



# Shire of Plantagenet Road Expansion REVEGETATION PLAN

---

Shire of Plantagenet

Newman Rd and Hannan Way Intersection, Narrikup  
6326

Final v. 3

06/01/2025



## DOCUMENT CONTROL

Title: Revegetation Plan – Shire of Plantagenet Road Expansion  
 Author (s): Donna Old  
 Reviewer (s): Shelley Hill; Graham Penter  
 Job No: MB0010-003  
 Client: Shire of Plantagenet (SoP)

### REVISION RECORD

Revision	Summary	Prepared By	Reviewed By	Date
Draft	Technical Review	D.Old	S. Hill	16/12/2024
Final	Approval Review	D.Old	G. Penter	16/12/2024
Final	Submitted to client for review	G. Penter	K. Hemmings	17/12/2024
Final v.2	Issued as final	G.Penter		18/12/2024
Final v.3	Update with DWER comments	G.Penter		06/01/2025



Bio Diverse Solutions Australia Pty Ltd

Albany Office	Denmark Office	Esperance Office	Perth Office
29 Hercules Crescent	Unit 7, 40 South Coast Highway	Unit 2A, 113 Dempster Street	Level 6, 191 St Georges Terrace
Albany WA 6330	Denmark WA 6333	Esperance WA 6450	Perth WA 6850
(08) 9842 1575	(08) 9848 1309	(08) 9072 1382	(08) 98421575

[www.biodiversesolutions.com.au](http://www.biodiversesolutions.com.au)

ABN 46 643 954 929

(C) Copyright: This document has been prepared by Bio Diverse Solutions for use by the client only, in accordance with the terms of engagement, and only for the purpose for which it was prepared.

CONTENTS

1.	Introduction.....	1
1.1.	Key Contacts .....	1
1.2.	Site Details .....	1
2.	Background Information .....	3
2.1.	Existing Land Use and Adjacent Tenure .....	3
2.2.	Geology and Soils .....	3
2.3.	Climate .....	3
2.4.	Habitat Connectivity.....	3
2.5.	Water and Wetlands .....	4
2.6.	Environmentally Sensitive Areas.....	4
2.7.	Remnant Vegetation.....	4
2.8.	Heritage.....	4
2.9.	Dieback.....	4
3.	Revegetation Commitments .....	5
4.	Reference Site Assessment .....	5
5.	Targets and Completion Criteria.....	5
6.	Site Preparation.....	8
6.1.	Fire management .....	8
6.2.	Weed management plan .....	8
6.3.	Dieback and hygiene management plan .....	9
6.4.	Ripping and ground preparation .....	9
6.5.	Topsoil.....	9
7.	Revegetation Methodology.....	10
7.1.	Species List .....	10
7.2.	Revegetation activities.....	11
7.3.	Initial planting.....	12
7.4.	Direct seeding.....	12
7.5.	Tube stock planting .....	12
7.6.	Timeline of activities .....	12
8.	Maintenance and Contingency Measures .....	14
8.1.	Additional watering .....	14
8.2.	Weed control .....	14
8.3.	Remedial planting.....	14
8.4.	Dieback treatment .....	14
9.	Monitoring and Analysis .....	15
10.	Schedule and Budget .....	16
11.	References .....	17
12.	Appendices.....	19

### LIST OF TABLES

Table 1: Vegetation Associations mapped within the survey area (Beard et al., 2013).

Table 2: Targets and completion criteria.

Table 3: Revegetation species list.

Table 4: Timeline of site preparation and revegetation activities in the first year.

Table 5: Monitoring details.

Table 6: Schedule of actions.

Table 7: Complete species list of Vegetation (Bradshaw, 2023).

### LIST OF FIGURES

Figure 1: (a - d) Photos of the subject site

Figure 2: Rainfall and temperature data for Mount Barker BoM Weather Station (023733)

Figure 3: Revegetation Area

### LIST OF APPENDICES

Appendix A: Species List.

## 1. Introduction

The Shire of Plantagenet (SoP), herein referred to as “the client” commissioned Bio Diverse Solutions as Environmental Consultants to prepare a Revegetation Plan for the revegetation of approximately 0.17 ha area across two sites that are adjacent the planned Newman Road upgrade.

The Revegetation Plan is a requirement to satisfy the offset conditions of clearing permit (CPS 10598/1) currently under assessment by the Department of Water and Environmental Regulation (DWER). The aim of this Revegetation Plan is to guide the revegetation activities across both revegetation areas. These include the entireties of Revegetation Area A (0.078 ha) and Revegetation Area B (approximately 0.087 ha). The proposed revegetation will address the impact of the clearing by returning the subject site to an area of native vegetation that is representative of the area that was cleared, bearing similar ecological and habitat values. This revegetation plan has been developed in line with DWER’s *Guide to Preparing Revegetation Plans for Clearing Permits* (DWER, 2018a).

### 1.1. Key Contacts

The clearing and revegetation activity is occurring at the Intersection of Newman Road and Hannan Way, in the Shire of Plantagenet, the clients key contacts are as follows:

- Executive Manager Infrastructure and Assets: Kevin Hemmings

The revegetation plan has been developed by Bio Diverse Solutions. The key Bio Diverse contacts involved in the drafting of this revegetation plan are as follows:

- Revegetation Specialist: Donna Old
- Ecologist/ Environmental Consultant: Shelley Hill
- Environmental Approvals and Compliance Manager: Graham Penter

### 1.2. Site Details

The clearing site, herein referred to as the “reference site”, and revegetation site, herein referred to as the “subject site”, are located adjacent to the intersection of Newman Road and Hannan Way, approximately 200 m north of Narrikup town site, in the Shire of Plantagenet (SoP) (Figure 3). The site is 32 km north west of Albany and 17km south east of Mount Barker. Approximately 0.059 ha of native vegetation has been identified as the proposed clearing area required for the Newman Road upgrade and road improvements program of works. The subject site is comprised of two areas adjacent to Newman Road and Hannan Way, totalling approximately 0.17 ha, refer Figure 1 (a - d) for site photographs and Figure 3 for a map of the revegetation areas in relation to the required clearing activities.





a) Newman Road revegetation area (Area A). Gravel road base will be removed by SoP.



b) New road alignment of Newman Road. Revegetation area will be in the old road alignment (Area A).



c) Hannan Way revegetation area (Area B). Bitumen road base will be removed by SoP.



d) End of Hannan way revegetation area. Showing power line and entrance to cricket grounds that will mark the end extent of revegetation (Area B).

