Weed Management Plan for Reserve 26257

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BAM Act: Biosecurity and Agriculture Management Act 2007 (WA)
DBCA: Department of Biodiversity, Conservation and Attractions
EPBC Act: Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
PEC: Priority Ecological Community
PF: Priority Flora (Under BC Act)
SOE: Shire of Esperance
TEC: Threatened Ecological Community
TF: Threatened Flora (Under BC Act)
TPFL: Threatened and Priority Flora Database (DBCA)
TPRF: Threatened and Priority Flora Report Form
WAH: Western Australian Herbarium (PERTH)
WAOL: Western Australian Organism List

1. Introduction

Reserve 26257 was vested by the Shire of Esperance as an environmental offset site in 2017, after field surveys confirmed the presence of the extensively cleared Beard Vegetation Association (BVA) 6048: Kwongkan shrublands with scattered *Nuytsia floribunda* suitable for offsetting the clearing of 6.216 ha of BVA 6048 in 'Very Good' condition under CPS 10154/1. Consequently, the vesting of R 26257 was changed from 'Recreation and Parklands' to 'Conservation'. Utilising banked offset site.

The 105.03 ha reserve exists in a predominantly 'Pristine' condition, with several localized areas of degradation evident where historical gravel pits have been rehabilitated, and where edge effects have facilitated the invasion of agricultural weeds into the site, including the highly destructive and monoculture-forming Victorian Tea Tree (*Gaudium laevigatum*), and one isolated infestation of Pyp Grass (*Ehrharta villosa*). The Maritime Pine (*Pinus pinaster*) has been planted widely across the Merivale area as forestry plantations and paddock windbreaks, and a population is currently naturalising within the reserve. A map of the vegetation types and condition across the reserve is presented in Appendix 1.

The Department of Water and Environmental Regulation (DWER) have calculated that the 33.97 ha of BVA 6048 (synonymous with Vegetation Type A: Kwongkan Shrublands) present in a 'Pristine' condition counterbalances the impact under CPS 10154/1 by 87.4%. Conserving an additional 1.4 ha mapped as 'Excellent', 'Very Good' or 'Good' condition would counterbalance approximately 3.2% of the clearing. Managing weeds within an additional 1.82 ha of BVA 6048 in 'Excellent', 'Very Good' and 'Good' condition would counterbalance approximately 5% if the vegetation cleared under CPS 10154/1. Therefore, Reserve 26252 is capable of offsetting approximately 95.6% of the clearing of 6.216 ha of BVA 6048 under CPS 10154/1. The remaining 4% of environmental offset will be required to be found elsewhere within the Esperance LGA.

This Weed Management Plan (WMP) provides additional offset values as well as maintaining the integrity of the reserve for conservation purposes into the future.

1.1 Purpose

The objective of the WMP is to address weed invasion within Reserve 26257, assisting the improvement of biological and ecological values of the vegetation as a suitable environmental offset site for CPS 10154/1. During a site survey of the site in September 2023, eight species of invasive flora were identified to be affecting the condition and natural regeneration of BVA 6048, particularly along the reserve boundary and in previously rehabilitated gravel pits. This WMP aims to provide a detailed strategy to manage and monitor the weed species identified to occur within the site, enhance natural bushland regeneration, and provide guidance on mitigating the risk of weed spread within and from outside the reserve. Ultimately, the WMP aims to restore the areas of vegetation classed as 'Excellent', 'Very Good' and 'Good' to an 'Excellent' or 'Pristine' condition, thereby increasing the amount of environmental offset of the reserve by for CPS 10154/1.

The effectiveness and efficacy of the WMP will be reviewed periodically to determine whether weed management is sufficient to meet targets, or if adjustments will be required. Successfully managing weeds (i.e. improving vegetation condition to 'Excellent' or 'Pristine') over 1.82 ha of mapped vegetation will counterbalance vegetation cleared under CPS 10154/1.

1.2 Scope

The WMP applies to vegetation classed as existing in an 'Excellent', 'Very Good', or 'Good' condition within Reserve 26257, as well as any observed early infestations across the entirety of the reserve.

Reserve-wide weed management is crucial for effective long-term control. Weed management and biosecurity measures included in this WMP relate to reserve management works that may include but are not limited to:

- Maintenance of firebreaks and any infrastructure;
- Movement of soil and vegetative material (e.g. felled weed trees) within the reserve, or movement to or from external sites, including on vehicles; and
- Environmental works, such as weed spraying, felling, slashing, hand-weeding, and / or assisted regeneration plantings.

1.3 Responsibility

The responsibility to implement this WMP lies primarily with the Shire of Esperance (SoE), which will ensure compliance with the strategies outlined in this WMP and also ensuring required monitoring is undertaken. The responsibility of meeting targets stipulated within this WMP also remain with the SoE.

1.4 Environmental Legislation and Guidelines

This WMP is complaint with the following Federal and State Environmental Legislation and Guidelines:

- Biosecurity and Agricultural Management Act 2007 (BAM Act);
- Australian Weed Strategy 2017-2027 (IPAC, 2017);
- Environmental Weed Strategy for Western Australia (EWSWA); and
- Shire of Esperance Environmental Weed Strategy 2009-2018 (Field, 2009).

2. Weed Management

2.1 Weeds present within Reserve 26257

The site was initially inspected on the 1st of September by Julie Waters (SOE Environmental Coordinator) and Kahree Garnaut (SOE Environmental Officer). It was re-visited on the 15th November 2023 by Kahree Garnaut to undertake a more thorough assessment of weed distribution. In addition to assessing weed species present, a general assessment of other ecological impacts was undertaken for disturbances such as senescence, Phytophthora dieback, illegal dumping and litter, fire, erosion, waterlogging, and invasive fauna. The field survey identified eight weed species within Reserve 26257, namely Victorian Tea Tree (*Gaudium laevigatum*), Pyp Grass (*Ehrharta villosa*), Freesia (*Freesia alba x leichtlinii*), Guildford Grass (*Romulea rosea*), Rose Pelargonium (*Pelargonium capitatum*), Maritime Pine (*Pinus pinaster*), Solar Fire (*Ursinia anthemoides*), and Agapanthus / African Lily (*Agapanthus praecox*). All weed species are listed as 'Permitted' under Schedule 11 of the BAM Act. All species except for *Ursinia anthemoides* are listed as environmental weeds under the EWSWA. No Weeds of National Significance (WoNS) were recorded within the site. Refer to Table 1 below.

