CPS 10333/1

Request For Further Information

Revegetation Management Plan

Shire of Dardanup

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This revegetation management plan was developed using the 'A Guide to Preparing Revegetation Plans for Clearing Permits under Part V of the Environmental Protection Act 1986' (DWER 2018)

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1.0 Introduction

1.1 Purpose of the plan.

This Revegetation Plan relates to the Shire of Dardanup's application (CPS 10333/1) for a clearing permit under section 51E (1) of the Environmental Protection Act 1986 (the EP Act). This application is regarding the proposed clearing of 0.07 hectares of native vegetation within Ferguson Road reserve (PIN 1321426) Henty, for the purpose of road safety upgrades. The application was received by the Department of Water and Environmental Regulation (the Department/DWER) on 12 September 2023.

On 31 October 2023, the Department wrote to the Shire of Dardanup requesting further information on avoidance and minimisation measures. DWER received a formal response on 9 November 2023, including a revised application area. The assessment of the revised application determined that residual impacts remain, and an offset is required to counterbalance these impacts.

On 4 December 2023, the Department wrote to the Shire of Dardanup notifying of this offset requirement, including the additional information requested to identify satisfactory environmental offsets as prescribed in Schedule 1 of the notice. This Revegetation Management Plan aims to satisfy the rationale of "Offset calculation 1 -onsite rehabilitation" of Schedule 1 within DWER's letter dated 4 December 2023.

1.2 How the proposed revegetation addresses the impacts of the clearing.

The DWER preliminary assessment identified that the area proposed to be cleared comprises habitat for three black cockatoo species, western ringtail possum; and is located within an extensively cleared landscape. An offset is required to counterbalance the above significant residual impacts. Based on the application area, the significant residual impacts of the proposed clearing include:

- approximately 0.07 hectares of suitable foraging habitat for black cockatoos and Pseudocheirus occidentalis (western ringtail possum); and,
- Approximately 0.07 hectares of remnant vegetation in an extensively cleared landscape.

Based on the current application area, the department undertook preliminary calculations for an appropriate offset, using the WA State Metric offset calculator for onsite revegetation/rehabilitation. This calculation identified that onsite rehabilitation within a road reserve by infill planting to improve the quality of the vegetation, as specified below, may be sufficient to adequately address the impacts of the proposed clearing (noting that these values can all be present within one larger remnant):

- infill planting of approximately 0.35 hectares of patchy roadside vegetation (with minimal foraging value) with known black cockatoo foraging species to improve the condition of the foraging habitat to moderate to high quality.
- Infill planting of approximately 0.67 hectares of roadside vegetation with species known to support western ringtail possum to improve the habitat and connectivity for western ringtail possums.
- Infill planting of approximately 0.21 hectares of roadside vegetation to improve the condition of the native vegetation from Degraded to Good/Very Good condition, to counterbalance the remnant vegetation loss.

This plan proposes the total of 1.4851 hectares of offset rehabilitation to satisfy the requirements above. This is an additional 2551m2 above the minimum 1.23 hectares as prescribed above.

NOTE: Revised to 0.706 hectares – During draft permit review

1.3 Location of clearing, property details, clearing size and purpose.

The clearing location is within a small section (0.07 hectares) of the southwestern side of Ferguson Road Reserve, just east of the Depiazzi Road intersection. Works are planned to implement safety upgrades to the intersection of Ferguson Road and Depiazzi Road, specifically line of sight issues. The Shire of Dardanup is the relevant Local Government with care, control, and management of the land as per Land Administration Act 1997. Please see Table 1 and Image 1 below.

Table 1. Property details of proposed clearing area.

Usage description	Road Isolation (Type 3 P)
Polygon number	1321426
Land ID Number	3170619
GPS	-33.399024, 115.792337
Lot on Plan	P ROAD

Image 1. Area proposed for clearing.

1.4 Location of revegetation site, property details and size of revegetation site.

The revegetation sites are located within two nearby road reserves, located 800m+ southwest (as the crow flies) of the clearing permit location to the top of the revegetation areas along the selected road reserves. See Image 2.

The revegetation locations are within the southern portion of Depiazzi Road Reserve and along the connecting Banksia Road (connected at intersection) See Image 3 further below. This is to link to the DBCA Dardanup Conservation Park.

The Shire of Dardanup is the relevant Local Government with care, control, and management of the lands as per Land Administration Act 1997. Please see Table 2 below.

Image 2. Distance from the proposed clearing site (light blue polygon) to the beginning of the proposed revegetation sites (red polygon).

Table 2. Property details of proposed revegetation site.