**Figure 1: (a - d) Photos of the subject site**

## 2. Background Information

### 2.1. Existing Land Use and Adjacent Tenure

The subject site, of approximately 0.17 ha, has two land owners. Area A is within the existing Rail Corridor and Area B is within a decommissioned road reserve within the Shire of Plantagenet. Area A is under the control of Arc Infrastructure who have confirmed acceptance for the use of the area for revegetation purposes. Area B is under the control of the SoP (Landgate, 2024).

### 2.2. Geology and Soils

Database searches show the subject site lies within the Redmond subsystem (242ReRD). This Subsystem consists of Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah, Albany Blackbutt Forest. Yellow solonetzic soils in depressions; Paperbark woodland (DPIRD 2024a).

### 2.3. Climate

The closest open Bureau of Meteorology (BoM) station is Mount Barker (023733). The average annual temperature in Mount Barker ranges from 48.1-20.1°C. The average summer temperature ranges between 10.5-27.3°C, whilst average winter temperatures range between 4.6-14.3°C (BoM, 2024a). The annual mean rainfall for Mount Barker is 762.6 mm (BoM, 2024a). On average the months of May – August are the months with the highest rainfall (Figure2).

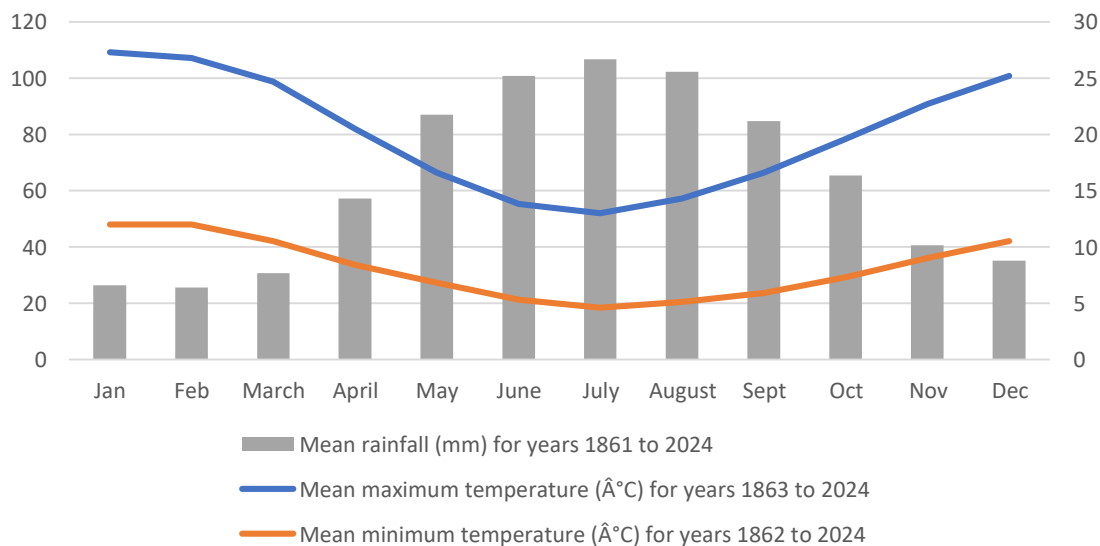


Figure 2: Rainfall and temperature data for Mount Barker BoM Weather Station (023733)

### 2.4. Habitat Connectivity

Habitat connectivity assessments rely on a bioregional and landscape-scale approach to evaluate habitat for fauna movement and ecological linkage across a region. Habitat connectivity is largely reliant on remnant vegetation, recognising it plays a very important role in developing corridors between protected areas to assist in achieving long-term biodiversity management outcomes (Wilkins et al. 2006).

The subject site lies partially within Crown Land (CL), controlled by the SoP and is surrounded by well vegetated sections. Area A is within the Rail Corridor controlled by Arc Infrastructure, adjacent to well vegetated Unallocated Crown Land (UCL). The Chorkerup Nature Reserve is located approximately 3 km South West of the survey area. The subject site is ultimately linked to these surrounding areas of vegetation through the existing road reserves, and vegetation within Unallocated Crown Land and the Crown land (Landgate, 2024). The site promotes fauna movement to adjacent vegetated areas with no fencing or other infrastructure except for the rail line itself to impede fauna movement. Revegetation of this site would improve fauna

habitat values and local ecological linkages for smaller reptiles and insects with only minor impediment but most likely will not have an effect on larger fauna or their movements.

## 2.5. Water and Wetlands

The subject site does not lie within any Public Drinking Water Source areas (DWER, 2024b). No RAMSAR wetlands, or significant wetlands are located within the subject site (DBCA, 2017a; DBCA, 2017b). No waterways occur within the subject site with the closest being Sleeman Creek approximately 1.34 km to the west (DWER, 2018c).

## 2.6. Environmentally Sensitive Areas

The subject site does not contain any Environmentally Sensitive Areas (ESAs). The nearest ESA lies approximately 13.07 km to the south-east, associated with the Mill Brook Nature Reserve (DWER, 2024c).