Table 1: Weed species present within the site.

Weed species	EWSWA Rating	WPP South Coast Rating (DBCA, 2011)		BAM Act
		Ecological Impact	Invasiveness	
Victorian Tea Tree *Gaudium laevigatum*	High	High	Rapid	Permitted – s11
Pyp Grass *Ehrharta villosa*	High	High	High	Permitted – s11
Agapanthus *Agapanthus praecox* subsp. *praecox*	Low	High	Moderate	Permitted – s11
Freesia *Freesia alba x leichtlinii*	High	High	Moderate	Permitted – s11
Rose Pelargonium *Pelargonium capitatum*	High	Medium	Rapid	Permitted – s11
Maritime Pine *Pinus pinaster*	Moderate	Medium	Moderate	Permitted – s11
Guildford Grass *Romulea rosea*	High	Unknown	Rapid	Permitted – s11
Solar Fire *Ursinia anthemoides*	Not listed	Unknown	Rapid	Permitted – s11

Of the eight species relevant to this reserve, *Ehrharta villosa* and *Gaudium laevigatum* presented as the most concerning, regarding the species' high ecological impacts and anticipated rapid invasion further into the reserve. Conversely, *Romulea rosea* and *Ursinia anthemoides* were regarded as the least concerning, and were subsequently not prioritised in this WMP. Refer to Table 2 below for details on each species' invasive tendencies and associated ecological impacts.

Table 2: Weed species descriptions and known ecological consequences. (ALA, 2023; Urban Bushland Council)

Weed species	Description	Ecological Impact	Reproduction and Dispersal Methods	Likely Sources	Photo
Agapanthus / African Lily *Agapanthus praecox*	Clump-forming lily with dark, glossy strap-like leaves arising from a basal clump. The leaves leak an irritating sticky sap when cut. Blue to purple, or occasionally white flowers appear in spring and summer, featuring as a prominent clustered head.	Rapidly colonises high-rainfall areas and near granite outcrops, threatening unique ecosystems that often host high endemism.	Fruiting and wind-dispersal of seeds. Basal clumping.	Garden cultivation and illegal garden waste dumping.	

Weed species	Description	Ecological Impact	Reproduction and Dispersal Methods	Likely Sources	Photo
Freesia *Freesia alba x liechtlinii*	Small herb growing to approximately 30 cm tall, with perennial tuber corms and annual above-ground foliage. Usually dormant during summer. Clusters of trumpet-shaped flowers that can be white, yellow, pink, red, or purple.	Competes with and displaces native herbs, sedges and grasses, including orchids. Bulbs can reach densities as high as 1500 /m^2. Can alter plant community structure and composition, and threaten rare and threatened flora. Can entirely occupy rock crevices and summit meadows.	Vegetatively – production of bulbils through the root system. Sexually – production of viable seed.	Garden cultivation and illegal garden waste dumping. Bulbils can be spread by road maintenance vehicles, contaminated soil dumping.	 *Image: Florabase*
Guildford Grass *Romulea rosea*	Perennial herb bearing inflorescences in spring, the six petals of each flower being pink with a yellow throat. Leaves are dark green and thread-like. Can often take on the appearance of a mat of grass. Perennial underground bulb regenerates foliage annually.	Displaces native herbs and can alter the structure and function of the vegetation community. Can cause toxicity to livestock; effect on native fauna unknown.	Vegetatively – production of bulbils through the root system. Sexually – production of viable seed.	Garden cultivation, mowing of infested areas (can spread bulbils and seed),	 *Image: Florabase.*

Weed species	Description	Ecological Impact	Reproduction and Dispersal Methods	Likely Sources	Photo
Maritime Pine *Pinus pinaster*	Medium to large (to 25 m) evergreen gymnosperm with deeply fissured, plated bark with smooth dark red or brown surface. Large cones 9-20 cm long that are nearly stalkless, with long, needle-like leaves usually borne in groups of two.	Slow to establish but once forming a canopy component, thick leaf litter can inhibit native seedling recruitment and reduce biodiversity, and can alter groundwater and surface hydrology by lowering the water table.	Seeds can be dispersed by animals or wind. Animals (e.g. cockatoos) often drop cones whilst foraging. Seed cones can be viable for 10-20 years in dry soil.	Forestry plantations and gardens.	
Rose Pelargonium *Pelargonium capitatum*	Straggly shrub to 1m with pubescent foliage, with clusters of pink flowers in spring and summer.	Intensively competes with native flora, particularly where a disturbance is regular or severe. Forms dense shrublands that can inhabit native seedling recruitment and deplete soil seed bank.	Seed production. Spiral coil on seed allows attachment to animal feathers, skin or fur, and also assists with securement in soil.Regenerates readily in recently-burnt areas.	Originally from gardens for ornamental and medicinal purposes.	

