

Main Roads Western Australia

**Toodyay Road Passing Lanes**

Revegetation Plan

September 2005



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## Executive Summary

The Toodyay Road passing lanes and Truck Bay construction project is programmed to start in January 2006 with completion expected in May 2006. The project involves construction of three passing lanes between the Darling Scarp at Redhill and Berry Road, north-east of Gidgegannup. A Truck Bay will be created at the top of Redhill, adjoining the western end of Passing Lane 1.

The project involves clearing of vegetation in all areas with some areas at risk of erosion due to slopes and adjacent minor creeklines. The road reserve at Passing Lane 1 and the Truck Bay passes through John Forrest National Park.

No Declared Rare or Priority flora species have been found to occur in the areas to be cleared and the vegetation is of variable quality, ranging from very degraded to excellent. There is a risk of the introduction and spread of dieback, particularly at Passing Lane 1, and there are a number of invasive weeds which must be managed over all areas.

GHD has been commissioned to develop a revegetation plan for the cleared areas which will remain alongside the new passing lanes. Most areas to be revegetated consist of thin strips with some being in areas of low cut. The revegetation plan is based on drawings developed by KBR (2005) and provided detail on vegetation and topsoil re-use, ground preparation, seeding and planting.

### **Ground Preparation**

Successful revegetation is dependent upon good weed control and correct soil preparation. This revegetation plan recommends the development and implementation of a weed control program in order to reduce particularly invasive weed species prior to seeding and planting. Soil preparation will involve deep scarification of the ground, and replacement of topsoil or gravel.

### **Vegetation and Topsoil Reuse**

The vegetation of Passing Lanes 1 and 4 is generally re-usable and will be chipped and respread over the revegetation areas. Some of the topsoil can also be re-used. Where topsoil is not useable the areas to be seeded and planted will be spread with a layer of clean gravel, which provides an excellent substrate for seeding and also suppresses weed growth.

### **Seeding and Planting**

A total of 3.44 kg of native plant seed will be spread over prepared soil at an average rate of 3 kg per hectare. Seed will be bulked up with smoke-water vermiculite in order to improve germination and evenness of spread.

Approximately 11,489 tubestock seedlings will be planted at an average density of 1 per 2 m<sup>2</sup>. All seedling and seed species will be of locally present taxa.



### Completion Criteria

Completion criteria have been recommended based on Main Roads guidelines. These require that there are at least 3 stems per m<sup>2</sup> within 2 years from revegetation works with a diversity of at least 70% of the planted/seeded species.

Table 1 below summarises the major steps required within the revegetation plan.

**Table 1 Summary of Recommended Preparatory Management Actions**

<b>Item</b>	<b>Description</b>	<b>Timing</b>	<b>Responsibilities</b>
Appoint revegetation contractor	Contract suitable experienced revegetation contractor	As soon as possible	MRWA
Collect seed	Seed collection from areas to be cleared for works	Sept 2005 to clearing	MRWA, Revegetation contractor
Order seedlings	Recommended seedlings to be ordered from accredited nursery	Sept 2005 to Dec 2005	MRWA, Revegetation contractor
Order extra seed	Seed to be ordered from accredited seed suppliers	Jan 2005 to Mar 2006	MRWA, revegetation contractor
Develop weed control plan	A weed control plan for pre- and post revegetation	Develop as soon as possible. Completion by March 2006	MRWA



# 1. Project Outline

## 1.1 Project Description

Main Roads Western Australia (MRWA) commissioned GHD to prepare a Revegetation Plan for the construction of three passing lanes and a Truck Bay along Toodyay Road between Red Hill and Berry Road, north east of Gidgegannup (Figure 2).

The project involves the following:

- » Passing lane 1 (Toodyay Road H33 Eastbound) – extension of the existing eastbound overtaking lane from SLK 5.47 to the existing overtaking lane at SLK 7.24, east of Red Hill;
- » Passing Lane 2 (Toodyay Road H33 Eastbound) – provision of an eastbound overtaking lane from SLK 13.83 to SLK. 15.40, near Stoneville Road;
- » Passing Lane 4 (Toodyay Road M26 Eastbound) - provision of an eastbound overtaking lane from SLK 6.57 to SLK. 8.10, near Berry Road; and
- » Truck Bay (Toodyay Road H33 Westbound) – improvements to existing westbound truck embayment at SLK 5.50, Red Hill.

Passing Lane 1 and the Truck Bay are on the upper edge of the Darling Scarp, while Passing Lanes 2 and 4 are situated on the Darling Plateau. The areas of the proposed passing lanes are contained within the Toodyay Road reserve. The land adjoining Toodyay Road consists primarily of 'special rural' lots between John Forrest National Park and Berry Road.

Construction works for these projects are scheduled to begin in January 2006, and will be staged with an expectation of completion in May 2006.

## 1.2 Scope of Work

GHD undertook a desktop study and fieldwork as required to prepare a Project Revegetation Plan (the "Plan"). The Plan will define the:

- » Scope and extent of the revegetation works, and
- » Staging and methods to deliver the works in a cost-effective manner.

The Plan builds on work undertaken by KBR (2005) which indicated the areas of road reserve to be revegetated and the general zones of revegetation.

MRWA require that the plant species chosen for revegetation are limited to those that are viable and survive, and are commercially available. MRWA also recommend that the plant species are locally occurring native species.



## 2. Relevant Issues

### 2.1 Commitments/Project Approval Conditions

No commitments or project approval conditions have been set for the project.

### 2.2 Roadside Management and Safety

MRWA adheres generally to AustRoads guidelines in regard to roadside safety and the distance from the carriageways to planted vegetation. The guidelines recommend distances from the edge of the seal to plants of varying sizes so that vehicles leaving the road have a lower chance of hitting a tree trunk. In many circumstances, shrubs can provide a runoff buffer for vehicles and can prevent them from travelling further. The MRWA document *Environmental Guideline - Vegetation Placement within the Road Reserve* (MRWA, 2004a) is the basis for revegetation planning in this regard.

Roadside maintenance is also of importance when considering revegetation. The aim is to develop vegetation which will not require pruning or slashing in the short to medium term and which will not damage the structure of the road. To this end there is a no-planting zone from the seal edge to approximately 1m up the backslope of the table drain, with tree species generally not recommended to be planted or sown in an area 9m from the edge of the seal.

