlands in seasonally inundated clay basins (South Coast)' Priority Ecological Community
<b>Threatened fauna</b>	Both Malleefowl and Chuditch were identified in 20km desktop search
<b>Critical Habitat</b>	None mapped
<b>Native Fauna</b>	Emu, kangaroo, frogs, a black fronted dotterel was spotted during recent inspection
<b>Beard Vegetation Associations</b>	<ul style="list-style-type: none"> <li>• LORT_51: Sedgeland; reed swamps, occasionally with heath</li> <li>• LAKE HOPE_482: Medium woodland; merrit &amp; red mallee</li> <li>• LORT_512: Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> &amp; Forrest's marlock (<i>E. forrestianna</i>)</li> <li>• SALMON GUMS_924: Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> &amp; red mallee</li> </ul>
<b>Catchment</b>	Stokes Inlet: Lort Young catchment
<b>European evidence</b>	This site has been previously used for the purpose of limestone extraction. (Two old limestone pits exist). These have been rehabilitated through ripping allowing for natural regeneration, this has been only moderately successful. Dam on eastern boundary – probably used for road construction water.
<b>Aboriginal evidence</b>	Not listed heritage sites, although likely to be important.
<b>Recreational evidence</b>	Campfires seen. 4WD activity. Large amount of firewood extraction has occurred in yate swamp since 2015 fire.
<b>Fire</b>	Approximately 60% of Reserve 26912 burnt during the November 2015 fires.
<b>Other Assets</b>	Good condition new fence along freehold property boundary on the south of the reserve

## Fire History

Approximately 60% of Reserve 26912 was burnt in November 2015, approximately 650 ha remains unburnt. It is unlikely that these unburnt areas have been burnt for a very long time. The area of unburnt land was estimated using aerial imagery.





**Figure 2.** Map providing estimates of area burnt in November 2015 bushfires.

## Vegetation Communities

In 2003, The Roberts Swamp reserve was characterised by the following vegetation communities (Greenskills):

- A - Mallee woodlands of sand and blue mallee
- B - Emergent yate forest within the wetland basin
- C - Fringing stands of Salmon gum and York gum
- D - Dense thickets of broomebush *Melaleuca acuminata* fringing the wetland areas
- E - Thickets of the wetland climber *Muehlenbeckia cunninghamii*

No paper copy of the report could be found and all electronic copies are missing the Appendices, which contain the vegetation maps.

In 2023, the vegetation communities of the reserve was mapped using a combination of aerial photography interpretation and ground truthing. Ground truthing was carried out along Rollond, Williams and Belgian Roads and tracks within the reserve, the salt lake on the western edge was also hiked into. (Note: Estimates of vegetation type areas are only approximations).

Reserve 26912 consists of four vegetation communities:

- A. Mixed Mallee woodland over mixed *Melaleuca* shrubland
  - A large majority of the reserve's vegetation
  - Occurring on sandy soils