Weed species	Description	Ecological Impact	Reproduction and Dispersal Methods	Likely Sources	Photo
Victorian Tea Tree *Gaudium laevigatum*	Shrub or small tree growing to 6 m, bearing small white flowers from autumn to spring. Reaches reproductive maturity at 4 years.	Forms monocultured, impenetrable thickets and can rapidly displace entire vegetation communities. Allelopathic chemicals released from leaves in litter inhibit germination of native plants.	Seed released from woody fruits. Seed released *en masse* when plants disturbed, especially by herbicide, mechanical damage or fire.	Used to be promoted as a windbreak species for local farmers. Now prevalent throughout Esperance bushland.	
Pyp Grass *Ehrharta villosa*	Vigorous mat-forming grass spreading via a network of strong, dense creeping rhizomes.	Forms monocultures when established, particularly in sand. Causes significant biodiversity loss and displace numerous faunal taxa of their habitat. Inhibits growth of native vegetation. Changes structure and dynamics of coastal sand dunes.	Spreads via network of rhizomes; also flowers in late spring and releases seeds to be dispersed by wind.	Likely wind-blown seed has established within pocket of sandy soil in granite.	 *Image: NACC NRM.*

2.2 Weed abundance and distribution

The seven weed species were observed, primarily occurring within the rehabilitated gravel pits and disturbed areas along the northern and eastern boundaries. Proximity to agricultural and forestry land uses, and regular disturbance from powerline access track maintenance, creates an environment favouring disturbance-opportunist invasive species. A map depicting weed distribution across the reserve is presented in Figure 1. Note that *Romulea rosea* is not depicted on this map, as it was widespread across the reserve's eastern boundary, and was subsequently not recorded with the GPS in the field.

Agricultural perennial grasses such as African Lovegrass (*Eragrostis curvula*), Perennial Veldt Grass (*Ehrharta calycina*), and Kikuyu Grass (*Cenchrus cladestinus*) were observed within the firebreaks (Image 2). These species were considered when designing the management schedule, as limiting their abundance and distribution adjacent to the firebreak / powerline access track would prevent future vegetation condition declines as a result of agricultural grass invasion.

Image 2: Perennial agricultural grassy weeds invading via firebreaks along the eastern edge.

The perennial *Ehrharta villosa* was observed colonising a patch of granitic vegetation in the centre of the reserve, marked in Figure 1. This plant's roots are bound by the shallow pocket of soil within the granite, restricting its ability to spread vegetatively. However, given the plant was likely sourced from wind-blown seed from a nearby infestation within a coastal dune system, other populations may appear in sandy soils within Vegetation Type A (Image 3).

Image 3: Granitic inselberg within which pockets of shallow soil support native geophytes, as well as a clump of *Ehrharta villosa*.

Gaudium laevigatum was abundant and widespread across the edges of the reserve's vegetation, particularly abundant within kwongkan vegetation managed as an access track for overhead powerlines, and along a disturbed bank fringing a rehabilitated gravel pit on the eastern boundary. In slashed areas, the weed was observed to be resprouting from cut stumps. Several isolated, young saplings and plants were evidence of population spread deeper into the core of the reserve's vegetation, particularly where vegetation had been altered by a sparse canopy of *Pinus pinaster*.

Agapathus praecox was found as one individual plant within a rehabilitated gravel pit. Due to this plant co-occurring with an early-stage infestation of *Freesia alba x leichtlinii*, it is likely that this site has been impacted by illegal garden waste dumping sometime over the last several years.

Pelargonium capitatum was present as an early-stage infestation of only several plants, localised to the disturbed fringe of vegetation along the northern boundary. It was co-occurring with a population of *Pinus pinaster* and *Gaudium laevigatum*.

Pinus pinaster was widespread and sparse across the northern-eastern quarter of the reserve, within rehabilitated gravel pits, at the base of granite inselbergs, and along the western boundary next to Cape Le Grand Road. In three locations towards the centre of the reserve, *P. pinaster* formed an open woodland above the kwongkan shrubland (Image 4). The observation of several young trees indicated this species was naturalising. Numerous chewed pine cones indicated that the species is utilised by the EN Carnaby's Cockatoo as a food source.

Image 4: Patch of *Pinus pinaster* within Vegetation Type A: Kwongkan Shrublands. Density of *P. pinaster* varied from isolated trees to open woodlands, as pictured above.