## 2.7. Remnant Vegetation

The subject site lies within the Darling Botanical District and is classified as the Narrikup 3 system. Mainly marginata, and Corymbia calophylla (Marri and Jarrah). Forest covered most of the area prior to clearing for agriculture (Beard et al, 2013).

**Table 1: Vegetation Associations mapped within the survey area (Beard et al., 2013).**

Details	Vegetation Association
System Association Name	Narrikup_3
Vegetation Association Number	3
Structure Description	Forest
Floristic Description	Mainly Eucalyptus marginata, Corymbia calophylla (Jarrah and Marri).
Remnant Vegetation by Beard Association Rarity in LGA	45% remaining (GoWA 2024).

## 2.8. Heritage

The subject site is not located within a registered Aboriginal heritage site (DPLH, 2024).

It is recognised that there has been a large scale of loss of cultural knowledge and information, and the survey area may contain additional heritage values that are not recognised through Department of Planning, Lands and Heritage (DPLH, 2024).

## 2.9. Dieback

The Dieback Information Delivery and Management System (DIDMS; SCNRM, 2023) disease confidence mapping of *Phytophthora cinnamomi* of the subject site has not been completed. It is important to note that the publicly available data provided in DIDMS is indicative only and it is stated by SCNRM that “the extent of infestations are underestimated, as not all areas have been surveyed and disease boundaries are likely to extend into mapped disease-free areas since surveys were conducted” (SCNRM, 2020).



### 3. Revegetation Commitments

The intent of this plan is to return the subject site to an area of native vegetation that bears ecological and habitat values, that will ultimately play a role in conserving biodiversity and ecological health at a site scale, as well as at a landscape scale.

The objectives of this plan are to:

1. Reestablish a functional landscape, representing pre-clearing vegetation units through similar composition, structure and density;
2. Reinstatement of the high condition value of the area, with revegetated areas to be at a minimum of good condition (Keighery, 1994), as per the minimum condition of the reference vegetation unit, with hygiene management strategies to prevent the introduction of weeds or disease to the subject site and maintain a limited presence of non-native species;
3. Reinstatement of the biodiversity of the area with use of a variety of species of local provenance seeds and propagating material; and
4. Reestablish an ecosystem that has the capacity to become self-sustaining with minimal to no management into the future.

Specific and measurable targets and completion criteria, will be detailed in Section 5 as per the DWER (2018a) document “*A Guide to Preparing Revegetation Plans for Clearing Permits*”. The subject site is proposed to be revegetated by means of planting with use of local provenance species, see Section 7 for details pertaining to revegetation methods to be employed.

### 4. Reference Site Assessment

Site assessment of the reference site, prior to clearing, was completed in 2023 by Wendy Bradshaw. The findings of the site assessment will be used as a basis for revegetation works as a representation of pre-clearing vegetation units (including composition, structure and density) (Bradshaw, 2023).

As per condition 8(b)ii of Clearing Permit CPS10598-1 site 2 and 6 from Bradshaw Report (Bradshaw, 2023) will be utilised as the reference sites for revegetation activities.

### 5. Targets and Completion Criteria

The completion targets and criteria for consideration of successful revegetation of the subject site are contained in Table 2.

**Table 2: Targets and completion criteria.**

Aspect	Completion Criteria	Monitoring
Species richness	The revegetation needs to achieve at least 70 per cent of the species richness of the reference sites.	Annually in spring by an environmental specialist until this completion criterion has been met and maintained for two years (i.e. three successive monitoring events).
Species density	The revegetation needs to achieve at least 70 per cent of the species density of the reference sites.	Annually in spring by an environmental specialist until this completion criterion has been met and maintained for two years (i.e. three successive monitoring events).
Kwongkan shrubland TEC	The revegetated vegetation meets the key diagnostic characteristics and condition thresholds for Kwongkan shrublands TEC, as specified in the relevant Approved Conservation Advice (DCCEEW, 2014).	The criterion is to be assessed annually by an environmental specialist in spring after the vegetation establishment until this completion criterion has been met and maintained for two years.
Black cockatoo foraging habitat	The revegetation needs to achieve at least 70 per cent of the black cockatoo foraging species coverage of the reference sites.	The criterion is to be assessed annually by an environmental specialist in spring after the vegetation establishment until this completion criterion has been met and maintained for two years.
Percentage of weeds present	Weed coverage in the revegetation area is no greater than 5 per cent the baseline data at the reference sites.	Monitor the revegetation site for weeds by quadrats annually in spring until this completion criteria has been met and maintained for two years.
Declared weeds	No Declared Weeds under the <i>Biosecurity and Agricultural Management Act 2007</i> present.	
Bare ground	The revegetation area has no more than 5 per cent greater than the baseline at the reference sites.	This criterion is to be assessed annually by an environmental specialist in spring after the vegetation establishment until this completion criterion has been met and maintained for two years.





Albany Office:  
29 Hercules Crescent  
Albany, WA 6330  
(08) 9842 1575

Denmark Office:  
7/40 South Coast Highway  
Denmark, WA 6333  
(08) 9848 1309

Esperance Office:  
2A/113 Dempster Street  
Esperance, WA 6450  
(08) 9072 1382



Overview Map Scale 1:100,000

**Legend**

- Cadastre
- Clearing
- Offset - Revegetation



Scale  
1:1,500 @ A3  
GDA MGA 2020 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
Shire of Plantagenet  
Unallocated Crown Land  
Narrikup, WA 6326

**Figure 3: Revegetation Area**

	QA Check <b>KPK</b>	Drawn by <b>ELB</b>
STATUS <b>FINAL</b>	FILE <b>MB0010-003</b>	DATE <b>18/12/2024</b>



## 6. Site Preparation

This section details actions required to prepare the site for revegetation activities.