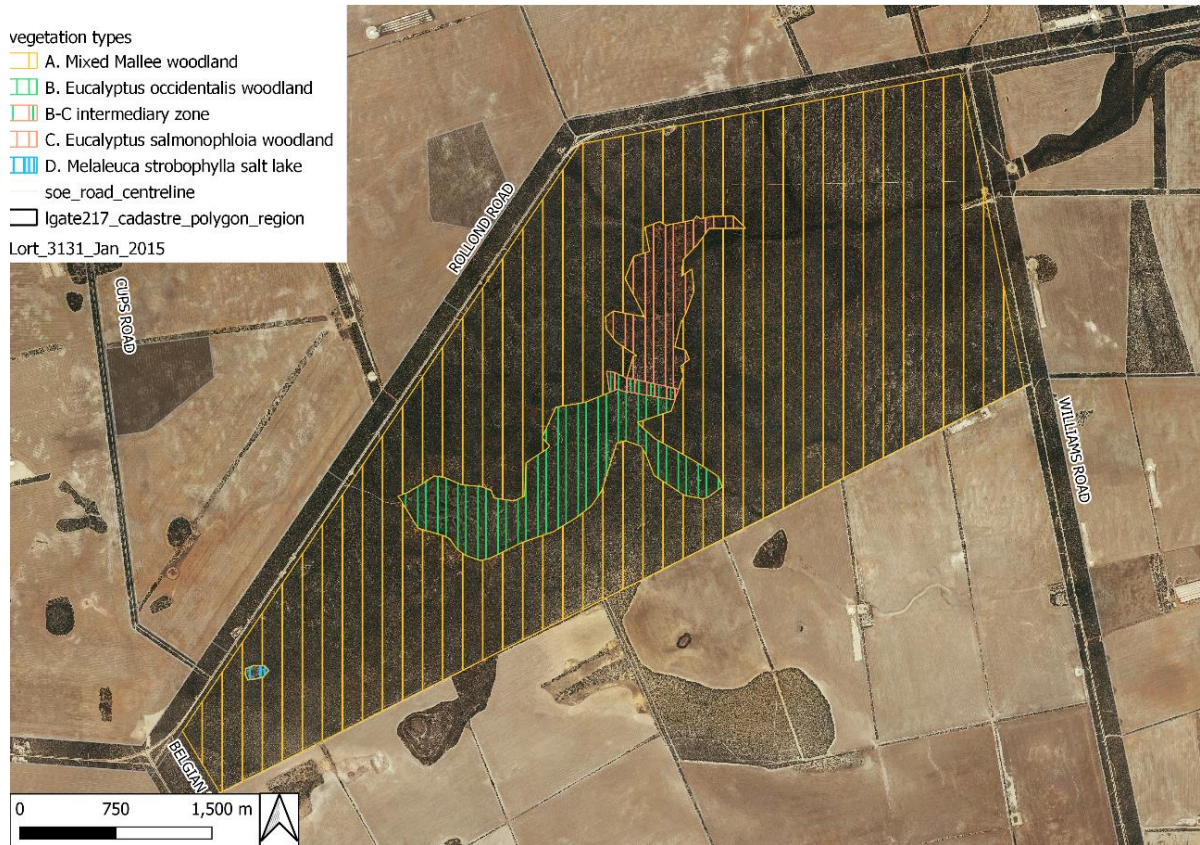
- B. *Eucalyptus occidentalis* woodland with central seasonally inundated basin
  - Occurring on the lowest lying parts of the reserve
  - Significant weed invasion has occurred within the seasonally inundated basin
  - Significant firewood extraction has occurred recently within this vegetation type
  
- C. *Eucalyptus salmonophloia* woodland with *Eucalyptus loxophleba* with sparse *Melaleuca* and *Acacia* shrubland over sedges
  - Found on the lower lying clay soils and fringing the *Eucalyptus occidentalis* woodland.
  - Only small patches of the woodland burned during the 2015 fires, mainly in transitional sections between vegetation types A & C
  
- D. *Melaleuca strobophylla* dominated salt lake with *Melaleuca calycina* and *Austrostipa elegantissima*
  - Small salt lake near the western corner of the reserve.
  - Hydrology appears to have been significantly altered since the 2015 fires. *Eucalyptus* species were fringing the salt lake prior to the fires which have failed to recruit since the fire.

Vegetation types A, B and C of both vegetation surveys match descriptions, however neither D or E of the 2003 vegetation types could be relocated. From memory of a previous visit vegetation types D and E were around the main swamp area (as it was impossible to penetrate into the yate swamp itself) and these areas have been opened up since the 2015 bushfire and firewood collection activities. It is likely that 2023 vegetation type D was not mapped as distinctive vegetation unit in 2003.

**Table 1.** Approximate size of each vegetation type and approximate area of burned and unburned vegetation (2023 vegetation mapping)

Vegetation type	Approximate area (ha)	Approximate burned (ha)	Approximate unburned (ha)
A	1472	958	513
B	123	37	86
B-C intermediary	5.8	1.4	4.4
C	59.5	9.4	50
D	1.5	1.5	-





**Figure 3.** Map of vegetation types present within the Reserve 26912.



**Figure 4.** Vegetation type A (burned): Mixed Eucalyptus woodland with mixed melaleuca shrubs. Photo taken on the 23/05/2023 by Katherine Walkerden.