	Depiazzi Road	Banksia Road (north)	Banksia Road (mid)	Banksia Road (South)
Usage description	Road Isolation (Type 3 P)	Road Isolation (Type 3 P)	Road Isolation (Type 3 P)	Road Isolation (Type 3 P)
Polygon number	1355203	1371577	12301211	1314673
Land ID Number	3182563	3018686	4343575	3168474
GPS	-33.40887371, 115.78470286	-33.41302717, 115.77814732	-33.41688891, 115.77798567	-33.43, 115.78
Lot on Plan	P ROAD	P ROAD	P ROAD	P ROAD

Image 3. Entire proposed revegetation sites along Depiazzi Road and Banksia Road (connection at intersection)

NOTE: The revised revegetation areas excludes six pockets from image 3 refer to Schedule 1 Figures 2, 3 & 4 of Permit CPS 10333/1

Image 4. Depiazzi Road Revegetation Sites

NOTE: The revised offset of Permit CPS 10333/1 includes all areas of Image 4

Image 5. Banksia Road (north and mid) Revegetation Sites

NOTE: The revised offset of Permit CPS 10333/1 **includes only** area 1847 depicted in Image 5

Image 6. Banksia Road (south) Revegetation Sites

NOTE: The revised offset of Permit CPS 10333/1 **includes** areas 551, 570 1186 depicted in Image 6

1.5 Name and qualifications of company providing expertise on completion criteria development and onsite revegetation techniques.

To be arranged.

2.0 Background of revegetation site

The revegetation locations are within the southern portion of Depiazzi Road Reserve and along Banksia Road. The Shire of Dardanup is the relevant Local Government with care, control, and management of the land as per Land Administration Act 1997. The long-term security of the revegetation site is ensured, as maintained as road reserve in perpetuity, with no long-term plans to undertake widening or realignment works.

2.1 Existing vegetation unit/s, summary structure and condition.

There is no mapped threatened or priority flora within the revegetation areas, however the sites are within several mapped threatened ecologically community buffer zone, pertaining to the roadside vegetation. This being Banksia WL SCP – Banksia Woodlands of the Swan Coastal Plain ecological community – Priority 3 – Endangered.

There is existing mapped native vegetation extent within the proposed revegetation sites. The mapped vegetation complex has a structural formation of low open forest to open forest, consisting of the Swan Coastal Plain upland landform of the Cartis Complex. This is generally noted as the foothills of the Whicher Scarp. The Cartis Complex comprises of *Eucalyptus marginata subsp. Marginata*, *Corymbia calophylla, Corymbia haematoxylon* with some *Banksia attenuata* and *Xylomelum occidentale* on dissecting escarpment in the humid zone.

The revegetation site is not within not Environmentally Sensitive Area, nor within a Geomorphic Wetland of the Swan Coastal Plain.

2.2 Soil type and Landform

Soil landscape mapping from the Department of Primary Industry and Regional Development have mapped the soil system as Forrestfield System, within landscape zone 213. This being the Western Region (2), Swan Province (1), and Pinjarra Zone (3). The complete mapping unit symbol is 213FoCSc.

The Pinjarra Zone is described as alluvial deposits (early Pleistocene to Recent) between the Bassendean Dunes Zone and the Darling Scarp, colluvial and shelf deposits adjacent to the Darling Scarp. Clayey to sandy alluvial soils with wet areas.

This Forrestfield System is summarised as undulating foot slopes of the Darling and Whicher Scarps. Duplex sandy gravels, pale deep sands, and grey deep sandy duplexes.

The specific soil group of 213FoCSs is described as very low relief (1-5%) foot slopes with rapidly drained deep bleached grey sands and occasionally deep yellow brown sands. Minor occurrence of gravels. The general vegetation of this soil type is woodlands of *E.marginata*, *calophylla* and *wandoo* and some *B.grandis.*

2.3 Existing hydrology and drainage.

The 213FoCSc landform is noted as neither water gaining nor water shedding, with good infiltration but only moderate storage capacity due to coarse texture. Surface water resource as apart of the Middle Preston (4) Area of the Southwest Division. This catchment flows towards the Leschenault Estuary. The unconfined aquifer is the Perth Swan Superficial. Both surface water and groundwater are classified as unproclaimed. There is a 13 - 15m decline from the most northern portion of Depiazzi Road to the south. Surface water flows in an east direction as shown in the contour mapping within Image 7. below. Banksia Road sits stable at 35m-45m.

Image 7. Contours

2.4 Photos of the existing environment should be provided.

Below are some images of cleared zones in the northern portion of the revegetation sites. Some understorey exists, mainly of *Xanthorrhoea sp*. and *Macrozamia riedlei*. Image 8 shows the west side of Depiazzi Road, looking north. Image 9 shows the east side of Depiazzi Road, looking north.