### 6.1. Fire management

A bushfire assessment was not undertaken for the subject site. Area A will be adjacent to the clearing area which will be the new and upgraded Newman Road. Newman Road will act as a fire break for Area A, and it is also adjacent to the rail corridor which has a 5 m fire break before the railway line. Area B on Hannan way will have the rail corridor at the Western edge. Maintenance and slashing of vegetation encroaching into the fire break should occur annually. This maintenance should be undertaken in September to November, prior to the bushfire risk season. Care should be taken to prevent excessive disturbance to the subject site so as not to negatively affect revegetation efforts.

### 6.2. Weed management plan

The subject site has weeds only found in one section next to the powerlines on Newman Road including *\*Watsonia* sp. and *\*Leptospermum laevigatum*. Eliminating weeds from the subject site will be essential for revegetation success, and will reduce competition for moisture, light and nutrients, and will assist in satisfying the targets and completion criteria for this revegetation plan.

The aims of the weed management plan are to:

- Significantly reduce extent of current weed invasions within areas intended for revegetation;
- Increase available area suitable for revegetation activities;
- Attempt to eradicate smaller infestations or small populations;
- Prevent the introduction of new weed species, particularly declared pests (BAM act) and WoNS (IPAC, 2017); and
- Regularly monitor the site for invasive species.

Weed treatment will be conducted using the following methodology:

- Ensure no weed-affected soil is brought into the subject site by vehicles, machinery or equipment;
- Large woody weeds will be grubbed (hand removal), poisoned or removed from site and disposed to approved green waste receival facilities;
- Small weeds will be sprayed by a licensed contractor but only if the weeds are out-competing the native vegetation establishment areas;
- Scalping to be conducted in the south western area of Area A where weed burden is particularly high (note that scalping is to be conducted in conjunction with removal of the roads); and
- Initial follow up spraying may be undertaken annually as required. This will be dependent on what species are present and in what volumes.

Generally, herbicide spraying is most successful when the weeds are actively growing and before they produce seed heads, in late winter to early spring (GoSA, 2019). An important requirement is to avoid herbicide drift or overspray as this will impact the health, vigour and fecundity of the native vegetation and potentially impact the revegetation success. Spraying should be conducted by a licensed and qualified weed management contractor, using suitable weed treatments that will not persist in the soil or negatively impact native vegetation success (e.g. residual herbicides). In addition, it is recommended that weed management strategies be extended to areas beyond the subject site (subject to those areas respective land tenure), to prevent weed invasion from external sources. See Table 5 for a suggested timeline for weed management prior to planting. Due to the high weed infestation at the subject site in the south west corner next to the powerlines off Newman Road, scalping is recommended. Scalping involves removing the top few centimetres of weed burden, including the weeds and the seed in the soil (Sheehan et al., 2018).

It is recommended that any vehicles or machinery are treated and clean prior to entering the subject site. This is to ensure that weeds are not further dispersed by the machinery and activity on site.

### 6.3. Dieback and hygiene management plan

There is no evidence of dieback (*phytophthora* sp.) infestations at the subject site or in adjacent vegetation. However, indications of dieback or other plant diseases will be monitored annually as a part of the annual reporting required by the clearing permit. In addition, dieback and hygiene management should be implemented for the clearing and road construction, and road removal and site preparation phases.

The aims of the dieback and hygiene management plan are to:

- Mitigate the risk of introducing or spreading disease through the subject site, or to adjacent vegetation.;
- Regularly monitor the subject site for indications of dieback or any other plant diseases; and
- Manage and treat dieback should it occur at the subject site.

The hygiene and dieback management will be conducted using the following methodology:

- Clean earth-moving machinery, vehicles or any other equipment of soil or vegetative material prior to entry or departure from the subject site;
- Erect clean down signs at entry and departure points from the site;
- Ensure that no dieback infected soil, or any other vegetative material enters the subject site;
- Limit earth-moving activity in wet conditions; and
- Employ a registered dieback interpreter to assess the presence of dieback at the site and guide subsequent management tactics, if indications of dieback are detected at the subject site.

### 6.4. Ripping and ground preparation

Subject site ground conditions are hard and compacted and consisting of gravel on Newman Road and bitumen on Hannan way, due to them being existing or previous roads. Both road bases will need to be removed by the SoP prior to revegetation. It is assumed ground works may well take place concurrently with clearing and preparation earth works for the Newman Road upgrade. This would enable revegetation activities to be planned for May as per Table 4. Deep ripping of the subject site (up to 0.5m, as recommended in the Wheatbelt; WNRM, 2023) will be required to break up soil compaction, to allow root and water penetration. Rip lines should be approximately 2-3m apart and run along contour lines, to aid in harvesting water as it flows down slope (WNRM, 2023).

### 6.5. Topsoil

Spreading of topsoil is advisable in the subject site due to the removal of the roads for revegetation. This method will assist with tube stock survival if the soil under the road surfaces is not adequate for planting. This introduction of topsoil from the clearing area could also increase native vegetation numbers from existing seed stores in the soil. Reference should also be made to 6.2 to ensure weed importation does not negatively impact on the subject site.



## 7. Revegetation Methodology

The following section outlines the detailed steps for successful revegetation of the subject site, including species list, revegetation actions and management.

### 7.1. Species List

The following species list, Table 3, shows a list of species that was taken from the flora survey performed by Wendy Bradshaw that can be used to revegetate the area. Species should be selected with regard to strata layer. (10% upperstorey, 20% midstorey and 70% understorey).