**Figure 5.** Vegetation type A (unburned): Mixed Eucalyptus woodland with mixed melaleuca shrubs. Photo taken on the 23/05/2023 by Katherine Walkerden.



**Figure 6.** Vegetation type B (central seasonally inundated area): *Eucalyptus occidentalis* woodland with central seasonally inundated section.





**Figure 7.** Vegetation type B (Edge of seasonally inundated area): *Eucalyptus occidentalis* woodland with central seasonally inundated section.





**Figure 8.** Vegetation type C: *Eucalyptus salmonophloia* woodland with *Eucalyptus loxophleba* with sparse *Melaleuca* and *Acacia* shrubland over sedges.





**Figure 9.** Vegetation type B-C intermediary (Salmon gums with yates)  
Photo taken on the 23/05/2023 by Katherine Walkerden.



**Figure 10.** Vegetation type D: *Melaleuca strobophylla* dominated salt lake with *Melaleuca calycina* and *Austrostipa elegantissima*. Photo taken on the 23/05/2023 by Katherine Walkerden.



## Vegetation condition:

Vegetation condition of Reserve 26912 was largely in a pristine or excellent condition. The seasonally inundated section of the swamp yate woodland had seen extensive firewood harvesting, several new tracks had formed since the 2015 fires and there was also significant weed invasion by *Cirsium vulgare* and *Solanum nigrum*. Rehabilitation of the previous limestone extraction areas was not done that well and these areas are only in good condition.