### 2.3 Environmental Issues

Key environmental issues were identified in the Preliminary Environmental Impact Assessment (GHD, 2002) and Landscape Design Report (KBR, 2005). These are:

- » Soil erosion - as the Darling Scarp is characterised by a steep climb over incised gully terrain to the plateau, it is anticipated that management of soil erosion within the revegetation area will be necessary.
- » Weeds – ATA Environmental conducted a weed survey of Passing Lane 1 and the Truck Bay, and found a total of 28 weed species within the survey area (2004). Of these, one (Paterson's Curse) is a Declared Plant under the *Agricultural and Related Resources Protection Act 1976*. Another four are significant Environmental Weeds based on CALM weed categorisation. Management of weedy species within the revegetation areas, and prevention of weed spread into adjacent bushland is an important aspect of the revegetation plan.
- » Dieback – dieback disease can kill a range of native plant species, whether natural or planted and has the potential to reduce the effectiveness of revegetation works. A dieback survey based on site observations was carried out by GHD to analyse for the presence of the disease and the risk of spread due to the works. A dieback survey, including soil analysis, of Passing Lane 1 and the Truck Bay, was also carried out by Glevan in 2004. Passing Lanes 4 and 2 are generally uninterpretable for dieback presence due to past activities. No clear evidence of dieback was





observed at Passing Lane 1 or the Truck Bay despite the presence of many indicator species.

## **2.4 Stakeholders**

Key Stakeholders identified during the PEIA and subsequent work include:

- » Department of Conservation and Land Management (CALM) – John Forrest National Park
- » Department of Environment (DoE) – Water catchments, clearing
- » City of Swan, Shire of Mundaring.



## 3. Key Site Biophysical Factors

Key biophysical factors have been determined with reference to the PEIA prepared by GHD in 2002, the *Toodyay Road Passing Lanes Design Report* (KBR, 2005) and subsequent desktop investigations and site visits.

### 3.1 Soil Profile

Passing Lane 1 and the Truck Bay are situated on the Darling Scarp which is characterised by very steep slopes, shallow yellow and red earths and massive granite outcropping and boulders (Churchward and McArthur, 1978). Small, localised areas of riverine deposits are probably present along the larger drainage lines in the lower part of the survey area.

Passing Lanes 2 and 4 are situated on the Darling Plateau. Churchward and McArthur (1978) suggest that this area of Toodyay Road incorporates the following landform and soil complexes.

- » Dwellingup: gently undulating landscape with duricrust on ridges, sands and gravels in shallow depressions
- » Yarragil: valleys on the western part of the plateau, sandy gravels on slopes and orange earths on swampy floors
- » Murray: deeply incised valleys with red and yellow earths on slopes and narrow alluvial terraces.

### 3.2 Hydrology and Drainage

A tributary of Strelley Brook runs parallel Passing Lane 1 to the south east and will be partly impacted by the roadworks. This creekline will be slightly altered to accommodate the passing lane. The road drainage ties into this steep sided creekline, and there is a relatively high potential for erosion of its banks, particularly where it will be directly impacted.

Similarly, construction of the Truck Bay will impact an existing drainage line to the south east of the road.

There will be no direct impact on natural drainage in Passing Lane 2, although there is a dampland/drain supporting dampland vegetation on the opposite side of the road to the proposed works.

The works at Passing Lane 4 intersect a minor tributary to Wooroloo Brook, which feeds across the road. There is potential for erosion at this gully but suitable culvert engineering and protection should minimise this risk.

Both Wooroloo Brook and Strelley Brook are Environmentally Sensitive Areas (ESA) under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. However, the tributary to Wooroloo Brook intersected by Passing Lane 4 is not part of the ESA.



### 3.3 Existing Vegetation

#### 3.3.1 Vegetation

The vegetation of the proposed works areas was divided into the following types as a result of field surveys conducted by GHD in 2002:

1. Wandoo (*Eucalyptus wandoo*) woodland with a scattered to medium amount of Marri (*Corymbia calophylla*) over mixed shrubs, grasses, herbs, sedges and introduced species;
2. Areas of revegetation in the road reserve planted (and/or seeded) by MRWA in the past;
3. Shrub heath on the upper slopes of the Darling Scarp and on the Darling Plateau in the vicinity of the John Forrest National Park; and
4. Roadside drainage areas within the road reserve mostly vegetated with introduced species, some native opportunistic species and/or *Eucalyptus rudis* and *Melaleuca raphiophylla*.

#### Passing Lane 1

The roadside verge vegetation in the area of proposed Passing Lane 1 is a mix of regenerated native species; naturally occurring mixed shrub heath with Marri, and introduced annual and perennial species. Most of the native shrub heath vegetation is located outside of the road reserve (within the boundaries of the John Forrest National Park or the Pioneer Quarry flora and fauna reserve), on the slopes and on top of the road embankment. The road reserve area has a small drainage channel adjacent to the road, including introduced species, shrubs, sedges and herbs. The native species recorded in these drainage areas are *Acacia pulchella*, *A. saligna*, *Anigozanthos* sp., *Astartea fascicularis*, *Juncus holoschoenus/pallidus*, *Lepidosperma* sp. and *Viminaria juncea*.

#### Passing Lane 2

This area supports a remnant Wandoo/Marri woodland, with some Jarrah, over mixed shrubs, herbs, *Xanthorrhoea* species (*X. gracilis* and *X. preissii*) and introduced annual and perennial species. The more common species present in the understorey stratum are *Acacia saligna*, *A. willdenowiana*, *Bossiaea ornata*, *Daviesia* sp., *Desmocladius fasciculatus*, *Dianella revoluta*, *Drosera* sp., *Dryandra lindleyana*, *Gastrolobium/Nemcia* sp., *Hakea lissocarpha*, *Hibbertia hypericoides*, *Hovea* sp., *Lechenaultia biloba*, *Lepidosperma* sp., *Lomandra* sp., *Opercularia hispidula/vaginata*, *Philothea spicata*, *Phyllanthus calycinus*, *Pterostylis* sp. and *Stypantra glauca*.

Other sections of this proposed overtaking lane area are past MRWA revegetation areas, which include the species *Acacia saligna*, *Calothamnus quadrifidus*, *Hakea lissocarpha/erinacea*, *Hypocalymma angustifolium* and *Phyllanthus calycinus*.

Damper roadside drainage areas are the most likely to be damaged by the construction activities. These areas are vegetated with a mixture of shrub, sedge, herb, and introduced species with scattered Marri (*Corymbia calophylla*) trees. The



dominant shrub species present are *Acacia pulchella*, *A. saligna*, *Agonis linearifolia*, *Astartea fascicularis*, *Lepidosperma* sp., *Melaleuca preissiana* and *Pericalymma ellipticum*. There are also two invasive introduced species present in these damper roadside areas; *Leptospermum laevigatum* (Coast Tea tree; a large shrub to 1m) and a species of *Cyperus* (sedge).

#### **Passing Lane 4**

There are two main vegetation types in this section of Toodyay Road; Marri/Wandoo woodland and areas of past MRWA revegetation. The Marri/Wandoo woodland has the following species present; *Acacia pulchella*, *A. saligna*, *Allocasuarina fraseriana/huegeliana*, *Bossiaea eriocarpa*, *Daviesia* sp., *Dryandra nivea/lindleyana*, *Grevillea synapheae*, *Haemodorum* sp., *Hakea prostrata*, *Kennedia prostrata*, *Lepidosperma* sp., *Lomandra* sp., *Nemcia/Gastrolobium* sp., *Neurachne alopecuroidea*, *Phyllanthus calycinus*, *Tetraria octandra* and *Xanthorrhoea preissii*.