The aim is to link the existing canopy along the two road reserves to have continuous shade, foraging and refugia for the ecological linkage from Ferguson Road to the DBCA Dardanup Conservation Park which is located at the end of Banksia Road.

Image 8. West side of Depiazzi Road, looking north

Image 9. East side of Depiazzi Road, looking north.

3.0 Current disturbances and threats

Part of the Depiazzi road reserve was widened in 2017, following a clearing permit approval, CPS 7175/1. This road is not scheduled for, and highly unlikely to need further widening.

There is no history of rubbish dumping or four-wheel drive access along the revegetation sites, nor is there much ability to undertake such activities.

It is not expected that the revegetation sites will have issues with soil compaction, as the location has had no stock or vehicle movement. The roads have been in situ for a long time. Surface drainage is free draining, and no surface erosion is apparent.

Weed invasion is from grassy weeds. This stabilises the bare ground, however, acts as a suppressant to the native seed bank. This revegetation plan addresses the need of weed control pre and post planting event. There is also abundant evidence of rabbit warrens in the area. These two invasive pressures have affected the species richness and abundance of the lower understorey/herbaceous plants. This plan aims to provide upper canopy in the bare zones, and also plant small, medium to large shrubs to grow above the grazing line of herbivorous predators and provide greater protection and cover the native fauna movement. Additionally, this plan aims to link the existing canopy along the two road reserves to have continuous shade, foraging and refugia for the ecological linkage from Ferguson Road to the DBCA Dardanup Conservation Park which is located at the end of Banksia Road.

4.0 Reference site floristic data collection

4.1 Identify each unique vegetation unit to be revegetated.

There is no mapped threatened or priority flora, however the revegetation sites are within a mapped threatened ecologically community buffer zone which pertains to the roadside vegetation. This being Banksia WL SCP – Banksia Woodlands of the Swan Coastal Plain ecological community – Priority 3 – Endangered.

There is existing mapped native vegetation extent within the proposed revegetation site. The mapped vegetation complex has a structural formation of low open forest to open forest, consisting of the Swan Coastal Plain upland landform of the Cartis Complex. This is generally noted as the foothills of the Whicher Scarp. The Cartis Complex comprises of *Eucalyptus marginata subsp. Marginata, Corymbia calophylla*, *Corymbia haematoxylon* with some *Banksia attenuata* and *Xylomelum occidentale* on dissecting escarpment in the humid zone. The revegetation site is not within not Environmentally Sensitive Area, nor within a Geomorphic Wetland of the Swan Coastal Plain.

4.2 Reconnaissance Vegetation Survey of Depiazzi Road

A reconnaissance survey was undertaken by experienced Shire of Dardanup staff to provide context and gather broad information about revegetation areas and the Cartis Vegetation Complex within that location scope. The survey was a walk through along the 'Degraded' vegetation selected areas, and additionally adjacent to these areas within the 'Good' vegetation condition areas, to provide floristic reference.

The proposed degraded revegetation areas did not support significant flora or vegetation, however the good condition areas showed good species richness. The main threatening degrading factor within these locations are rabbit warrens and feeding activity. This reconnaissance survey was undertaken to verify information obtained from an initial desktop analysis, and to characterise the flora and delineate the vegetation condition areas present for optimum revegetation site selection along the two road reserves. The recorded species list below. This is a simple species richness/presence list.

Acacia extensa	Gompholobium capitatum
Acacia pulchella	Haemodorum spicatum
Acacia stenoptera	Hodgsoniola junciformis
Acacia ulicifolia	Jacksonia furcellata
Adenanthos meisneri	Jacksonia horrida
Adenanthos obovatus	Kennedia prostrata
Allocasuarina humilis	Kingia australis
Banksia attenuata	Kunzea glabrescens
Banksia grandis	Kunzea capitata
Banksia nivea	Lyginia barbata
Calothamnus lateralis	Macrozamia riedlei
Calothamnus sanguineus	Mesomelaena tetragona
Conostylis candicans	Nuytsia floribunda
Corymbia calophylla	Petrophile linearis
Dasypogon bromeliifolius	Stirlingia latifolia
Daviesia acicularis	Xanthorrhoea preissii
Eucalyptus marginata	Xylomelum occidentale

4.3 Describe chosen reference site in the context of developing completion criteria.

The reference and revegetation sites were chosen due to the proximity to the clearing site, being within 1km, and the same Cartis vegetation complex. The entire road reserve has a range of vegetation condition, varying from Completely Degraded to Very Good on the Keighery Scale 1994. Much of the vegetation within the proposed revegetation area is in a degraded to good condition. This vegetation condition was grading in the 2017 clearing permit approval - CPS 7175/1.