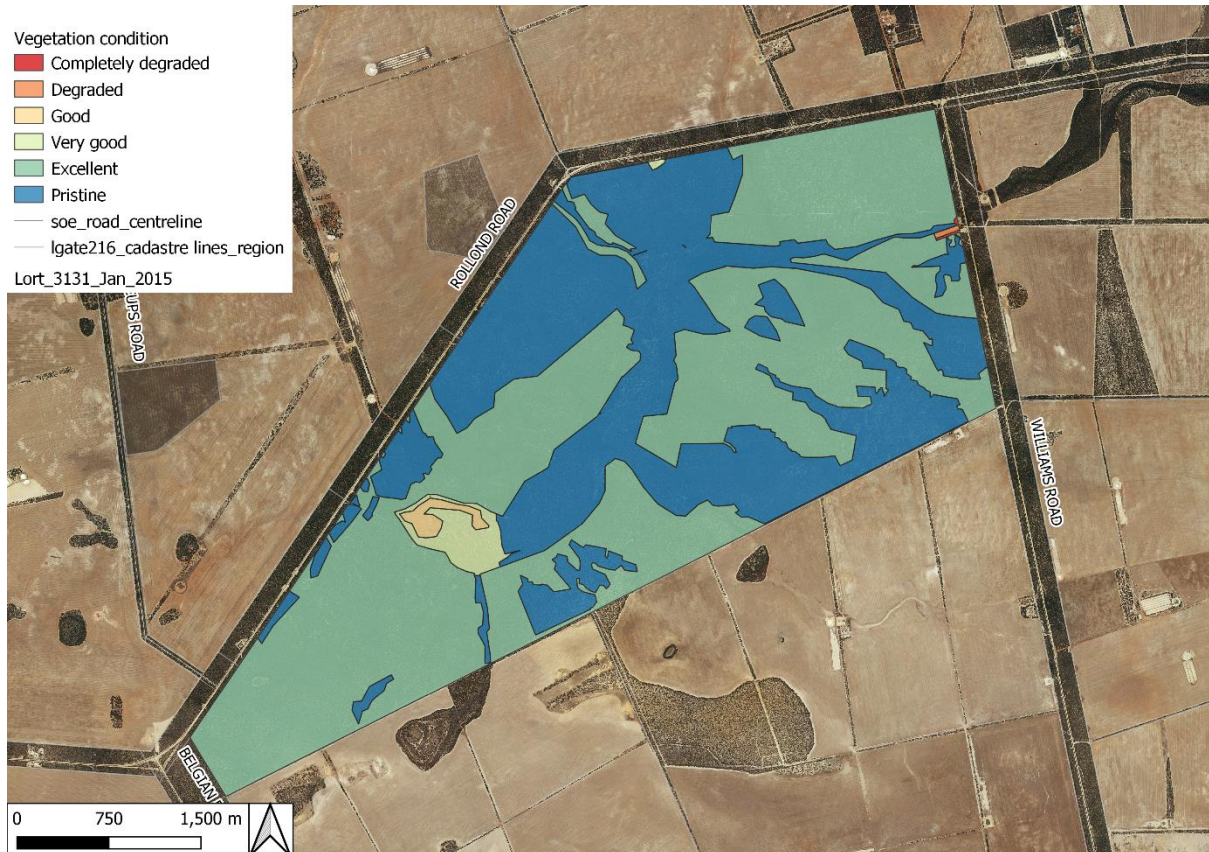


Figure 11. Map of estimated vegetation condition within Reserve 26912.

## Threatened Ecological Communities

As Roberts Swamp within Reserve 26912 was known to be dominated by *Eucalyptus occidentalis*, the vegetation within the reserve was compared against the 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' PEC listing documentation (Table 5, Appendix 1, Ecologia (2008)). There is no official conservation advice or official description of the Swamp Yate PEC.

The central basin is degraded by significant weed invasion. The only native understorey species present within the central basin were *Rhagodia sp.* and *Goodenia viscida*.



**Table 2.** Comparison between potential occurrences of the Swamp Yate PEC and listing documentation criteria “Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia” (Appendix 1) within Vegetation type B within Reserve 26912.

Swamp Yate ( <i>Eucalyptus occidentalis</i> ) woodlands in seasonally inundated clay basins with intact understorey and fringing vegetation	Criterion 1: Abiotic Factors i) Occurs on valley floor; ii) Basin is more or less circular; iii) Seasonally inundated.	Criterion 2: Centre of basin inhabited by <i>Eucalyptus occidentalis</i> low woodland (often with an understorey of <i>Melaleuca cuticularis</i> ).	Criterion 4: Fringing the wetland is dense rushes and sedges.	Criterion 3: Peripheral to the central basin is a waterlogged zone of <i>E. occidentalis</i> associated with heath to open scrub and/or small trees. <i>Melaleuca calycina</i> , <i>M. glaberrima</i> , <i>M. incana</i> , <i>M. pulchella</i> , <i>Taxandria callistachys</i> ;	Swamp Yate PEC (Yes / No)
Vegetation type B	i) Occurs on a valley floor. ii) Central seasonally inundated area is a circular basin. iii) Occurrence is seasonally inundated.	Occurrence is dominated by <i>Eucalyptus occidentalis</i> regrowth.	There was no dense sedge layer within or immediately surrounding the vegetation type.	Peripheral to the central basin there was denser <i>Eucalyptus occidentalis</i> regrowth and some unburned <i>Eucalyptus occidentalis</i> .  A <i>Melaleuca</i> or myrtaceous shrub fringe was not present.	No

### Habitat Suitability for Malleefowl

Malleefowl are found in arid and semi-arid areas dominated by Mallee eucalypts on sandy soils. They are known to also occur in Mulga (*Acacia aneura*), Broombush (*Melaleuca uncinata*), Scrub Pine (*Callitris verrucosa*), Eucalyptus woodlands and coastal heathlands. Malleefowl require abundant leaf litter and a sandy substrate for the successful construction of nest mounds. The effect of fire on Malleefowl is severe, and breeding in burnt areas is usually reduced for at least 30 years.

Approximately 40% of Reserve 26912 (650 ha) did not burn during the November 2015 bushfire. Vegetation type A ‘Mixed Mallee woodland with mixed *Melaleuca* shrubs’ contains roughly 513 ha of likely suitable unburnt vegetation with suitable sandy substrate and leaf litter. This vegetation type occurs entirely on the mapped areas of sandy duplex soils. During the single day visit to the reserve no malleefowl or nests were located. The remaining 958 ha of vegetation type A which burnt in 2015 likely won’t be suitable nesting habitat until 2045, but will contain foraging habitat prior to then.