The areas of revegetation by MRWA have the following species present: *Acacia drummondii*, *A. extensa*, *A. lasiocarpa*, *Allocasuarina* sp., *Banksia grandis*, *Calothamnus quadrifidus*, *Eucalyptus ?leucoxydon* var. *rosea*, *Hakea laurina*, *H. ?petiolaris*, *H. trifurcata*, *Hypocalymma angustifolium* and *Melaleuca ?radula*.

#### **3.3.2 Threatened Ecological Communities**

No CALM listed Threatened Ecological Communities (TEC) are recorded in the vicinity of the proposed development (CALM, 2005) and none were recognised as a result of the field investigations.

#### **3.3.3 Declared Rare and Priority Flora**

CALM's Declared Rare and Priority Flora database was searched as part of the PEIA in 2002 (GHD, 2002). While 15 species were identified as being present in the general vicinity of the study sites, none were found within the road reserve that will be impacted by the construction of Passing Lanes 1, 2 and 4 or the Truck Bay. The database was again searched in 2005, with some species being removed from the 2002 list for the area, and some being added. None of the species listed on the database were found in the passing lane areas or Truck Bay, either in the original field flora list (GHD, 2002) or during the 2005 field visit.

### **3.4 Weed Species**

GHD completed a site visit at Passing Lanes 1, 2 and 4 in 2005 and noted the presence of weed species. Much of the road reserve contains a significant amount of introduced annual and perennial pasture species, due to past agricultural practices. Some of these species are particularly invasive.

ATA Environmental conducted a weed survey of Passing Lane 1, and found a total of 28 weed species within the survey area (2004). One of the weeds identified was Patersons Curse (*Echium plantagineum*), which is classified with a P1 category throughout the state (Department of Agriculture, 2005). P1 prohibits the movement of



the plant and its seeds throughout the State. Four other weeds identified are weeds of high environmental significance as defined in the *Environmental Weed Strategy for Western Australia* (CALM, 1999). These are the Victorian Tea Tree (*Leptospermum laevigatum*), African Lovegrass (*Eragrostis curvula*), Watsonia (*Watsonia meriana*) and Freesia (*Freesia* sp). Weeds with a high rating:

- » Have a high level of invasiveness;
- » Are widely distributed or have a potentially wide distribution; and
- » Their presence results in environmental impacts including changing the structure composition and function of ecosystems.

In addition to pastoral grasses, four environmental weeds were recorded at Passing Lane 2, these were: *Acacia baileyana/decurrens*, *Corymbia citriodora*, *Leptospermum laevigatum* and *Watsonia meriana*. African Lovegrass (*Eragrostis curvula*) was recorded in sections of Passing Lane 4.

### 3.5 Drainage

The surface hydrology of Passing Lane 1 is characterised by considerable runoff from the steep, granitic terrain of the Darling Scarp. Surface water is collected into gully channels over the slopes and then into a larger watercourse near the western end of John Forrest National Park. A tributary to Strelley Brook crosses Passing Lane 1 and runs parallel to it for most of the length of the passing lane.

A tributary of Wooroloo Brook is in close proximity to the area proposed for Passing Lane 4, but it is unlikely that the construction works will have any direct impacts on this brook. Small drainage lines, located in private property adjacent to the road verge area, lead down into the tributary to Wooroloo Brook and are mostly degraded due to the presence of introduced annual and perennial pasture species. The tree species associated with these drainage lines are *Eucalyptus rudis* and *Melaleuca raphiophylla*.

No natural basin wetlands are shown for the area in the "Wetlands of the Swan Coastal Plain, Volume 2B" (Hill *et al.* 1996), or in the *Revised Draft Environmental Protection (Swan Coastal Plain Wetlands) Policy and Regulations 2004* (EPA, 2004).

### 3.6 Other

#### 3.6.1 Dieback

Dieback disease (caused by the fungal pathogen *Phytophthora cinnamomi*) may be present along parts of the road alignment (GHD, 2002).

Glevan Consulting undertook a dieback assessment of Passing Lane 1 and the Truck Bay (2004). No visual evidence of dieback was recorded. One soil and tissue sample was taken to assist in the assessment process, and returned a negative result.

Despite this result, the majority of vegetation on the verges of Toodyay Road in this area is at risk of being infected with dieback.



The vegetation on Passing Lane 2 is almost entirely planted trees, some of which have a low susceptibility to the disease. There is no evidence of dieback presence but the area must be considered as uninterpretable, due to long-term disturbance.

One section of revegetation within the area of Passing Lane 4 has a number of young, planted and seeded, individuals of *Banksia grandis*, which are particularly susceptible to the disease (GHD, 2002). Some individuals of *Banksia grandis* were recorded as dead or dying during the recent site visit on 7<sup>th</sup> July 2005 but it is believed that the deaths are more likely as a result of drought and plant competition on the rehabilitated embankment. A number of other potentially susceptible plant species in the revegetation area are healthy. Despite this, it is still possible that dieback is present along sections of Passing Lane 4 as the area has been significantly altered and some sections are uninterpretable.

A short visit to the Lilydale Road pit was also undertaken, in order to consider the risk of dieback spread from gravels in the pit area. Again, most of the area of the pit is uninterpretable due to extensive disturbance and the lack of indicator native plant species. The area above the pit still retains some native vegetation although much of the understorey species have been removed by grazing. Any soil from the pit area would be considered uninterpretable for *Phytophthora* infestation, due to the disturbance and lack of hygiene controls for earthmoving over many years.

### **3.6.2 Conservation Reserves**

John Forrest National Park in the vicinity of Red Hill is immediately adjacent to the works area associated with Passing Lane 1 and the Truck Bay. This may be indirectly impacted by proposed construction works. Direct construction impacts are only likely within the road reserve, which has mostly re-established native and introduced species, and some remnant native species. Indirect impacts include soil erosion, introduction of weeds, and spread of dieback. These aspects will need to be managed.



## 4. Revegetation Strategy

Key biophysical factors and other relevant issues have been incorporated into the revegetation plan. The revegetation plan takes into consideration the soils, terrain and nature of the surrounding land use and vegetation of the Passing Lanes. In order to address these issues the revegetation plan includes information on:

- » Vegetation;
- » Weeds;
- » Erosion;
- » Dieback; and
- » Revegetation species selection and recommendations for planting.