**Table 3: Revegetation species list.**

Family	Species
Asparagaceae	<i>Laxmannia sessiliflora</i>
	<i>Lomandra nigricans</i>
	<i>Lomandra nutans</i>
	<i>Lomandra pauciflora</i>
	<i>Lomandra rupestris</i>
Casuarinaceae	<i>Allocasuarina humilis</i>
	<i>Allocasuarina fraseriana</i>
Colchicaceae	<i>Burchardia congesta</i>
Cyperaceae	<i>Cyathochaeta avenacea</i>
	<i>Machaerina articulata</i>
	<i>Machaerina juncea</i>
Dasypogonaceae	<i>Dasypogon bromeliifolius</i>
	<i>Kingia australis</i>
Dilleniaceae	<i>Hibbertia gracilipes</i>
Ericaceae	<i>Andersonia caerulea</i>
	<i>Lysinema ciliatum</i>
Fabaceae	<i>Acacia myrtifolia</i>
	<i>Acacia brownii</i>
	<i>Bossiaea rufa</i>
	<i>Daviesia flexuosa</i>
	<i>Daviesia preissii</i>
	<i>Hovea trisperma</i>
	<i>Pultenaea radiata</i>
	<i>Gompholobium polymorphum</i>
	<i>Gompholobium venustum</i>
	<i>Sphaerolobium vimineum</i>
Goodeniaceae	<i>Dampiera leptoclada</i>
	<i>Scaevola striata</i>
Haemodoraceae	<i>Conostylis aculeata</i>
Hemerocallidaceae	<i>Agrostocrinum hirsutum</i>
Iridaceae	<i>Patersonia umbrosa</i>
Loranthaceae	<i>Nuytsia floribunda</i>
Myrtaceae	<i>Agonis theiformis</i>
	<i>Astartea glomerulosa</i>
	<b>Beaufortia anisandra</b>

Family	Species
	<i>Darwinia diosmoides</i>
	<i>Eucalyptus marginata</i>
	<i>Kunzea recurva</i>
	<i>Melaleuca densa</i>
	<i>Melaleuca thymoides</i>
	<i>Pericalymma spongiocaula</i>
	<i>Taxandria linerifolia</i>
	<i>Taxandria parviceps</i>
	<i>Verticordia habrantha</i>
Pittosporaceae	<i>Billardiera variifolia</i>
Poaceae	<i>Austrostipa variabilis</i>
	<i>Neurachne alopecuroidea</i>
	<i>Rytidosperma caespitosum</i>
Polygalaceae	<i>Comesperma confertum</i>
Proteaceae	<i>Banksia arctotidis</i>
	<i>Banksia armata</i>
	<i>Banksia dryandroides</i>
	<i>Banksia gardneri</i>
	<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>
	<i>Grevillea fasciculata</i>
	<i>Hakea ceratophylla</i>
	<i>Hakea corymbosa</i>
	<i>Hakea ferruginea</i>
	<i>Hakea ruscifolia</i>
	<i>Isopogon formosus</i>
	<i>Isopogon sphaerocephalus</i>
	<i>Synaphea favosa</i>
	<i>Synaphea polymorpha</i>
Restionaceae	<i>Desmocladius fasciculatus</i>
	<i>Hypolaena exsculca</i>
	<i>Loxocarya cinerea</i>
	<i>Platychorda applanata</i>
Rhamnaceae	<i>Cryptandra nutans</i>
Rutaceae	<i>Boronia spathulata</i>
Thymelaeaceae	<i>Pimelea angustifolia</i>
	<i>Pimelea sulphurea</i>
Xanthorrhoeaceae	<i>Xanthorrhoea platyphylla</i>

## 7.2. Revegetation activities

Local provenance tube stock will exclusively be used for this revegetation. In the first year the availability of local provenance tube stock for the required species could be a limitation. As such it is recommended that an initial planting be conducted, with some of the recommended species more commonly found in nurseries. Subsequent planting can be conducted in the second year, using tube stock, to infill and increase species diversity as per the targets and completion criteria (refer Section 5). The minimum seeding/planting rate proposed is 1700 stems per ha. See Table 4 for a suggested timeline for the first year of site preparation and revegetation activities.

### 7.3. Initial planting

An initial planting event should occur in the first year with tube stock of some more commonly cultivated nursery species, sourced from nurseries based in the Wheatbelt or Great Southern. The optimal time to conduct tube stock planting in the Wheatbelt is May to June (DWER, 2018a). Planting should be conducted after good rains with rain forecasted in the weeks following the planting. Planting at this time of year gives seedlings a chance to establish roots so they can persist through the dry summer months. In addition, direct seeding can also occur in conjunction with this initial planting provided local provenance seeds of appropriate species can be sourced. The spacing of seedlings and seeding should take into account a subsequent planting event in the following year.

The following species are some species generally available and should be utilised in the initial planting:

- *Acacia myrtifolia*
- *Allocasuarina fraseriana*
- *Banksia armata*
- *Lomandra pauciflora*
- *Patersonia umbrosa*

### 7.4. Direct seeding

Direct seeding can occur if requested by client. The optimal time for direct seeding in the Wheatbelt is April to June, after good rains and before forecasted follow-up rain (GAV, 2003).

### 7.5. Tube stock planting

A secondary tube stock planting event will occur in the second year with the local provenance tube stock. These seedlings should be planted among the plants and seedlings from the initial planting. This planting should be conducted in May to June, after the rain for the wetter season has commenced.

### 7.6. Timeline of activities

Tube stock needs to be ordered in January from local nurseries to be ready for planting in May and June. Removal of the road bases needs to occur prior to or during April in year one. Once road bases are removed, a determination can be made if topsoil is needed throughout the site prior to planting.

Weed control activities will need to be undertaken in February and March with a minimum of 25 days between spraying and planting so that there is no negative effect on tube stock and to allow time for the weeds to die post treatment. Post planting weed control will also need to be carried out in September to November to minimise competition with tube stock. Weeds could also be brought in through topsoil from the clearing areas and this will need to be assessed prior and post clearing.

Post planting monitoring will need to be conducted during spring in the first year to determine tube stock survival and to assess when and if watering needs to occur. A proposed timeline of revegetation activities for the first year is outlined in Table 4.