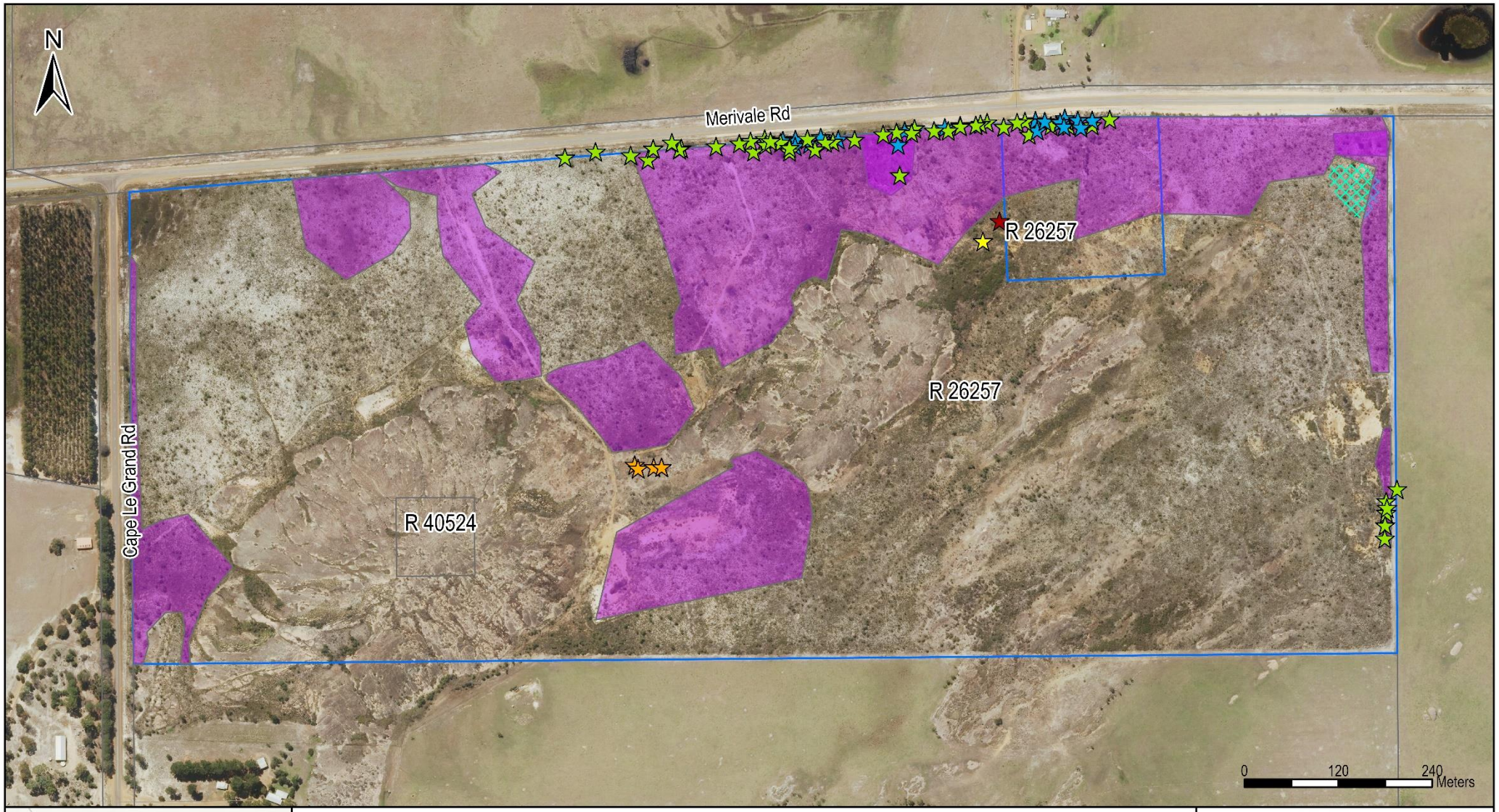

Figure 1: Reserve 26257 Weed Distribution.

R 26257
Potential Dieback
Weed Area
Scattered *Pinus pinaster*

Weed species
Agapanthus praecox
Ehrharta villosa
Freesia alba x leichtlinii
Gaudium laevigatum
Pelargonium capitatum

Created on 15/11/2023 by Kahree Garnaut
Shire of Esperance

Imagery: Merivale 3330 Aerial (March 2018)
Coordinate System: GDA 1994 MGA Zone 51
Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS

Scale: 1:7,000

2.3 Weed management and control actions

Effective weed management typically requires a holistic approach involving the use of herbicides, biological control agents (e.g. insects or disease), manual control (e.g. slashing, mowing) and managing ecological degradation and disturbance processes, including fire regimes. The most cost-effective method is to prioritise targeting early-stage infestations for weed control, particularly if they are within vegetation of 'Excellent' or better condition. Smaller populations at an early stage of establishment are much more likely to respond to treatments, particularly where they have not yet established a soil seed bank.

Assisted bushland regeneration involves promoting natural vegetation recovery by reducing disturbance pathways and selectively removing weeds using the least destructive techniques possible. This gradual approach is centred around protecting the most intact vegetation, before slowly working towards areas that are more disturbed. This might involve approaches such as, but not limited to:

- excluding seed-dispersing invasive fauna;
- hand-weeding, injecting or felling small infestations;
- replanting bare areas with native seedlings;
- implementing suitable fire regimes, or excluding unsuitable practices;
- laying brushing of native species; and
- selectively spraying small areas.

Due to *Pinus pinaster* existing as a favoured novel food source and roosting tree for the EPBC Act-listed EN Carnaby's Cockatoo, which has been observed to utilise the invasive species within the site, replacement with local native forage species will be strongly recommended. Refer to the species list in Appendix 3 for planting recommendations. Due to the small population size and low density of pines present within the site, and the close proximity of the site to large *P. pinaster* plantations for forestry, the pines within the reserve are highly unlikely to constitute significant forage or roosting value for the cockatoos. Therefore, enhancing the understorey with endemic black cockatoo forage species should sufficiently compensate for the loss of pine cone forage provided by the scattered individuals in the north of the reserve.

2.4 Weed Prioritisation

A weed species management hierarchy was developed based on an assessment of each weed species' ecological impact, invasive potential, and current distribution / abundance within the site. Refer to Table 3 below.

Table 3: Prioritisation of weed species management within R 26257.

Priority	Weed Species	Management Actions
1	Victorian Tea Tree *Gaudium laevigatum*	Slash and fell thickets, burn when dry. Hand-pull seedlings. Seed bank persists > 1 year, and plants reach reproductive maturity at 4 yrs. Spray regrowth with 100 mL Glyphosate (450 g/L) with 25 mL Pulse® in 10 L of water. Management will be required for > 10 years to address soil seed bank.
2	Pyp Grass *Ehrharta villosa*	Targeted removal of individual plant within granite outcrop. Either dig out or spray with1% glyphosate with penetrant during growing season (spring). Revisit site next spring to assess whether follow-up treatment required.
3	Agapanthus *Agapanthus praecox*	Manually remove complete plant (including root system) and burn. Glyphosate is not effective; however, spraying is unlikely to be necessary due to early stage of infestation.
4	Freesia *Freesia alba x leichtlinii*	Can carefully hand-manage small infestations by loosening soil and ensuring all bulbs are completely removed. Any bulb fragments can re-sprout. Replant treated area with native shrubs / ground covers. In sensitive areas, wiping leaves with 1-part Glyphosate (450 g/L) mixed with 2-parts water sufficient. If spraying, 2-3 years of 0.5 g metsulfuron (600 g/kg) in 10 L water.
5	Rose Pelargonium *Pelargonium capitatum*	Remove large plants and hand-weed seedlings year-round to prevent seed set for > 3 years. Replant with native plant species. In bushland areas spray with 1 L/ha of 2,4-D amine (500 g/L) plus 25 mL wetting agent in 10 L of water. Isolated plants can be target-sprayed with 1-part Glyphosate (450 g/L) in 2 parts water.
6	Maritime Pine *Pinus pinaster*	Fell large trees and paint stump cut with Vigilant® gel, metsulfuron at 20 g/L, or Grazon. Hand-pull seedlings and smaller pines. Remove any pine cones evident on the ground to reduce risk of germination. Due to nearby plantations and Carnaby's Cockatoos dropping pine cones, re-infestation is likely and continual management necessary.