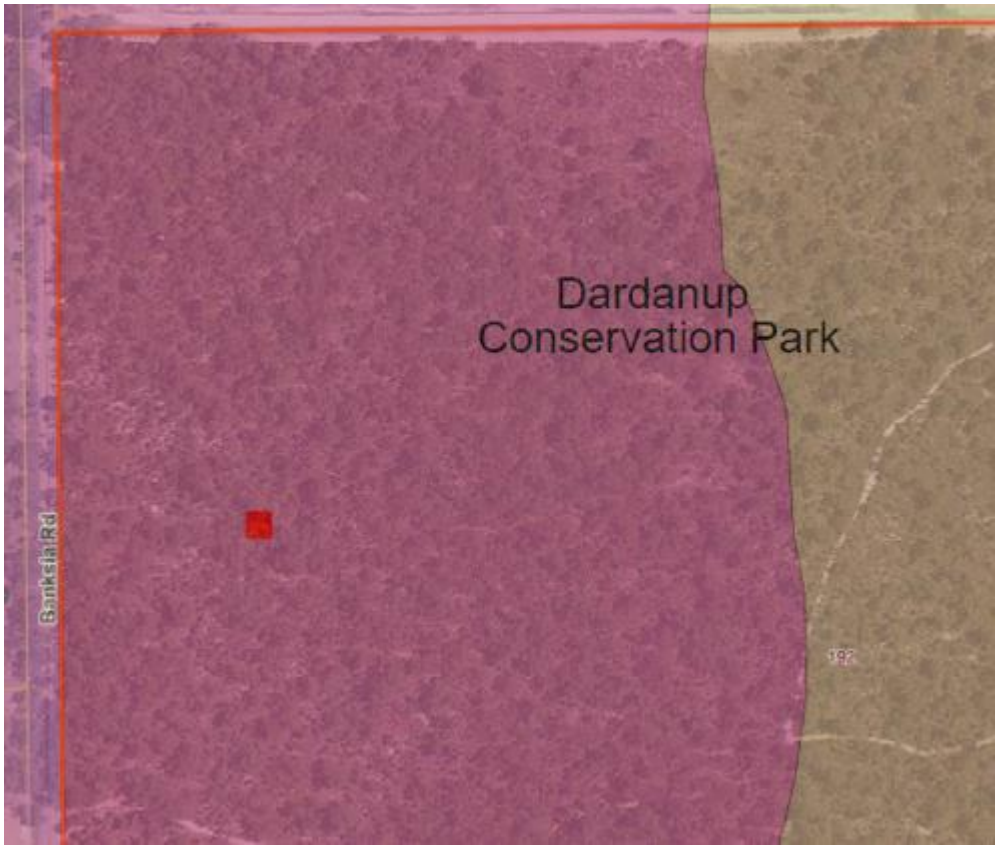
Depiazzi and Banksia Road reserves contains a vegetated corridor within an extensively cleared local area (10km radius), in which up to 73% of pre-European vegetation has been cleared for agricultural, residential, and industrial uses. Boyanup State Forest and Dardanup Conservation Park are both located within one kilometre of the application area and represent the largest remnants of native vegetation in the local area. This vegetated corridor provides nearly a continuous linkage to a larger area of habitat to the south of Banksia Road and a small habitat remnant in private property at the northern end of Depiazzi Road. Therefore, it is important to enhance this linkage to a high-quality ecological corridor function.

4.3.1 Additional Reference Site

Reference sites were completed through a reconnaissance survey along Banksia Road and is discussed above in 'Section 4.2 Reconnaissance Vegetation Survey of Depiazzi Road.'

In addition to above, a 10m x 10m quadrat as per (EPA 2016) was placed within the Dardanup Conservation Park, just south of the revegetation sites, to act as a reference site. This quadrat location was chosen due to the vegetation being of the same Cartis Complex. Please see location Image 10 below, quadrat in red.