**Figure 12.** Typical quantity of leaf litter in the unburned sections of vegetation type A. Photo taken on the 23/05/2023 by Katherine Walkerden.

### **Regional Context**

Reserve 26912 is located approximately 27 km south-west of Salmon Gums along Rollond road. The regional landscape is highly fragmented due to agricultural clearing.

The area is listed as containing Beard vegetation associations 51, 512, 924 & 482. Beard VA 512 has been highly cleared with only 20% of its pre-European extent remaining within the Shire of Esperance additionally only 2% of its pre-European extent is currently within land protected for conservation. VA 512 would greatly benefit from the current offset proposal due to its extremely low extent within protected areas.



**Table 3.** Vegetation association by percentage of pre-European extent remaining.

<b>Vegetation association</b>	LORT_51:	LORT_512	SALMON GUMS_924	LAKE HOPE_482
<b>Description</b>	Sedgeland; reed swamps, occasionally with heath	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & Forrest's marlock ( <i>E. forrestianna</i> )	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & red mallee	Medium woodland; merrit & red mallee
Pre-European extent remaining	55.95	26.40	56.47	99.04
Pre-European extent remaining within the <b>Shire of Esperance</b>	42.97	20.14	56.47	97.54
Pre-European extent remaining within <b>Eastern Mallee IBRA Sub-region</b>	42.97	26.07	56.43	95.36
Pre-European extent in land protected for conservation	38.09	2.40	22.64	8.83

#### 4 Threats (to nature conservation values):

<b>Altered hydrology</b>	Salinity and or waterlogging appears to have significantly increased since the 2015 Bushfire, with vegetation structure having been obviously altered in the small western salt lake area. It is unclear what impact this is having in the central yate swamp basin.
<b>Introduced plants</b>	Pasture weeds are present along the southern edge of the reserve localised to a section adjacent to a historic dam. There was significant weed invasion within the central seasonally inundated section of the yate swamp.
<b>Introduced animals</b>	Feral predators such as foxes and cats are likely present within the reserve and there is currently no control activities occurring within the reserve.
<b>Disease</b>	No obvious signs of disease were present, a majority of the vegetation is unlikely to be susceptible to phytophthora dieback.
<b>Detrimental regimes (fire)</b>	Approximately 60% of the reserve burned in 2015. There are currently no plans for controlled burns within the reserve.
<b>Timber cutting / clearing</b>	Significant firewood harvesting has occurred within the yate swamp area.
<b>Extractive activities</b>	There are two limestone pits that have only been partially rehabilitated at the site.
<b>Rubbish</b>	A small amount of rubbish had been left behind during firewood harvesting.
<b>Grazing</b>	None present.
<b>Beekeeping</b>	None present.
<b>Utilities</b>	None present.
<b>Recreation</b>	The remains of a campfire were seen in one of the historic limestone pits. The two tracks into the reserve have had moderate recent traffic.



**Figure 13.** Photo showing firewood extraction within Vegetation type B. Photo taken on the 23/05/2023 by Katherine Walkerden.

## 5 Offset suitability

Reserve 26912 'Roberts Swamp' is a large (1661.7 ha) and ecologically diverse reserve. The reserve contains suitable offsets as significant remnant vegetation and Malleefowl breeding habitat. Despite the reserve containing a 300ha "Regionally Significant" Yate Swamp, this yate swamp does not meet the PEC definition in the PEC listing documentation criteria. It should be noted that this documentation referred to yate swamps near Bremer Bay.

Roberts Swamp is described as an "irregular macroscale sumpland and associated extensive damplands" (Ecologia 2000). This means the wetland is a large seasonally inundated basin, which is connected to a number of adjoining flats that are seasonally waterlogged. The wetland is fed by at least three seasonal watercourses, the main tributary draining the catchment to the north east and east of the reserve. Roberts Swamp seasonally inundates and then slowly empties, possibly through cavities in the underlying soil profile, which results in little accumulation of salts. The water quality in the wetland has therefore remained fresh. For this reason and due its size, the Roberts swamp is considered an excellent example of its wetland type.