Priority	Weed Species	Management Actions
7	Guildford Grass *Romulea rosea*	Agricultural weed only prevalent along the reserve edges and access tracks; no management actions warranted unless otherwise observed to be impacting vegetation recovery or appears to be spreading.
8	Solar Flare *Ursinia anthemoides*	Minor weed with minimal observed impacts. No management actions warranted unless increases in abundance or impacts on native vegetation are observed.

2.5 Revegetation

Revegetation is a restoration technique commonly used to assist the recovery of vegetation struggling to recruit through existing ecological processes, or where bare soil created by weed management would otherwise be quickly re-infested by weeds. Other revegetation areas to be targeted would include failed gravel pit rehabilitation areas and eroded zones. A suite of recommended planting species has been devised for each vegetation type, based on the incidental flora lists created during the 2017 and 2023 surveys, and Florabase records of plants that occur locally (refer to Appendix 3).

Due to disturbances and possible residual effects of weed treatments, planting will likely commence one to two years' post-chemical application. The plantings will be highly variable in their extent, density (stems per ha), and species composition. To mitigate the impacts of feral herbivore or macropod grazing on the establishing seedlings, a physical barrier of biodegradable tree guards with pine stakes will be erected. Brushing may be used within these planting areas to enhance erosion mitigation, reduce grazing pressure, and promote native seed recruitment. Potential areas to be planted during the operation of this WMP are depicted in Figure 2. Approximately 2.87 ha is available for planting. Due to the variable density of plantings required, only 1000 – 2000 seedlings will be planted initially in the second winter of the WMP, in July 2025, and infill plantings may be required in 2026-2028.

The entire mapped potential dieback infestation will be avoided under most circumstances during the operation of the WMP to mitigate the risk of disease spread. No planting or brushing will be undertaken within this zone, as the seedlings would also likely perish or be inhibited if infected by the pathogen.

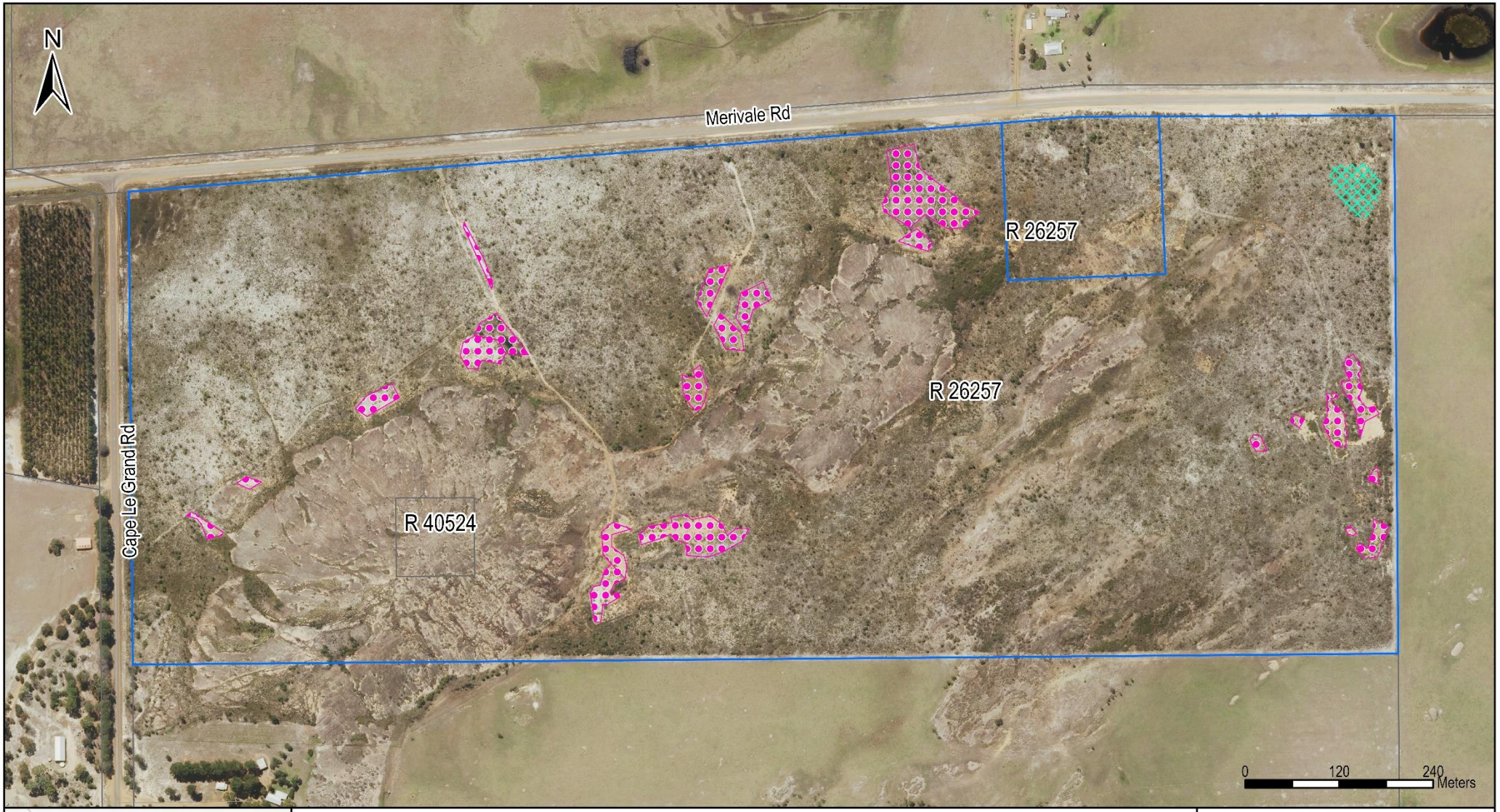

Figure 2: Reserve 26257 Potential Revegetation Areas.