Image 10. Reference Site Location

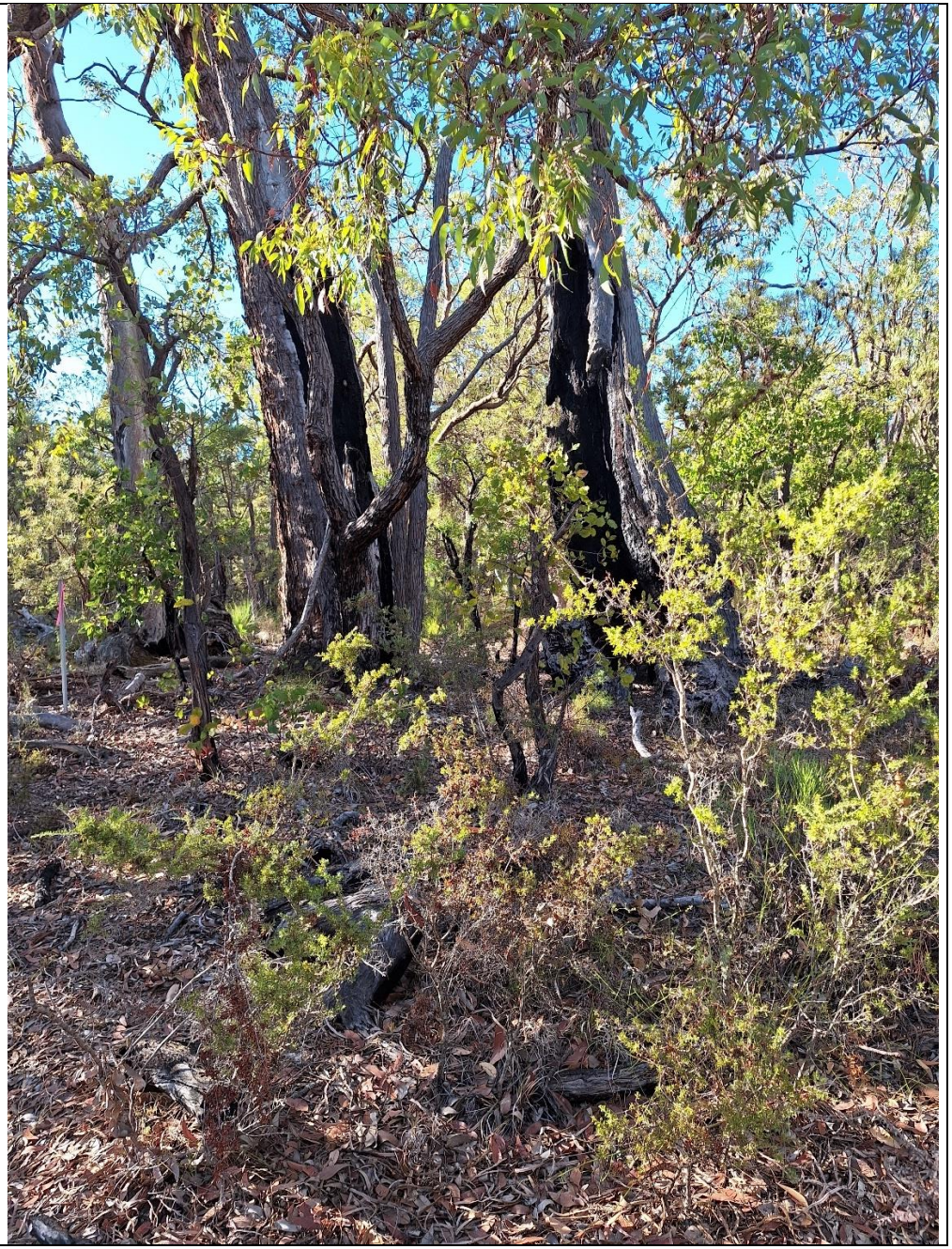


This land is State Forest, owned by State of Western Australia, C/- Department of Planning, Lands and Heritage. The address being Lot 192 Ferguson Road, State Forest WA, PIN 11263264, plan number P220644, and reserve number R 46403. The coordinates for the quadrat are -33.434030, 115.779172.

Details of the reference site are listed in Table 3 below.

Table 3. Reference Site details.

Data Type	Data	Notes
Scale	Quadrat level	
Species richness	Trees: 5 Shrubs: 15	
Species list	**TREES** *Eucalyptus marginata* *Xylomelum occidentale* *Persoonia longifolia* *Banksia attenuata* *Nuytsia floribunda* **SHRUBS** *Kunzea glabrescens* *Acacia pulchella* *Melaleuca spp.* *Calytrix fraseri* *Dasypogon bromeliifolius* *Stirlingia latifolia* *Jacksonia sternbergiana* *Hakea sericea* *Macrozamia riedlei* *Conostylis aculeata* *Adenanthos barbiger* *Kennedia coccinea* *Cassytha spp.* *Patersonia occidentalis* *Hakea stenocarpa or Hakea falcata*	No weeds recorded. Trees/shrubs noted nearby: *Persoonia elliptica* *Banksia grandis* *Xanthorrhoea preissii* *Xanthorrhoea gracilis*
Density	**TREES:** Quadrat (10m2) x 1000 = hectare (10,000m2) 17 stems x 1000 = 17,000 stems per hectare. **SHRUBS:** 60 per quadrat	NOTE: Did not include Nuytsia floribunda in calculation as they were small/ without defined trunk yet.
Vegetation structure - Muir (1977)	Low Open Forest to Open Forest	
Vegetation condition - Keighery (1994)	Very Good	No weeds present, vegetation structure altered in the groundcover. Strong evidence of kangaroo grazing (scats)
% Bare ground	60%	See above
Photos	On next five pages	