The Revegetation Plan format has been agreed through consultation with the Project Manager, and with reference to MRWA policy and guidelines, in particular:

- » *Environmental Guideline: Revegetation Planning and Techniques* (MRWA, 2004a)
- » *Environmental Guideline: Vegetation Placement within the Road Reserve* (MRWA, 2004b)
- » *Specification 204: Environmental Requirements* (MRWA, 2003a)
- » *Specification 301: Clearing* (MRWA, 2005a)
- » *Specification 302: Earthworks* (MRWA, 2003b)
- » *Specification 304: Revegetation and Landscaping* (MRWA, 2005b)

### 4.1 Revegetation Objectives

At a minimum, the revegetation will fulfil the following objectives:

- » To achieve roadside safety and sight line requirements:
  - Comply with MRWA' clearance requirements (*Environmental Guideline - Vegetation Placement within the Road Reserve* (MRWA, 2004a) for all new planting and seeding.
  - No existing trees (to be retained) shall be within the nominated clear zone for the road speed.
- » To achieve roadside stability and minimise on-going maintenance:
  - Implement batter and soil surface stabilisation and protection measures.
  - Re-establish vegetation cover that is similar in structure and composition to comparable naturally occurring local vegetation in the area.
- » To protect and enhance biodiversity:
  - Match the species selection to the composition of naturally occurring local vegetation in the area.



- Collect and supply seed for direct seeding and planting, as much as is practical, from local provenance native species.
- Use regeneration from site topsoil, with some direct seeding and supplementary planting of local native species.
- Implement topsoil management and weed control measures to discourage the establishment of weeds over disturbed soil surfaces.

## 4.2 Required Vegetation Cover

### 4.2.1 Function

The vegetation cover will help to prevent soil erosion by rainfall impact and surface water flows. It will also provide for transition from the cleared roadway into the native vegetation adjacent to the roadway, as well as having an aesthetic value.

### 4.2.2 Type

The revegetation will consist of local provenance native species, grown directly from seed, or planted in recommended areas. Species chosen for revegetation are limited to those that are viable and likely to become established, and are commercially available.

### 4.2.3 Communities

Revegetation communities will reflect those of the present road reserve and adjacent bushland, in particular:

- » **Passing Lane 1 and Truck Bay** – Native scrub heath with scattered Marri;
- » **Passing Lane 2** - Wandoo/Marri woodland, with some Jarrah, over mixed shrubs, herbs and *Xanthorrhoea* species. Revegetation in damper areas will consist of natives such as *Astartea fascicularis* which are adapted to these conditions; and
- » **Passing Lane 4** - Marri/Wandoo woodland and previous MRWA revegetation.

## 4.3 Revegetation Zones/Species Mix

Lateral zones, height and stem/trunk size of new vegetation within the clearing zone of roadways are constrained for public safety and to ensure sufficient sight lines are maintained.

Revegetation areas have been divided into three zones (Appendix B) to ensure maintenance of appropriate sight lines along the road edge. All roadside drains are to be kept clear of deliberate planting or seeding. No planting or seeding will be undertaken on the road shoulder, within the road side drain, or within 1m of the top of the embankment on fill batters.

- » **Zone 1** consists of species that are less than 600 mm high;
- » **Zone 2** consists of species less than 4m high (and stem diameter <100 mm); and





- » **Zone 3** consists of areas in which there are no height restrictions for revegetation species.

The area of each of these zones for each of the Passing Lanes is summarised in Table 2. These areas are given in the Landscaping Design Report developed by KBR (2005).

**Table 2 Areas of revegetation zones in the project**

	Area of each Zone (m <sup>2</sup> )			Total Area (m <sup>2</sup> )
	Zone 1	Zone 2	Zone 3	
Passing Lane 1 and Truck Bay	3,709	1,047	367	5,123
Passing Lane 2	1,917	-	-	1,917
Passing Lane 4	2,517	1,049	883	4,449

## 4.4 Proposed Treatments

### 4.4.1 Vegetation clearing and chipping

Native and planted vegetation will be cleared from works areas and suitable (native, weed free) vegetation will be chipped and stored for re-use in rehabilitation or embankment stabilisation. Some areas of the proposed works contain significant amounts of weed species and vegetation from these will not be re-used. However, suitable chipped vegetation is a valuable source of local provenance seeds and will also serve as a mulch for seeding and planting. Areas where cleared plant material can be chipped are given in Appendix C.

### 4.4.2 Topsoil Stripping and Re-Use

Topsoil will be stripped to a maximum depth of 100 mm along all sections of the works areas subject to rehabilitation. Where topsoil is not suitable for re-use it will be disposed of to a site agreed by the Local Authority or adjoining landholders. Recommendations for topsoil utilisation at locations along the passing lanes are presented in Appendix C.

Topsoil which is to be re-used will be stripped to a maximum depth of 100 mm (preferably 50-75 mm) and will be stored as close as possible to the source area or target area for re-use. Topsoil shall be stored in an area as free as possible from weeds and in windrows or heaps not more than 1 m high. It should be re-used as soon as possible after stripping, and as close as possible to its source area. Topsoil shall not be transferred between passing lanes.



#### **4.4.3 Soil Preparation**

Once the worked surfaces are ready for rehabilitation, they will be scarified to enhance infiltration of water and the establishment of species used in revegetation.

For maximum effectiveness, scarifying will occur in the summer months, when the soil is more likely to shatter. If this is not possible areas should be scarified in the driest possible conditions, prior to the respreading of topsoil or gravelling. Scarifying need only occur on compacted and natural surfaces and not on areas of fill.

Scaryfying should occur to a depth of at least 400 mm and in lines along the contour at a maximum of 500 mm intervals.

#### **4.4.4 Topsoil and Mulch Respreading**

Suitable stored topsoil will be respread over the designated areas of Zone 3 only at Passing Lane 4. Due to the potential for tree species to establish in Zones 1 and 2 the topsoil cannot be used there.

For Passing Lane 1, where the vegetation consists mostly of shrub species, the topsoil can be respread in Zones 2 and 3.

Topsoil should be respread to a depth of a maximum of 75 mm, over the scarified, weed-free, natural soils.

In areas of high infestation by aggressive weeds, where suitable topsoil is not available, gravel will be used as a substrate for revegetation. This gravel will be certified "dieback – free" for Passing Lane 1 and the Truck Bay area but may be from an uninterpretable area (such as the Lilydale pit) for Passing Lanes 2 and 4, and will be spread over the scarified and weed-free surface to a minimum depth of 150 mm.

Following topsoil or gravel spreading, stored chipped vegetation can be respread over the surface as per the requirements for topsoil. That is, in Zone 3 only at Passing Lane 2 and 4 and in Zones 2 and 3 at Passing Lane 1 and the Truck Bay.

#### **4.4.5 Preliminary weed control**

Preliminary weed control will be carried out if necessary prior to topsoil being respread or gravel being laid. The requirements for weed control will depend upon the success of the original topsoil stripping and the time elapsed between stripping and respreading.

Weed control should aim to remove any existing or new weed growth in order to prevent seed set and dispersal prior to rehabilitation. It is likely to involve spraying with a knockdown herbicide such as glyphosate and possibly a residual herbicide such as simazine to reduce germination of weed seedlings. Simazine should not be used if topsoil is to be replaced or native seed sown on the area within 6 weeks of spraying.