- R 26257
- Potential Dieback
- Potential Revegetation Areas

Created on 15/11/2023 by Kahree Garnaut
Shire of Esperance

Imagery: Merivale 3330 Aerial (March 2018)
Coordinate System: GDA 1994 MGA Zone 51
Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS

Scale: 1:7,000

3. Biosecurity and Hygiene

Effective weed management requires vigilance regarding the mitigation weed spread from their current distribution within the site, and establishing new populations elsewhere. This requires consideration of the vectors of weed spread that may present during the operation of the WMP, or are present systematically within the reserve, such as routine firebreak slashing. The following key measures (Table 4) will be implemented to ensure minimisation of the risks of weed spread; many of these hygiene measures were tailored according to the Dieback Working Group's *Managing Phytophthora Dieback in Bushland – A Guide for Landholders and Community Conservation Groups* (DWG, 2015).

Table 4: Mitigation strategies for managing spread of dieback and weeds.

Risk		**Management Strategy**
i	*Transfer of seeds and other weed-infected material on vehicle, machinery, or other mobile equipment*	In dry conditions, brushing down tyres, undercarriages, and other potentially contaminated parts with a clean bristle brush, ensuring all seeds and clods of dirt are removed before entering and departing site. Spray tyres with diluted methylated spirits. In wet conditions, spraying vehicle down at the earliest convenience in a designated wash bay. Ensure that Shire staff and contractors endeavour to clean equipment and machinery when entering and exiting bushland.
ii	*Spread of dieback from known potential infestation*	Avoidance of entering or disturbing mapped potential dieback zone; this includes weed management contractors, weed mapping surveyors, and revegetation contractors.
iii	*Transfer of seeds and / or dieback from the site on personnel and clothing*	All personnel will be required to ensure that all seeds, weed and soil materials are removed from socks, shoes, gaiters, trousers, and other pieces of clothing. If present within a dieback area, spray soles of shoes with diluted methylated spirits before entering and exiting a known or suspected infestation site. Refrain from walking into infested areas. Stay on well-drained tracks where possible.

Risk		Management Strategy
iv	*Viable weed material escaping during management actions*	All plant material hand-weeded will be placed in a hessian bag or thick black plastic bag, ensuring no seeds, corm-contaminated soil or viable reproductive material is shed. Bags will be secured closed with zip ties. The organic waste will either be left in the sun at the Shire Deport to solarise, be burnt, or will be disposed of appropriately. Trees and large shrubs will be felled and any seed-bearing branches placed on an outstretched tarpaulin, cut into manageable pieces and bagged. Any fruiting bodies or reproductive material, e.g. pine cones, will be removed and bagged.
v	*Introduction of Pc Dieback with assisted bushland regeneration actions*	Ensure that native seedling propagation involves the use of confirmed dieback-free soil, or from a nursery with a reputation for excellent hygiene. Drill auger is either sprayed with methylated spirits or is cleaned thoroughly of all soil before boring holes. All personnel involved in planting are required to follow all standard Pc Dieback protocols listed in Risk iii. Minimise activity in wet conditions; undertake planting on winter days where soil is moist but not wet. Avoid walking through infested areas and take methylated spirits in a spray bottle during works. Consider planting species that are resistant to Dieback, particularly within or close to known infestations. For summer watering, ensure water is either sourced from mains supply, or is treated if from a dam. Ensure that any brushing material is sourced from known Dieback-free areas.

4. Targets

Ideally, weed management actions will enable the eradication of early-stage or isolated infestations of environmental weeds. However, for species that are very persistent, widespread and unlikely to be completely eradicated within the soil seed bank within the reserve, such as Victorian Tea Tree, effective long-term suppression could be deemed a success.

Table 5: Performance targets.

Timeframe	Performance Target
Short-term (0 - 2 years)	Eradication of *Agapanthus praecox, Pelargonium capitatum*, and *Freesia alba x leichtlinii*.
	Reduction of *Gaudium laevigatum* population by approximately 80%.
	No new weed species identified within the reserve.
Medium-term (2-5 years)	No new weed populations. Eradication of *Ehrharta villosa* population in granite.
	Weed populations stabilised and/or reduced to < 5% cover
	Presence of emerging native seedlings in brushed areas.
Long-term (> 5 years)	Achieve 'Excellent' or 'Pristine' condition in managed vegetation.
	Sustained suppression of *Gaudium laevigatum* populations.

5. Monitoring

Monitoring is an essential component of examining the efficacy of a WMP, allowing determination of successful techniques, as well as identifying impractical, insufficient, or otherwise ineffective management strategies that will need to be revised. The weed management contractor will be required to visually assess whether the utilised strategies are meeting short- and medium-term performance targets.

Monitoring will take place five years' post-commencement of the WMP, involving re-mapping vegetation condition, weed distribution and abundance within the reserve, and assessing results against the performance targets. A basic report focused on detailing the effectiveness of the WMP in managing weeds within the site will be created from monitoring data and submitted to DWER.

6. Schedule

This WMP is designed to be conducted over approximately 5 years, a time frame considered sufficient to detect any long-lasting improvements in Kwongkan vegetation condition as a result of an effective weed management program. Ecologically, ongoing weed management, as long as surrounding land uses continue to source weeds, will be required to maintain the pristine condition of vegetation within the core of the reserve. The reserve will likely need to be revisited 5 to 10 years after the commencement of this WMP to determine the trajectory of vegetation condition change, and allow for early intervention should weeds and / or other disturbances continue to cause decline. The schedule for weed management is outlined in Table 6.