Monitoring will also need to occur in year 2 in April to determine whether infill planting needs to be undertaken in year 2 and how many plants are required. This monitoring will also determine if weed control needs to occur prior to this infill planting event.

**Table 4: Timeline of site preparation and revegetation activities in the first year.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Order available from nursery for the initial planting.	Initial weed control- manual removal and spraying within subject site and adjacent weed infested areas. Allow minimum 25 days between herbicide application and planting (WNRM, 2023).	Scalp/rip/mound and remove road bases in the subject site in preparation of planting.	Weed monitoring prior to planting.  Initial planting conducted after first rains. Tube stock to be used.							Post planting monitoring	
										Water planted areas and vegetation as required (see Section 8.1).	
		Spread topsoil prior to planting.								Post planting/ annual weed control as required.	
		Fire management.									
Weed management plan – Ongoing											
Dieback and hygiene management - Ongoing											

## **8. Maintenance and Contingency Measures**

The contingency measures will only be enacted if monitoring outcomes suggest that the completion targets listed in Section 5 were not tracking to be met after year two of the revegetation plan. Contingency measures are included within this management plan. These protocols are designed to reduce adverse environmental impacts and provide an early detection of non-conformance and subsequent corrective action. Any modifications to the outlined strategies and methodologies to meet unexpected conditions shall be agreed to by the SoP before being enacted. Monitoring shall be used to confirm the effectiveness of any changes.

### **8.1. Additional watering**

If rain during the winter/planting period has been insufficient or lower than average (approx.762.6mm) and there is evidence of plant stress (stunted growth of seedlings, signs of desiccation), additional watering will be undertaken. The SoP has mobile watering resources for use when and if required. If watering is required it should be undertaken between the months of November and March. Broadcast watering is recommended as a cost-effective, low labour method of watering, and the planted rip lines should divert water to seedlings. An additional contingency action during particularly dry periods/years is the addition of a wetting agent to further support seedling success.

### **8.2. Weed control**

If weeds present are listed as WoNS, declared pests or environmental weeds that are aggressive and likely to suppress native plant growth, weed control should be undertaken prior to planting activities. Based on monitoring outcomes annual follow-up weed control should be undertaken when required, utilising appropriate herbicides with optimal timing of weed control works being winter and spring.

If weed management, detailed in Section 6.2, is deemed insufficient for emerging site conditions and weed infestation, reassessment of control techniques will be undertaken. If deemed appropriate an updated and comprehensive weed management plan should be developed to manage the weed issue at the subject site.

### **8.3. Remedial planting**

Should annual monitoring suggest that targets and completion criteria are not on track after year two revegetation activities remedial planting will occur. Site conditions and reasons for lack of plant success will be considered and addressed if additional planting is to occur. This may include, but is not limited to, an increase in watering rates, fertiliser application when planting, or use of a more suitable species for the observed conditions or erecting fences to reduce grazing pressure. Infill plantings are to be undertaken as required in consultation with the SoP.

### **8.4. Dieback treatment**

If indications of dieback are detected, a registered dieback interpreter will be employed to assess the presence of dieback at the site and guide subsequent management tactics. If dieback is present dieback mapping, monitoring, management and reporting to DWER will occur. If necessary, hygiene management protocols will be intensified.



## 9. Monitoring and Analysis

It is expected that a minimum of 3 years will be required to meet a successful revegetation program of this scale. However, determination of the area to be 'on track' to meet measurables can be recorded as indicative of success in future years. Annual monitoring is to be undertaken in December/January (Summer periods) each year to assess the success of the revegetation plan and/or as per the targets and completion criteria specified in Table 2. The timing is appropriate for all weed grass species to be absent from growth period, post spring growth of native species and assessment of the revegetation plants to be clearly identifiable. Assessment for weeds may be required during winter/spring months if weeds are encroaching and/or suppressing plant growth.

A minimum of 6 photo monitoring points are to be established along two transects as set out in Table 5.

An annual report containing records relating to any clearing permit conditions and/or records of activities undertaken in the preceding calendar year (1 January to 30 December), is to be compiled. See Table 5 for details of what monitoring data will be collected, including incidental records and data that will be collected if relevant.

**Table 5: Monitoring details.**

Data collection type	Aim of monitoring	Output	Frequency	Duration
Site-level	Vegetation condition	Data and map.	Annual	Ongoing annually until completion criteria met and maintained for two years.
	Weed monitoring and mapping	Data and map.		
	Disease monitoring, as required.	Data, map, name and qualifications of dieback interpreter.		
Transect-level	Transect floristics	Floristic survey data, analysis (ordinations), discussion, list of coordinates and site map with quadrats.	Annual	Ongoing annually until completion criteria met and maintained for two years.
	Vegetation structure	Data, analysis and discussion.		
	Photo point monitoring	Images, list of coordinates, map of photo points from transect location.		

## 10. Schedule and Budget

Table 6 outlines a schedule of actions for the revegetation project. Once timings and activities are confirmed, formal budget expenditure can be inputted against the key activities.

**Table 6: Schedule of actions.**

Task	Description	Timing	Budget
Site prep	Removal of bitumen and gravel road. Spreading of top soil.	April	TBC
Sourcing of tube stock	Sourcing tubes tock from local nurseries prior to planting.	April	TBC
Planting	Planting tube stock using pottipukis at a density of 1 per 3 m <sup>2</sup>	May to June	TBC
Monitoring	Photo points along transect. Twice a year to monitor weed and plant survival	By annually in November and Autumn	TBC
Weed control	Remove or spray any weeds within revegetation site	July to August	TBC
Infill planting (year 2)	This occurs if the criteria for species survival are not met (70%)	May to June	TBC