#### **4.4.6 Direct seeding**

If topsoil replacement is not successful, the majority of the revegetation will be achieved through direct seeding. The requirements for seeding are detailed in



*Specification 304: Landscaping and Revegetation* (MRWA, 2005b). Recommended areas for seeding are presented in Appendix C.

A list of seed suppliers is supplied in Appendix D.

#### **4.4.7 Planting**

Planting of tubestock will be undertaken in areas where roadside stability is necessary early on in the program. Planting will also be used to supplement seeding. Tubestock planting is used as a 'safeguard' against either topsoil replacement and/or seeding not being successful. The requirements for planting are detailed in *Specification 304: Landscaping and Revegetation* (MRWA, 2005b). Recommended areas for planting are presented in Appendix C.

#### **4.4.8 Weed overspraying**

Weed overspraying will be used if necessary prior to, or following native seed germination. A grass selective herbicide can be used over native vegetation to remove annual, and young perennial, grasses. This will not damage native plant seedlings.

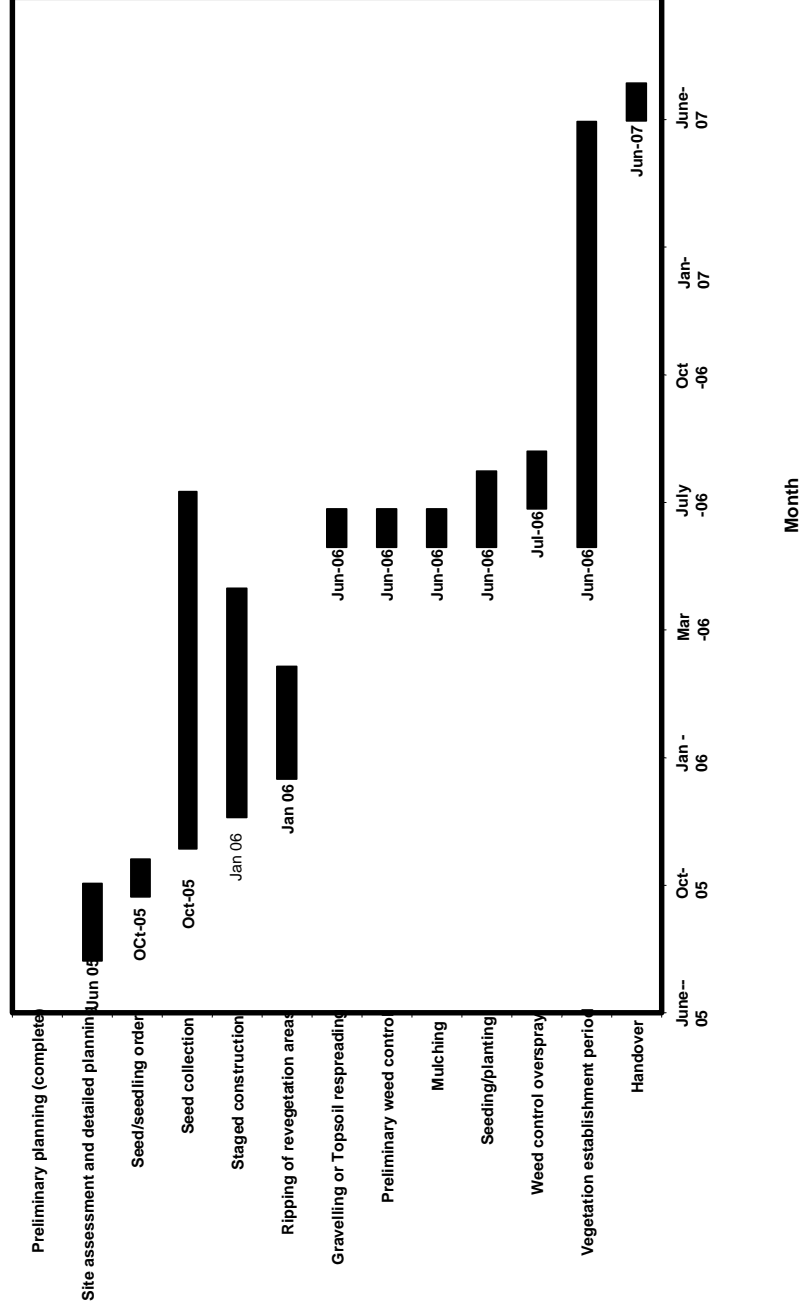
### **4.5 Timing and Staging of Revegetation Works**

MRWA's environmental guideline for *Revegetation Planning and Techniques* (MRWA, 2004a) suggests that a revegetation program takes approximately 40 months from the preliminary planning stage through to ongoing maintenance.

The suggested timeline recommends a period of 20 months for seed collection and weed control. This allows for seed from various species reaching maturation at different times of the year, and the possibility of low seed set due to poor rainfall. Due to the tight timeframe of the project, with construction commencing in January 2006, the seed collection period and weed control period will be truncated:

- » Considering the above average rainfall to date this year, it is expected that seed set will be high, and that the seed collection period can be shortened.
  - For Passing Lanes 2 and 4, local provenance seed can be supplemented with seed of the same species originating elsewhere if necessary.
  - Supplementing local provenance seed with other seed should be avoided for Passing Lane 1 and the Truck Bay because of their proximity to John Forrest National Park and the good quality of the adjacent native vegetation.
- » With respect to weed control, the long period allows for several rounds of weed control to adequately control new growth of weed species. Weed control is also most effective at certain times of the year. A weed control program should be developed to address these issues in light of the tight project timeframe.

Considering the scheduled completion of this revegetation plan at the beginning of October 2005 and commencement of construction in January 2006, the following timeline is recommended for the Toodyay Road Passing Lanes Project (Figure 1).



**Figure 1** Timeline for revegetation of Toodyay Road Passing Lanes



## 4.6 Plant Species

### 4.6.1 Selection and estimated quantities

The species proposed for revegetation at each of the passing lanes are presented in the tables at Appendix D. The species chosen have been based on the plant species identified in the PEIA (GHD, 2002) and which are known to be successful germinators either *in situ* or for the production of nursery stock. In addition, lists of a range of seed and plant suppliers were analysed in order to assess which plants and seeds were likely to be available commercially. Many local native plant species are not suitable or available for revegetation and others, although listed in seed catalogues, are very difficult to acquire.

The seeding rate is recommended at 3 kg/ha, and the planting rate at 1 stem/m<sup>2</sup>. Estimated quantities of seed and plants have been calculated using the clearing zone areas in Table 2, and are presented in Table 3. Planting along Passing Lanes 1 and 4 will supplement topsoil and mulch respreading in some areas, so the quantities provided in the table are potentially an overestimate. The care taken during topsoil and mulch stripping, storage and respreading will determine the success of native plant germination.