Table 6: Weed management schedule.

Year	Season	Management Activities
1	Autumn	1. Fell large Victorian Tea Tree and dispose of above-ground vegetation appropriately, paint cut stumps with glyphosate. Hand-pull or cut down seedlings. 2. Dig up entire Agapanthus plant and remove from site for disposal or burning. 3. Cut and paint large Maritime Pine trees; fell medium-sized or small trees. Hand-pull seedlings, and pick up and dispose of seed cones.
	Late winter	1. Follow up glyphosate spray over Victorian Tea Tree after autumn felling. Ideally spray when plants are re-sprouting. 2. Hand-weed early-stage Freesia infestation. Check surrounding areas for any previously undetected populations / isolated occurrences. 3. Hand-weed small Rose Pelargonium plants and seedlings. Hand-spray large areas.
	Spring	1. Collect seed (if required) from reserve and surrounding areas for seedling propagation. 2. Spray Pyp Grass in granite area, or dig out as only one plant.
2	Autumn	1. Inspect for Victorian Tea Tree seedlings and survivors of spraying, and address with either hand-pulling, hand-sawing, or chain sawing.
	Winter	1. Hand-weed any remaining Rose Pelargonium plants. 2. Plant local-provenance native seedlings at a low density in bare areas to encourage natural bushland regeneration. Map areas planted and estimate density. 3. Place seed-bearing native brushing over disturbed, bare areas undergoing weed management (if chosen to be undertaken).
	Late winter	1. Inspect for any germinant weeds and map distribution for spraying 2. Hand-weed Victorian Tea Tree, Rose Pelargonium, Freesias, and Agapanthus if present.
	Summer	1. Conduct summer revegetation area monitoring to assess establishment of seedlings into their second summer.
3	Autumn	1. Inspect for Victorian Tea Tree seedlings, opportunistically hand-weeding or hand-sawing young plants.
	Winter	1. Hand-weed any Rose Pelargonium plants. 2. Infill-plant areas with unsuccessful revegetation establishment with hardier endemic species, or determine cause of failure; 3. Lay any additional brushing where possible and / or required.
4	Autumn	1. Inspect revegetation areas for establishment rates; note whether any failures in infill plantings.
	Winter	2. Follow-up weed control where required.
5		1. Follow-up weed control where required 2. Undertake monitoring activities and reporting.

7. Contingency Plan and Adaptive Management

Due to environmental and ecological variability, and the nature of natural resource management, there is an appreciation that some techniques typically utilised to manage weed species will be unsuitable for the site. Additionally, climatic regimes and weather can be variable, and an exceptionally low-rainfall, warm summer or a heatwave event may result in an unprecedented mass mortality of seedlings used in assisted bushland regeneration.

If issues arise with determining alternative action on weed management or assisted bushland regeneration, or if the progress of weed control is failing, or is predicted to fail targets, several avenues of local expertise may be available, including weed management contractors, native plant nursery managers, Conservation staff from the DBCA, Esperance Tjaltjraak Native Title Aboriginal Corporation (ETNTAC), natural resource management or environmental consulting agencies, and DPIRD.

8. Compliance

The SOE Environmental Team will ensure compliance with this WMP, and evidence of compliance will be made available to DWER for auditing purposes.

9. REFERENCES

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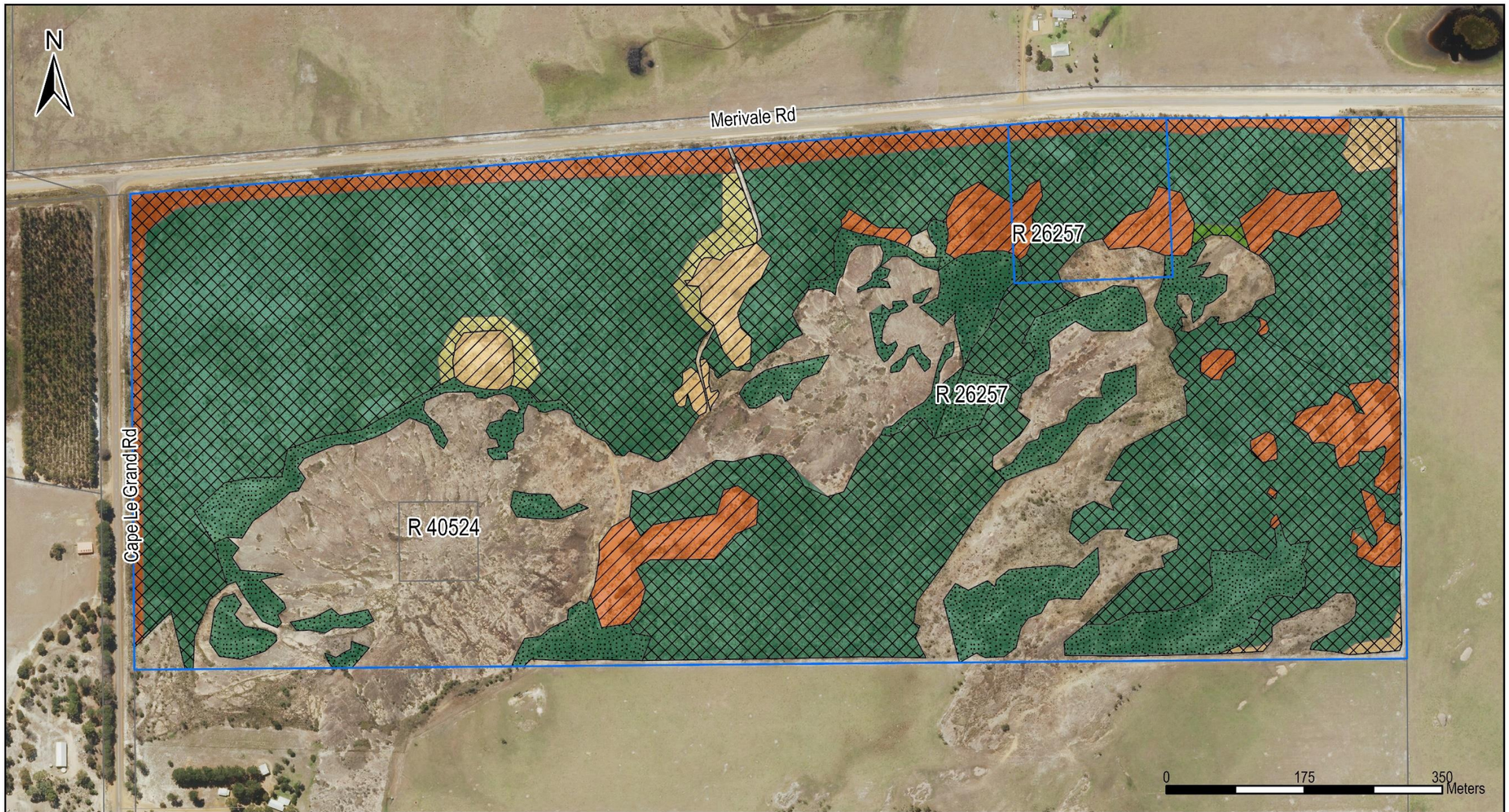
Appendix 1: Vegetation Map.