5.0 Revegetation commitments and completion criteria

5.1 Vision: an overarching statement of the intent and goal.

To infill revegetate the ecological corridor along Depiazzi Road and Banksia Road to a high quality 'good to very good' vegetation structure, to provide a continuous linkage to a larger area of habitat (DBCA Dardanup Conservation Park) located on the south of Banksia Road and a small habitat remnant in private property at the northern end of Depiazzi Road and Ferguson Road.

This plan aims to provide upper canopy in the bare zones, and plant small, medium to large shrubs, to grow above the grazing line of herbivorous predators and provide greater protection and cover the native fauna movement.

Additionally, this plan aims to link the existing canopy along the two road reserves to have continuous shade, foraging and refugia for the ecological linkage.

5.2 Objectives: set the main goals of the revegetation.

1. Improved understorey richness and structure.
2. Increased canopy connectivity.
3. Self-sustaining vegetation, representative of the original vegetation unit.

5.3 Outline Targets and S.M.A.R.T. Completion Criteria

Table 4. in on the next page. The acronym S.M.A.R.T. standing for specific, measurable, achievable, relevant, and time bound.

NOTE: The completion criteria is specific to each site therefore remains relevant for the revised offset. The total number of trees in 2a of the table is excluded as it does not reflect the revision.

Table 4. Targets and S.M.A.R.T. Completion Criteria

	Objectives and Targets		
	1.	**2.**	**3.**
	Understorey richness and structure with improved representation of the cartis vegetation complex. Structure target is small, medium, and large shrubs, with trees, to avoid rabbit grazing destruction and provide smaller birds with movement opportunities and refugia from predators.	**Reduce the gaps between canopy patches for long term canopy connectivity and achieve greater coverage and respite from the sun.**	**Return the rehabilitated area to a self-sustaining and functional ecosystem, comprising of local provenance species, for long term resilience. Identify keystone species and increase disturbance resistance to the ongoing effects of feral rabbits and invasive grass weeds.**
S	Specific to the appropriate Cartis vegetation complex and richness requirements.	Specific to the vegetation structure requirements in needing full connectivity.	Specific to the need for resilience against disturbance threats.
M	Measurable by referring to Cartis complex species lists. Target densities: Trees: 1 per $10m^2$ Shrubs: 1 per $3m^2$ Groundcovers: 1 per $1m^2$	Measurable to the estimated reduction of bare, open patches. Target densities: Trees: 1 per $10m^2$ Shrubs: 1 per $3m^2$ Groundcovers: 1 per $1m^2$	Measurable by the success of the revegetation event. Percentage of target bare ground, being no more than 5% greater than in the reference site.
A	Achievable by on ground results of species richness equalling 26 native species per site. Monitoring will be occurring annually over the five-year maintenance period through photographic points, traverse 'transect-style' walk through reconnaissance surveys noting success and deaths, with weed monitoring.	Achievable by on ground results of species richness equalling 9 selected native trees species per site. Nine tree species selected (~~9 x 33 units = 297~~) down a linear corridor at 10m spacing is nearly 3kms. Many wider selections will have trees planted in rows with the target density of 1 per $10m^2$. Monitoring will be occurring annually over the five-year maintenance period through photographic points, traverse 'transect-style' walk through reconnaissance surveys noting success and deaths, with weed monitoring.	Achievable by on ground results of 26 native species per site. Most species selected are present in reference sites, therefore have a distaste to rabbits and aim to establish against the threatening disturbance. Monitoring will be occurring annually over the five-year maintenance period through photographic points, traverse 'transect-style' walk through reconnaissance surveys noting success and deaths, with weed monitoring.
R	Relevant to the missing vegetation structure elements that need restoring. Dominant tree species selected include: *Agonis flexuosa, Allocasuarina fraseriana, Allocasuarina humilis, Banksia attenuata, Banksia grandis, Corymbia calophylla, Eucalyptus marginata, Nuytsia floribunda, Xylomelum occidentale*	Relevant to the missing vegetation structure elements that need restoring. Dominant tree species selected include: *Agonis flexuosa, Allocasuarina fraseriana, Allocasuarina humilis, Banksia attenuata, Banksia grandis, Corymbia calophylla, Eucalyptus marginata, Nuytsia floribunda, Xylomelum occidentale*	Relevant to the missing vegetation structure elements that need restoring. Dominant tree species selected include: *Agonis flexuosa, Allocasuarina fraseriana, Allocasuarina humilis, Banksia attenuate, Banksia grandis, Corymbia calophylla, Eucalyptus marginata, Nuytsia floribunda, Xylomelum occidentale*
T	Time bound to this project, but also for future benefit. Protection and preservation in perpetuity of the road reserve.	Time bound to this project, but also for future benefit. Protection and preservation in perpetuity of the road reserve.	Time bound to this project, but also for future benefit. Protection and preservation in perpetuity of the road reserve.