**Table 3 Estimated quantities of seed and plants to be used in the revegetation**

		Estimated Quantity			Total Estimated Quantity
		Zone 1	Zone 2	Zone 3	
Passing Lane 1 and Truck Bay	Seed	1.11 kg	0.31 kg	0.11 kg	1.53 kg
	Plants	3,709	1,047	367	5,123
Passing Lane 2	Seed	0.58 kg	-	-	0.58 kg
	Plants	1,917			1,917
Passing Lane 4	Seed	0.76 kg	0.31 kg	0.26 kg	1.33 kg
	Plants	2,517	1,049	883	4,449

A list of plant species and the suggested quantities of each species is attached at Appendix D.

### 4.6.2 Supply

A list of seed and plant suppliers is provided in Appendix D. These suppliers have the expertise and experience of carrying out the revegetation from seed collection through to monitoring of vegetation establishment.



## 4.7 Other requirements

### 4.7.1 Dieback management

The introduction of the *Phytophthora* (dieback) fungus to the revegetation work area has the potential to reduce the effectiveness of revegetation at Passing Lanes 2 and 4 and to spread into well conserved native vegetation in John Forrest National Park from Passing Lane 1 and the Truck Bay. No direct evidence of dieback presence was found during investigations but basic hygiene practices should be used in order to reduce the risk of introducing or spreading the disease. Requirements are that:

- » All machinery used on the passing lanes should be clean of soil and plant material and should be cleaned down between works on different passing lanes;
- » Soil introduced into the roadworks should be certified dieback free if possible, or at least from a source which has been assessed for dieback risk;
- » All introduced plant stock should be sourced from a certified dieback-free nursery;
- » Topsoil will be stored as close as possible to the source area or target area for re-use. These areas should be existing cleared areas, where possible and deemed weed and dieback free.

## 4.8 Integration with road works or other activities

It is expected that construction will commence in January 2006, and be staged such that it is complete in May 2006 (Figure 1). The revegetation plan has been integrated in the following ways:

- » Seed collection and the seed and seedling order periods have been truncated to enable revegetation to begin in June 2006. As a result, it may be necessary to supplement local provenance seed with seed of the same species for Passing Lanes 2 and 4 (see Section 4.5);
- » Topsoil to be respread during the revegetation works will therefore need to be scraped and stockpiled until it is required. Topsoil will therefore be stockpiled at Lilydale Pit, located off Lilydale Road, south-east of Gidgegannup at (approx. 428002.5E, 6482540.5N GDA94). Appropriate dieback management measures are required for this topsoil and are detailed in Section 4.7;
- » Revegetation areas have been scheduled for scarifying during the summer months (December 2005 to February 2006), in line with the construction. Scarifying in some areas during this period may not be possible (Section 4.4.1).
- » Revegetation works have been scheduled to commence once construction is complete, in June 2006.

## 4.9 Stakeholder consultation and or involvement

Passing Lane 1 and the Truck Bay are located close to John Forrest National Park, which is managed by CALM. Previous consultation with CALM (by GHD in 2002),



indicated that CALM had concerns about dieback introduction and weed spread into the Park as a result of roadworks.

It is recommended that MRWA provide CALM with a copy of the draft revegetation plan for their information prior to final document release.

#### **4.10 Procurement approach and contract arrangements**

It is recommended that MRWA specify that the roadworks contractor should sub-contract the services of a specialist revegetation company (see Appendix D for recommended companies). If the revegetation works are not included in the main roadworks contract, then MRWA should directly employ the services of a specialist sub-contractor prior to roadworks commencing. The specialist sub-contractor should have the opportunity/requirement to liaise with the road contractor with regard to satisfactory topsoil stripping and storage as well as mulching. Ideally the specialist sub-contractor should also have the opportunity to collect any suitable seed within the areas of proposed clearing.

In order to gain the best possible outcomes for the revegetation it is essential that a revegetation specialist has some role in monitoring vegetation mulching and topsoil removal, storage and respreading. If these actions are not carried out well there will be a loss of opportunity from using existing seed sources and also the potential for introduction and spread of weed species which will reduce the effectiveness of seeding and planting and includes maintenance costs.



## 5. Estimate of Probable Costs

### 5.1 Extent of project works

The extent of the project works are shown in the plans attached at Appendix B. The revegetation areas have been divided into three zones as described in Section 4.3, and the area of each zone calculated and presented in Table 4

**Table 4 Areas of revegetation zones in the project**

	Area of each Zone (m <sup>2</sup> )			Total Area (m <sup>2</sup> )
	Zone 1	Zone 2	Zone 3	
Passing Lane 1 and Truck Bay	3,709	1,047	367	5,123
Passing Lane 2	1,917	-	-	1,917
Passing Lane 4	2,517	1,049	883	4,449

The construction contractor will employ the services of a revegetation consultant, with the scope of works determined from this plan in combination with the project specifications. The revegetation will commence in conjunction with construction, and end at Handover, in May 2007.

### 5.2 Assumptions and exceptions

The following assumptions were made in generating the cost estimate:

- » The cost of seed has been determined through averaging the cost of seed from a variety of species that are recommended for revegetation;
- » The cost of the tubestock has been determined with reference to the APACE Revegetation Catalogue;
- » No cost has been estimated for vegetation mulching, topsoil removal, and cartage, storage and replacement of these items following completion of roadworks; and
- » Depending upon the timing of works, soil may require extra tilling prior to direct seeding.

### 5.3 List of cost items and estimated costs

The following list of cost items has been developed to generate a cost estimate (Table 5). Note that the list is not exhaustive, and the costs are indicative only.





**Table 5 Summary Estimate of Probable Costs**

<b>Item</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Average Unit Rate</b>	<b>Value</b>
Seed	Sold by weight	g	3,440	\$2.50/g	\$8,600
Plants	Sold by the stem	tube	11,489	\$1.15/tube	\$13,312
Planting cost	Approximately the same as plant cost assuming soil is prepared	tube	11,489	\$1.15/tube	\$13,312
Fertiliser tablet	One per plant	unit	11,489	\$0.15	\$1,723
Tree guards	One per seedling in susceptible areas	unit	Say 4,000	\$2.00	\$8,000
Seeding cost	Direct seeding over all relevant sections. Includes seed mixing, bulking and spreading	hectare	1.15 ha	?\$3000	?\$3450
<b>Total Cost</b>					<b>\$48,397</b>

Other costs include weed control, monitoring and reporting. These costs will be very variable dependent upon the care taken during topsoil stripping and replacement and on the MRWA requirement for monitoring.

General weed spraying costs are possibly about \$1000 per hectare in this instance, due to the small areas involved and the need for hand spraying in many areas.



## 6. Completion Criteria

### 6.1 Completion criteria

Completion criteria have been drawn from *Specification 304: Revegetation and Landscaping* (MRWA, 2005b).