## 11. References

- Beard, J., Beeston, G., Harvey, J., Hopkins, A., & Shepherd, D. (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second Edition. *Conservation Science Western Australia*, 9, 1-152.
- BoM, Bureau of Meteorology Australia. (2024a). Climate Statistics for Australian Locations – Mount Barker (Station No. 023733) Accessed: December 2024. [www.bom.gov.au](http://www.bom.gov.au).
- Bradshaw, W. (2023). *Newman Road/Hannan Way Narrikup. Plantagenet Shire proposed road realignment*. Vegetation and Flora Survey. July 2023. Unpublished report prepared for the Shire of Plantagenet.
- DBCA, Department of Biodiversity, Conservation and Attractions. (2017a). *Ramsar Sites (DBCA-010)*. [Data set]. DataWA. <https://catalogue.data.wa.gov.au/dataset/ramsar-sites>
- DBCA, Department of Biodiversity, Conservation and Attractions. (2017b). *South Coast Significant Wetlands (DBCA-018)*. [Data set]. DataWA. <https://catalogue.data.wa.gov.au/dataset/south-coast-significant-wetlands>
- DCCEEW, Department of Climate Change, the Environment, Energy and Water. (2014). Approved Conservation Advice for Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia. <https://www.environment.gov.au/biodiversity/threatened/communities/pubs/126-conservation-advice.pdf>
- DPIRD, Department of Primary Industries and Regional Development. (2024a). Soil Landscape Mapping - Best Available (DPIRD-027) [Data set]. <https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-best-available>
- DPIRD, Department of Primary Industries and Regional Development. (2019). *Pre-European Vegetation (DPIRD-006)*. [Data set]. <https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006>
- DPLH, Department of Planning, Lands and Heritage. (2023). *Aboriginal Cultural Heritage Inquiry System (ACHIS)*. <https://espatial.dplh.wa.gov.au/ACHIS/index.html?viewer=ACHIS> Viewed December 2024.
- DWER, Department of Water and Environmental Regulation. (2018a). *A Guide to Preparing Revegetation Plans for Clearing Permits*. Government of Western Australia. [https://www.der.wa.gov.au/images/documents/our-work/consultation/Revegetation-plan/A\\_Guide\\_to\\_Preparing\\_Revegetation\\_Plans\\_for\\_Clearing\\_Permits.pdf](https://www.der.wa.gov.au/images/documents/our-work/consultation/Revegetation-plan/A_Guide_to_Preparing_Revegetation_Plans_for_Clearing_Permits.pdf)
- DWER, Department of Water and Environmental Regulation. (2018b). *Hydrographic Catchments - Catchments (DWER-028)*. [Data set]. <https://catalogue.data.wa.gov.au/dataset/hydrographic-catchments-catchments>
- DWER, Department of Water and Environmental Regulation. (2018c). *Hydrography, Linear (Hierarchy) (DWER-031)*. [Data set]. <https://catalogue.data.wa.gov.au/dataset/hydrography-linear-hierarchy>. Accessed December 2024.
- DWER, Department of Water and Environmental Regulation. (2024a). *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*. [Data set]. <https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>
- DWER, Department of Water and Environmental Regulation. (2024b). *Public Drinking Water Source Areas (DWER-033)* [Data set]. DataWA. <https://catalogue.data.wa.gov.au/dataset/public-drinking-water-source-areas>. Accessed December 2024.
- DWER, Department of Water and Environmental Regulation. (2024c) South Coast Significant Wetlands (DWER-018) <https://catalogue.data.wa.gov.au/dataset/south-coast-significant-wetlands>. Accessed December 2024.
- GAV. Greening Australia Victoria. (2003). *Revegetation Techniques*. [https://www.greeningaustralia.org.au/wp-content/uploads/2017/11/GUIDE\\_A-guide-for-establishing-native-vegetation-in-Victoria.pdf](https://www.greeningaustralia.org.au/wp-content/uploads/2017/11/GUIDE_A-guide-for-establishing-native-vegetation-in-Victoria.pdf)

- GoSA, Government of South Australia. (2019). *Weed management techniques*. Factsheet. <https://cdn.environment.sa.gov.au/landscape/docs/hf/weed-management-techniques.pdf>
- IPAC, Invasive Plants and Animals Committee (2017). *Australian Weeds Strategy 2017-2027*. Commonwealth of Australia.
- Keighery, B.J. (1994). *Bushland Plant Survey: a Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc.), Nedlands, Western Australia.
- Landgate, (2024). *Cadastre. Land tenure*. <https://map-viewer-plus.app.landgate.wa.gov.au/index.html> Accessed December 2024
- SCNRM, South Coast Natural Resource Management. (2020). *Plant Disease Data Help Document*. [https://didms.gaiaresources.com.au/static/doc/DIDMS%20Help%20content%20PI\\_dis%2020210311.pdf](https://didms.gaiaresources.com.au/static/doc/DIDMS%20Help%20content%20PI_dis%2020210311.pdf)
- SCNRM, South Coast Natural Resource Management. (2023). *The Dieback Information Delivery and Management System*. <https://dieback.net.au/dieback-public-map/>
- Sheehan, M., James, R., & Blood, K. (2018). *Looking for weeds: search and detect guide* (2nd Edition). A guide for searching and detecting weeds at the early stage of invasion on public land in Victoria. Department of Environment, Land, Water and Planning, Victoria. [https://www.environment.vic.gov.au/\\_data/assets/pdf\\_file/0024/49173/WESI-Guide-2ndEd-01\\_search-and-detect\\_PRINT.pdf](https://www.environment.vic.gov.au/_data/assets/pdf_file/0024/49173/WESI-Guide-2ndEd-01_search-and-detect_PRINT.pdf)
- Shepherd, D.P., Beeston, G.R., & Hopkins, A.J.M. (2002). *Native Vegetation in Western Australia, extent, type and status*. Resource Management Technical Report 249. Department of Agriculture.
- Wilkins, P., Gilfillan, S., Watson, J., & Sanders, A. (2006) *The Western Australian South Coast Macro Corridor Network – a bioregional strategy for nature conservation*. Department of Conservation and Land Management (CALM) & South Coast Regional Initiative Planning Team (SCRIPT). <https://southcoastnrm.com.au/wp-content/uploads/2022/05/WA-MacroCorridorReport-Full-WEB.pdf>
- WNRM, Wheatbelt Natural Resource Management. (2023). *Revegetation: It's Time to Get Your Trees in the Ground*. <https://www.wheatbeltnrm.org.au/whats-happening/news/healthy-environments/revegetation-it%E2%80%99s-time-get-your-trees-ground>