6.0 Site preparation

6.1 Techniques, timing, and methods to be used to undertake site preparation actions.

- Site preparation will be pre-planting weed spraying and slashing over the revegetation locations.
- Timing of the revegetation will be mid-winter (planting season).
- Planting technique will be augering and basin formation around the seedlings for water retention and microclimate protection. Mulch may be employed at an establishment material if organic material on ground is minimal. However, there is already a large amount of material available for natural mulch affects, such as cut weed grass matter. It may be difficult to bring in large amounts of mulch given the roadside location. Seedling protection/guarding will be employed.

6.2 Revegetation site protection actions undertaken, including methods and timing.

- Protecting the site through fencing and providing protection from grazing.
    - Not necessary – no livestock grazing in the location of the road reserve.
- Seedling protection/guarding will be employed.
- Provide dieback mapping and site hygiene plan showing hygiene boundaries to prevent spread of dieback and other plant diseases.
    - Appointed contractor will be required to adhere to dieback hygiene methods before entering the site and leaving the site.
- Provide weed mapping and hygiene boundaries to prevent spread of weeds and other plant diseases.
    - Appointed contractor will be required to adhere to weed hygiene methods before entering the site and leaving the site.
    - Weed mapping is not necessary as the grass weeds (lovegrass, veldt grass) infestation is widespread and consistent.

7.0 Vegetation establishment

7.1 Species list and amounts from completion criteria.

Summer watering over five seasons (five years) to ensure establishment and survivorship. Please note, this list may be subject to change with respect to availability and supply. This species list is indicative of the final, and species were selected after the reconnaissance floristic survey findings and with respect to the Cartis vegetation complex.

Additionally, species suitable for Western Ringtail Possum and Black Cockatoo habitat and foraging have been identified. **With the revegetation densities proposed and the linear nature of the selected road verge revegetation sites, it is evident that movement and feeding connectivity for both the fauna species will be achieved. Furthermore, Objective 2 and corresponding Target of the Completion Criteria in Section 6, identifies the aim to "Reduce the gaps between canopy patches for long term canopy connectivity and achieve greater coverage and respite from the sun."**

Species	n	Western Ringtail Possum habitat and forage appropriate	Black Cockatoo habitat and forage appropriate
Acacia extensa	33	Y	
Acacia pulchella	33	Y	
Acacia stenoptera	33	Y	
Adenanthos meisneri	33		
Agonis flexuosa	33	Y	Y
Allocasuarina fraseriana	33	Y	Y
Allocasuarina humilis	33	Y	Y
Banksia attenuata	33	Y	Y
Banksia grandis	33	Y	Y
Banksia nivea	33	Y	
Calothamnus lateralis	33		
Calothamnus sanguineus	33		
Conostylis candicans	33		
Corymbia calophylla	33	Y	Y
Dasypogon bromeliifolius	33		
Eucalyptus marginata	33	Y	Y
Gompholobium capitatum	33		
Hakea lissocarpha	33	Y	Y
Jacksonia sternbergiana	33		Y
Kennedia prostrata	33		
Kunzea glabrescens	33	Y	Y
Macrozamia riedlei	33		
Melaleuca thymoides	33	Y	
Nuytsia floribunda	33		
Xanthorrhoea preissii	33	Y	Y
Xylomelum occidentale	33		Y
TOTAL	858	15	12

7.3 Confirm that seedlings are obtained from dieback-free sources to prevent introduction or spread of disease.

All seedlings obtained from accredited members of the Nursery & Garden Industry of Western Australia.

NOTE: For the revised offset of Permit CPS 10333/1, the species list will remain the same the quantities will be amended to reflect the 0.706 hectare offset

8.0 Proposed monitoring plan

Please see Items 6 and 7 of Section 10.0 Revegetation Schedule and Maintenance Timeline.

8.1 Describe Monitoring Frequency and Timing

Monitoring of the revegetation will occur every spring, through the appointed contractor over a five-year period to record success and ensure losses remain low/minimal. Summer watering will be undertaken over a five-year period to ensure survivorship.

Quantitative vegetation monitoring will be conducted yearly by traverse surveys of the linear revegetation offset sites. Monitoring data obtained from the traverse surveys will be used to assess the success of revegetation against completion criteria.