#### 6.1.1 Planting (non irrigated)

Acceptance criteria for plants shall be.

- » Plants are well formed and exhibit signs of healthy growth.
- » Plants are free of disease symptoms (e.g. yellowing, wilting etc).
- » Plants are free from signs of insect pests.

**Table 6 Completion criteria for non irrigated planting (MRWA, 2005b)**

Criterion	Twelve weeks after Completion	After one Autumn	At Final Completion
Plants surviving (%) within each representative plot.	90	75	60
Species richness (% of the species planted still present) within each nominated planting zone.	80	80	80
Nominated key species (% of the species planted) still present within each nominated planting zone.	100	100	100
Surviving plants meeting acceptance criteria (%)	100	100	100
Weed free zone (radius) around base of each plant.	>0.1 metres	>0.3 metres	> 0.3 metres
Healthy foliage cover of weeds (%) within each nominated planting zone.	<10	<5	<1
Foliage cover (or demonstrated progress towards this level by monitoring reports)			

Two or more randomly selected representative plots (2m x 2m or equal area) per nominated planting zone should be sampled within each project area. Nominated planting zones are as shown in the drawings at Appendix B.



### 6.1.2 Erosion control

**Table 7 Compliance criteria for erosion control**

Criterion	Twelve weeks after Practical Completion	After one Autumn	At Final Completion
Maximum number of active rills > 150 mm in depth within each nominated zone.	2	1	0

Acceptance criteria shall be full compliance with the specifications for product and material and construction requirements.

### 6.1.3 Weed control

**Table 8 Compliance criteria for weed control**

Criterion	Twelve weeks after Practical Completion	After one Autumn	At Final Completion
Healthy foliage cover of nominated weeds (%) within each representative plot.	<10	<5	<1
Compliance with acceptance criteria (%)	100	100	100

Two or more randomly selected representative plots (2m x 2 m or equal area) per nominated zone within the project area. Nominated planting/seeding and grassing zones are as shown in the drawings at Appendix B.

Acceptance criteria for weed control shall be:

- » The approved weed control program is implemented as required.
- » Treated areas display signs of dying off within 14 days of application.

### 6.1.4 Direct seeding of plants

**Table 9 Compliance criteria for direct seeding of plants**

Criterion	Twelve weeks after Practical Completion	End of second Spring	At Final Completion
Mean number of stems (excluding weed species) / m <sup>2</sup> within each representative plot.	>3	>3	>3
Number of species within each representative plot.	-	>3	>3



Criterion	Twelve weeks after Practical Completion	End of second Spring	At Final Completion
Species richness (% of species sown) within each nominated seeding zone.	-	60	70
Presence of nominated key species in within each nominated seeding zone.	-	90	90
Bare soil areas (excluding weed species) > 1m <sup>2</sup> within each representative plot.	1	0	0
Foliage cover (or demonstrated progress towards this level by monitoring reports)			

Two or more randomly selected representative plots (2m x 2m or equal area) per nominated seeding zone should be sampled within each project area. Nominated seeding zones are as shown in the drawings at Appendix B.

Acceptance criteria for individual seedlings from direct seeding shall be.

- » Plants are well formed and exhibit signs of healthy growth.
- » Plants are free of disease symptoms (e.g. yellowing, wilting etc).
- » Plants are free from signs of insect pests.

## 6.2 Monitoring – timing and reporting

Monitoring of the revegetation will occur at the times recommended in the tables above. Reporting times shall be agreed between the contractor and MRWA.



## 7. Implementation Issues

### 7.1 Seed collection

Seed can be collected from plants which are to be cleared for the roadworks. This should happen immediately, although there will be a limited number of species which will hold seeds over the year.

Seed should be stored in dry, sealed containers with an insecticide and properly labelled with species, location and date of collection.

### 7.2 Weed and pest control

A weed control plan should be developed to cover the time from Autumn 2006 to handover in 2007. Some of the requirements for pre-planting control and overspraying are discussed in Section 4.4 of this report. Satisfactory weed control is essential to the success of revegetation, particularly direct seeding, and should be a priority. In addition, CALM has concerns about weed spread into the National Park at Passing Lane 1 and these should be addressed through careful weed control following soil disturbance in the area.

Rabbit grazing may be an issue in some areas. If grazing is believed to be a high risk, tree guards should be used to protect planted seedlings. The revegetation contractor should consider the risk and advise appropriately.

### 7.3 Erosion control

Care should be taken to ensure that erosion risk is reduced, especially alongside the tributary to Strelley Brook at Passing Lane 1. CALM has expressed concern about sedimentation and erosion within this creekline and extra gravel mulching or rock armoring may be required.

### 7.4 Protection of vegetation to be retained

Vegetation to be retained should be marked out and protected via temporary fencing, particularly at Passing Lane 1. It is imperative to protect all remnant vegetation possible alongside John Forrest National Park and especially close to the creek zones. Remaining vegetation will reduce the risk of erosion and provide a buffer to the Park and creek zones.

The works superintendent should check marked clearing zones prior to any clearing commencing to ensure that the minimal amount of native vegetation is removed.

### 7.5 Threatened flora management

There is no known threatened flora (Declared Rare or Priority Flora) on any of the Passing Lane areas.



## **7.6 Treatment of vegetation to be cleared**

Vegetation in designated areas (see Appendix C) should be chipped and stockpiled in a dry, weed-free zone. This can occur at Lilydale pit. Stockpiles of chipped vegetation must be mapped and marked so that the relevant vegetation mulch is returned to the correct area.

## **7.7 Spoil and stockpile areas**

Topsoil and vegetation mulch can be stored in Lilydale pit if there are no suitable areas closer to the works. Topsoil and vegetation should be stored in marked and mapped heaps, no more than 1m high and on a dry and weed-free base. Stockpiles should be temporarily fenced to discourage access.

## **7.8 Topsoil management/soil hygiene**

Topsoil should be replaced as close as possible to its source area and only in Zones 2 and 3 due to the possibility of tree species germinating. Topsoil should be replaced at a depth of no more than 75 mm, and preferably 50 mm over scarified ground.

## **7.9 Imported soils and mulch materials**

Gravel mulch will be used in areas where it is not recommended to replace topsoil or vegetation mulch (see Appendix C). Gravel mulch will be from a designated dieback free source or from an area which has been assessed as at low risk for dieback infestation.

## **7.10 Planting and Seeding**

### **7.10.1 Direct Seeding**

Seed should be spread at a density of approximately 3 kg per hectare. The seed mix should be bulked up with smoke-water vermiculite and clean sand in order to assist with even distribution and germination success.

#### **Seed quantities required**

A total of 3.44 kg of seed is required. The breakdown of seed types will depend upon availability and should be estimated and controlled by the revegetation contractor.

#### **Seed bed preparation**

Areas to be direct seeded should be controlled for weeds and should be lightly tilled immediately prior to seeding for best results. When topsoil or gravel mulch is spread over the revegetation areas, seeding should occur as soon as possible afterwards so that soils do not develop a crust.