The reserve did not provide suitable offsets for the 'Swamp Yate (*Eucalyptus occidentalis*) woodlands in seasonally inundated clay basins (South Coast)' PEC. It is unclear whether the yate swamp would have been consistent with the PEC listing documentation prior to the November 2015 bushfires.



The *Eucalyptus occidentalis* swamp had seen significant firewood extraction and weed invasion, *Eucalyptus occidentalis* swamps are particularly vulnerable to disturbance and measures will be taken to curtail extractive activities within the reserve.

The large unburned sections of Mallee woodland provide suitable Malleefowl breeding habitat are in a pristine condition with no weed invasion or firewood harvesting occurring. The patchwork burn pattern within the reserve will reduce the likelihood of future high intensity fires within the reserve.

The conservation and intrinsic value of the reserve can be appreciated by walking through and observing the diversity of flora, the old growth Salmon Gums, the active birdlife and the tell-tale signs of kangaroos and emus.

## References

Ecologia Environmental Consultants (2000) *A Preliminary Evaluation of Wetlands in the Esperance Water Resource Region*, Unpublished report for the Water and Rivers Commission.

Greenskills (2003) *Wetland Conservation at Esperance WA Recommendations for the Management of the Catchment and waterways of the Roberts Swamp*, A report produced by Green Skills for the Natural Heritage Trust and the Water and Rivers Commission by Wetland project officer Kevin Hopkinson November 2003.

## Appendix 1: Swamp Yate (*Eucalyptus occidentalis*) woodland in seasonally-inundated basins - Community Description

Description obtained from: Ecologia for Grange Resources Limited (2008) Southdown Magnetite Proposal. Regional Flora and vegetation assessment. Unpublished Report

### Swamp Yate (*Eucalyptus occidentalis*) woodland in seasonally-inundated basins

#### Community Description

The centre of these sumplands was usually inhabited by Swamp Yate (*Eucalyptus occidentalis*) low woodland often with an understorey of the Saltwater Paperbark (*Melaleuca cuticularis*). Peripheral to the central seasonally-inundated basin of these wetlands there was often a waterlogged zone of *E. occidentalis* associated with *Kunzea recurva* heath to open scrub and/or the small trees *Melaleuca preissiana* and *Banksia littoralis* and a number of mallees (primarily *Eucalyptus decipiens* subsp. *adesmophloia*). Fringing the wetland there was usually an *Anarthria laevis* sedgeland. However in the wetlands where there was shallow laterite, the sedgeland was usually replaced with a *Pericalymma ellipticum* heath.