At each traverse survey will note the following:

- A list of all species present, as well as their density and height
- Vegetation condition using (EPA 2016) condition scale.
- Indicative photos of the revegetation
- General observations e.g. condition of plant protectors, litter, evidence of feral animals.

8.2 Monitoring Reports

Monitoring reports will be compiled within three months following each monitoring event. These reports will be sent to DWER for their records as part of the annual monitoring report. These reports will:

- Outline the date and description of traverse surveys undertaken during the reporting period.
- Record and evaluate the success of revegetation through analysis of data (both spatial and temporal trends against reference site and revegetated sites)
- Identify any follow up remedial or maintenance works to be undertaken to meet the completion criteria.
- Set out a program for the remedial or maintenance works.

9.0 Maintenance and contingency measures

Please see Items 8 and 9 of Section 10.0 Revegetation Schedule and Maintenance Timeline.

To be arranged through appointed contractor following monitoring traverse surveys, which will indicate survivorship and species numbers. Remedial infill planting (dependent on establishment and ongoing success) will be undertaken as per Table 5 below.

Table 5. Contingency Measures

Item	Issue	Contingence Measures
Revegetation Success	Monitoring indicates revegetation areas do not meet completion criteria	1. Determine missing vegetation components (via monitoring report) 2. Identify likely cause of failure (e.g. weeds, lack of water, inappropriate timing of revegetation, lack of nutrients, poor soil condition, lack of water, insect/fungus attack, dieback, predation by herbivores) 3. Address cause of failure (this may include watering strategies, mulching, soil stabilisation, pest control, tree guards) 4. Plan infill planting to compensate for missing vegetation components.
Plants	Inadequate tube stock available in first year	Commission alternative nurseries to germinate stock. Plant additional tube stock in subsequent years.
Bush Fire Management	Revegetation area experiences a bush fire occurrence.	Undertake an assessment of bush fire impact within revegetation area. Undertake contingency planting where necessary.
Plant Damage	Traffic incident crushes planting area	Plan infill planting to compensate for missing vegetation components.

9.1 Post-Planting Weed Control

Targeted weed spraying will be undertaken by traversing the entire site by foot and spot spraying for weeds annually, as discussed in Table 5, and Items 8 and 9 of Section 10.0 Revegetation Schedule and Maintenance Timeline. To be arranged through appointed contractor.

Weed control objective is to control and prevent further spread of weeds within the revegetation areas.

Baseline	Completion Target	Completion Criteria
Weeds are absent at reference sites	Weed cover is no greater than 15% cover.	The revegetation site should have a maximum of 15% weed cover.
No declared weeds are present.	Managed as required by the Biosecurity and Agriculture Management Regulations 2013.	Absent

10.0 Revegetation Schedule and Maintenance Timeline

Cost and funding source through the Shire of Dardanup major projects budget. Costings to be investigated.

STAGE	ITEM	ACTIONS	TIMING	RESPONSIBILITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4 +
Completion Criteria	1	Reference site surveys and development of completion criteria	Spring	The Shire of Dardanup is the lead consultancy and will engage and coordinate specific sub-contractors as required.	X			
Site Preparation	2	Dieback hygiene plan	Spring	Revegetation Consultants to be appointed	X			
	3	Weed control	Autumn	Revegetation Consultants to be appointed	X	X		
Vegetation Establishment	4	Place tube stock orders with nursery	Summer	Revegetation Consultants ordering from Native Nursery	X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).		
	5	Plant tubestock and undertake direct seeding	May–July	Revegetation Consultants to be appointed		X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).	
Monitoring	6	Vegetation monitoring against completion criteria	Spring	Revegetation Consultants to be appointed		X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).	
	7	Weed monitoring	Spring	Revegetation Consultants		X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).	
Maintenance and Contingency	8	Weed control	After winter rains	Contractors		X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).	
	9	Remedial planting	May - July	Revegetation Consultants			X	Ongoing as indicated by monitoring
Reporting	10	Revegetation plan		Shire of Dardanup	X			
	11	Annual progress report	June 30 annually	Shire of Dardanup and appointed consultant.		X	Until completion criteria have been met and maintained (within the timeframe of the clearing permit).	

11.0 References and appendices

References

DWER, Department of Water and Environmental Regulation. 2018. *A Guide to Preparing Revegetation Plan for Clearning Permits under Part V of the Environmental Protection Act 1986.* Perth: Government of Western Australia.

EPA, Environmental Protection Authority. 2016. *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment.* Technical Guidance , Perth: The Government of Western Australia.

Associated spatial data of the revegetation site.

Shape files will be attached to email upon submission.