## 12. Appendices

Appendix A: Species List (Bradshaw, 2023)



# Appendix A

Species List (Bradshaw, 2023)

**Table 7: Complete species list of Vegetation (Bradshaw, 2023).**

Family	Species Name
Anarthriaceae	<i>Anarthria dioica</i>
	<i>Anarthria prolifera</i>
Apiaceae	<i>Xanthosia singuliflora</i>
Asparagaceae	<i>Laxmannia sessiliflora</i>
	<i>Lomandra nigricans</i>
	<i>Lomandra nutans</i>
	<i>Lomandra pauciflora</i>
	<i>Lomandra rupestris</i>
Casuarinaceae	<i>Allocasuarina humilis</i>
	<i>Allocasuarina fraseriana</i>
Colchicaceae	<i>Burchardia congesta</i>
Cyperaceae	<i>Lepidosperma</i> sp. aff. <i>squamatum</i>
	<i>Cyathochaeta avenacea</i>
	<i>Machaerina articulata</i>
	<i>Machaerina juncea</i>
	<i>Mesomelaena tetragona</i>
	<i>Morelotia octandra</i>
	<i>Netrostylis</i> sp. Jarrah Forest
	<i>Tricostularia davisii</i> P3
Dasypogonaceae	<i>Dasypogon bromeliifollius</i>
	<i>Kingia australis</i>
Dilleniaceae	<i>Hibbertia gracilipes</i>
	Droseraceae
	<i>Drosera fimbriata</i>
	<i>Drosera huegelii</i>
	<i>Drosera menziesii</i>
	<i>Drosera verrucata</i>
Ericaceae	<i>Andersonia caerulea</i>
	<i>Leucopogon gibbosus</i>
	<i>Leucopogon glabellus</i>
	<i>Leucopogon verticillatus</i>
	<i>Lysinema ciliatum</i>
	<i>Styphellia concinna</i>
	? <i>Styphellia compacta</i>
Fabaceae	<i>Acacia myrtifolia</i>
	<i>Acacia brownii</i>
	<i>Bossiaea rufa</i>
	<i>Daviesia flexuosa</i>
	<i>Daviesia preissii</i>
	<i>Hovea trisperma</i>
	<i>Pultenaea radiata</i>
	<i>Gompholobium polymorphum</i>
	<i>Gompholobium venustum</i>
	<i>Sphaerolobium vimineum</i>

Family	Species Name
Goodeniaceae	<i>Dampiera leptoclada</i>
	<i>Scaevola striata</i>
Haemodoraceae	<i>Conostylis aculeata</i>
Hemerocallidaceae	<i>Agrostocrinum hirsutum</i>
Iridaceae	? <i>Patersonia</i> sp.
	<i>Patersonia umbrosa</i>
	* <i>Watsonia</i> sp.
Loranthaceae	<i>Nuytsia floribunda</i>
Myrtaceae	<i>Agonis theiformis</i>
	<i>Astartea glomerulosa</i>
	<i>Beaufortia anisandra</i>
	<i>Darwinia diosmoides</i>
	<i>Eucalyptus marginata</i>
	<i>Kunzea recurva</i>
	* <i>Leptospermum laevigatum</i>
	<i>Melaleuca densa</i>
	<i>Melaleuca thymoides</i>
	<i>Pericalymma spongiocaula</i>
	<i>Taxandria linerifolia</i>
	<i>Taxandria parviceps</i>
	<i>Verticordia habrantha</i>
Orchidaceae	<i>Prasophyllum gracile</i>
	<i>Pterostylis vittata</i>
	<i>Thelymitra crinita</i>
Pittosporaceae	<i>Billardiera variifolia</i>
Poaceae	<i>Austrostipa variabilis</i>
	* <i>Eragrostis curvula</i>
	<i>Neurachne alopecuroidea</i>
	<i>Rytidosperma caespitosum</i>
Polygalaceae	<i>Comesperma confertum</i>
Proteaceae	<i>Banksia arctotidis</i>
	<i>Banksia armata</i>
	<i>Banksia dryandroides</i>
	<i>Banksia gardneri</i>
	<i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i>
	<i>Grevillea fasciculata</i>
	<i>Hakea ceratophylla</i>
	<i>Hakea corymbosa</i>
	<i>Hakea ferruginea</i>
	<i>Hakea ruscifolia</i>
	<i>Isopogon formosus</i>
	<i>Isopogon sphaerocephalus</i>
	<i>Synaphea favosa</i>
	<i>Synaphea polymorpha</i>

Family	Species Name
Restionaceae	<i>Desmocladus fasciculatus</i>
	<i>Hypolaena exsulca</i>
	<i>Loxocarya cinerea</i>
	<i>Platychorda applanata</i>
Rhamnaceae	<i>Cryptandra nutans</i>
Rutaceae	<i>Boronia spathulata</i>
Santalaceae	<i>Choretrum lateriflorum</i>
Stylidiaceae	<i>Stylidium accuminatum</i> subsp. <i>meridionale</i>
	<i>Stylidium hirsutum</i>
	<i>Stylidium menziesii</i>
Thymelaeaceae	<i>Pimelea angustifolia</i>
	<i>Pimelea sulphurea</i>
Xanthorrhoeaceae	<i>Xanthorrhoea platyphylla</i>