The understorey shrubs of this vegetation were typically very open. *Melaleuca cuticularis*, *Kunzea recurva* and *Hakea nitida* generally formed an open tall shrub layer. *Hakea denticulata*, *Hakea laurina*, *Hakea varia*, *Exocarpos sparteus*, *Agonis theiformis*, *Lambertia inermis* and *Nuytsia floribunda* were also sometimes present in the seasonally waterlogged areas fringing the sumplands. Other common shrub taxa, recorded at low density across the sampled sites were *Isopogon trilobus*, *Acacia pulchella* var. *glaberrima*, *Taxandria spathulata*, *Astartea glomerosa*, *Astartea aspera*, *Beaufortia empetrifolia*, *Melaleuca concinna* and *Conothamnus aureus*. Other mid and low shrub species recorded at lower abundance included *Acacia biflora*, *Acacia luteola*, *A. subcaerulea*, *Adenanthos cuneatus*, *Banksia baueri*, *Banksia dryandroides*, *Bossiaea praetermissa*, *Daviesia inflata*, *Dryandra falcata*, *Dryandra mucronulata* subsp. *mucronulata*, *Dryandra tenuifolia* var. *tenuifolia*, *Gompholobium confertum*, *Hibbertia lineata*, *Leucopogon conostephioides*, *Melaleuca subtrigona*, *Petrophile squamata* subsp. *squamata*, *Petrophile media*, *Spyridium majoranifolium*, *Stirlingia anethifolia* and *Thomasia stelligera*. The perennial herbs *Villarsia parnassifolia*, *Anthotium humile*, *Stylidium corymbosum*, *Goodenia filiformis* and *Velleia trinervis* were abundant in the wetlands in good condition. These herbs inhabited the shallowly-inundated zone of the wetland and were most apparent when the water receded and the herbs were in flower in late summer. A dense ground layer was generally present in the seasonally waterlogged fringe of the sumplands and this was dominated by rushes and sedges including *Anarthria laevis*, *Baumea juncea*, *Gahnia ancistrophylla*, *Lepidosperma striatum*, *Schoenus laevigatus*, *Schoenus subfascicularis* and *Tricostularia compressa*. A suite of native grasses was also recorded including *Amphipogon amphipogonoides*, *Austrostipa hemipogon*, *Cyperochloa hirsuta*, *Deyeuxia quadriseta* and *Neurachne alopecuroidea*. Naturalised alien grasses and herbs were prevalent in the more disturbed wetlands and these included \**Aira caryophyllea*, \**Cirsium vulgare*, \**Conyza parva*, \**Conyza sumatrensis*, \**Hordeum leporinum*, \**Hypochaeris glabra*, *Juncus pallidus*, \**Lagurus ovatus*, \**Pennisetum clandestinum*, \**Pseudognaphalium luteoalbum*, \**Rumex crispus*, \**Solanum nigrum* and \**Vulpia myuros* var. *megalura*



## Appendix 2: Desktop Flora Search Results

**Table 4.** Threatened or priority flora identified by the desktop study to be present within a 20 km radius of the offset site, using Threatened and Priority Flora Reporting, WA Herbarium and Esperance District Threatened Flora datasets

Taxon	Conservation Status	Distance from site (km)	WA Herb	TPFL	Esperance District
<i>Acacia diaphana</i>	P1	1.22	X		X
<i>Acacia diminuta</i>	P1	17.84	X	X	
<i>Dicrastylis archeri</i>	P1	4.78	X		X
<i>Eucalyptus misella</i>	P1	18.76	X	X	X
<i>Eutaxia andocada</i>	P1	11.50		X	X
<i>Styphelia sulcata</i>	P1	11.87	X	X	X
<i>Acacia amyctica</i>	P2	5.52	X	X	X
<i>Aotus</i> sp. Dundas (M.A. Burgman 2835)	P2	0.29	X		
<i>Conospermum sigmoideum</i>	P2	9.42	X		
<i>Acacia glaucissima</i>	P3	10.55	X	X	
<i>Acacia improcera</i>	P3	17.18	X		X
<i>Chorizema circinale</i>	P3	19.84	X		X
<i>Conostephium marchantiorum</i>	P3	14.60	X	X	X
<i>Cyathostemon</i> sp. Salmon Gums (B. Archer 769)	P3	17.27	X		
<i>Eremophila chamaephila</i>	P3	6.36	X	X	X
<i>Goodenia laevis</i> subsp. <i>laevis</i>	P3	6.39	X		
<i>Persoonia cymbifolia</i>	P3	11.21	X		
<i>Persoonia scabra</i>	P3	4.77	X		
<i>Eucalyptus dolichorhyncha</i>	P4	4.61	X		X
<i>Grevillea aneura</i>	P4	8.52	X		X
<i>Marianthus aquilonaris</i>	T	2.99			X
<i>Leucopogon rugulosus</i> (sp. Roberts Swamp)	P1	0.54	X	X	X
<i>Stenantha lacsalaria</i>	P2	19.65			X
<i>Halgania</i> sp. Peak Eleanora	P2	10.41	X		X
<i>Bossiaea flexuosa</i>	P3	17.64	X		X
<i>Eremophila compressa</i>	P3	9.88	X	X	X
<i>Eremophila lactea</i>	T	1.70	X	X	X
<i>Hypocalymma magnificum</i>	T	16.20	X		