Vegetation Types and Condition - R 26257 Cnr Merivale and Cape Le Grand Roads

R 26257

Vegetation Type

- A: Kwongkan Shrubland with Nuytsia floribunda
- B: Melaleuca cuticularis Wetland on Gravel
- C: Mixed Granitic Heath with Kunzea baxteri and Borya spp.

Vegetation Condition

- Pristine
- Excellent
- Very Good
- Good
- Degraded

Created on 06/09/2023 by Kahree Garnaut
Shire of Esperance

Imagery: Merivale 3330 Aerial (March 2018)
Coordinate System: GDA 1994 MGA Zone 51
Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS

Scale: 1:7,000

Appendix 2: Categories and Control of Declared (Plant) Pests in Western Australia.

Control Category	Control Measures
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible'. Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to — (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to — (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.

Appendix 3: Recommended Planting List.

Vegetation Type	Genus	Species	Vernacular	Diagnostic Kwongkan species?	Carnaby's Cockatoo forage species?
A	*Allocasuarina*	*humilis*	Dwarf Sheoak		X
	Allocasuarina	*thuyoides*	Horned Sheoak		X
	Callitris	*roei*	Roe's Cypress Pine		
	Mesomelaena	*stygia*	Stygian's Mesomelaena		
	Mesomelaena	*tetragona*	Semaphore Sedge		
	Jacksonia	*spinosa*			
	Nuytsia	*floribunda*	WA Christmas Tree		
	Apectospermum	*spinescens*	Spiny Tea Tree		
	Calothamnus	*gracilis*			X
	Calothamnus	*quadrifidus*	One-sided Bottlebrush		X
	Eucalyptus	*pleurocarpa*	Tallerack		X
	Eucalyptus	*tetraptera*	Four-winged Mallee		X
	Eucalyptus	*uncinata*	Hook-leaved Mallee		X
	Melaleuca	*calycina*			X
	Melaleuca	*pulchella*	Claw Flower		X
	Melaleuca	*striata*			
	Melaleuca	*thymoides*			
	Billardiera	*fusiformis*	Australian Bluebell		
	Adenanthos	*cuneatus*	Coastal Jugflower	Yes	X
	Banksia	*armata*	Prickly Dryandra	Yes	X
	Banksia	*nivea*	Honeypot Dryandra	Yes	X
	Banksia	*nutans*	Nodding Banksia	Yes	X
	Banksia	*obovata*	Wedge-leaved Dryandra	Yes	X
	Banksia	*occidentalis*	Red Swamp Banksia	Yes	X
	Banksia	*pulchella*	Teasel Banksia	Yes	X
	Banksia	*repens*	Creeping Banksia		X
	Grevillea	*concinna*	Red Combs	Yes	X
	Grevillea	*oligantha*			X
	Hakea	*cinerea*	Ashy Hakea	Yes	X
	Hakea	*corymbosa*	Cauliflower Hakea	Yes	X
	Hakea	*ferruginea*			X
	Hakea	*obliqua*	Needles and Corks	Yes	X
	Hakea	*ruscifolia*	Candle Hakea		X
	Hakea	*trifurcata*	Two-leaf Hakea	Yes	X
	Hakea	*undulata*	Wavy-leaved Hakea		X

Vegetation Type	Genus	Species	Vernacular	Diagnostic Kwongkan species?	Carnaby's Cockatoo forage species?
	Hakea	*varia*	Variable-leaved Hakea		
A	*Isopogon*	*formosus*	Rose Coneflower	Yes	X
	Isopogon	*polycephalus*	Clustered Coneflower	Yes	X
	Isopogon	*trilobus*	Barrel Coneflower	Yes	X
	Lambertia	*inermis*	Chittick	Yes	X
B	*Mesomelaena*	*stygia*	Stygian's Mesomelaena		
	Mesomelaena	*tetragona*	Semaphore Sedge		
	Eucalyptus	*occidentalis*	Swamp Yate		X
	Banksia	*occidentalis*	Red Swamp Banksia	Yes	X
	Hakea	*varia*	Variable-leaved Hakea		X
	Isopogon	*formosus*	Rose Coneflower	Yes	X
	Spyridium	*globulosum*	Basket Bush		
C	*Acacia*	*nigricans*			X
	Calothamnus	*quadrifidus*	One-sided Bottlebrush		
	Kunzea	*baxteri*			X
	Banksia	*repens*	Creeping Banksia		X
	Hakea	*trifurcata*	Two-leaf Hakea	Yes	X
	Hakea	*clavata*	Coastal Hakea		X