### **7.10.2 Planting**

#### **Seedlings required**

11,489 tubestock seedlings are required. Seedlings should be in long tubes (minimum of 15 cm deep) to ensure suitable root development. Species numbers should be divided up with there being a larger number of groundcover and low shrub species and fewer trees. The revegetation contractor should provide the breakdown of species numbers. Seedlings should be sourced from a certified dieback free nursery.

#### **Plant preparation**

Seedlings should be planted in a hole or rippline in which the soil has been loosened to a depth of at least 20cm and a width of 20 cm. A native plant fertiliser tablet should be placed at the bottom of each planting hole.

Plants should be watered in with a minimum of 2 L of water per seedling and the soil tamped down.

Tree guards may be required in some areas depending upon the risk of rabbit grazing. This should be considered by the revegetation contractor.

### **7.11 Hydro mulching**

No hydro-mulching will be carried out.

### **7.12 Landscaping**

No hard landscaping is required. Soft landscaping will include seeding and planting of local native shrubs in a manner to mimic natural vegetation structure.

### **7.13 Irrigation and watering**

No irrigation or watering is required.

### **7.14 Quality control of materials/Surveillance of Works**

A suitably qualified and experienced revegetation expert shall be contracted to oversee the revegetation works from seed collection and sourcing through to establishment monitoring. The roadworks Superintendent should be responsible for ensuring that all clearing, topsoil removal and earthworks are carried out correctly to give the rehabilitation process the best chance of success.



## 8. Recommended Management Actions

The following general actions are recommended to ensure that the revegetation works are successfully progressed and implemented.

- » A qualified and experienced revegetation contractor should be used for the works. This contractor should be available from seed collection through to handover.
- » The roadworks superintendent should be fully aware of the requirements for revegetation and the importance of correct topsoil stripping, handling and replacement.
- » A weed control program should be developed for the project.
  - Specifically, this should take into account preliminary weed control, and overspraying prior to, and following, germination of seed.
  - Weed control post revegetation should also be addressed in the program.
  - The choice of weed control will be appropriate for the location and the weed species present at the sites.
- » Relevant CALM staff from the Mundaring Region should be advised of the revegetation plan and weed control program.





## 9. References

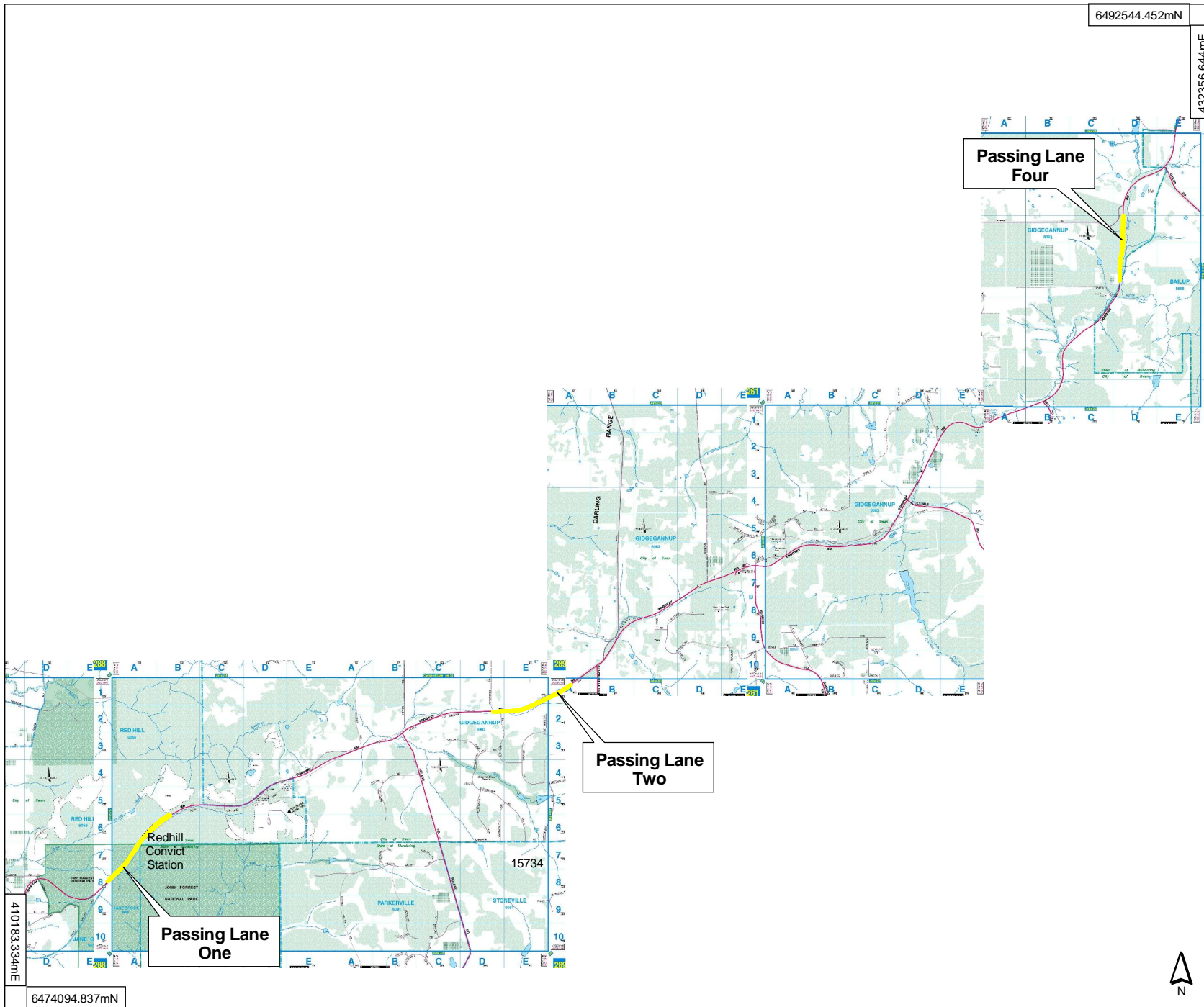
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## Appendix A

# Figures

Figure 2 Overview of study sites



6492544.452mN

432356.644mE

**LEGEND**

**Infrastructure**  
 — Passing Lane - Proposed

Passing Lane Four

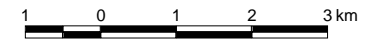
Passing Lane Two

Passing Lane One

STREET MAPS SOURCED FROM STREETEXPRESS 2002  
 NOTE THAT POSITIONAL ERRORS CAN BE > 2M IN SOME AREAS

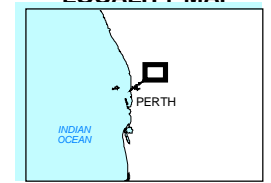
VIEW: Overview

**SCALE**



1:100000 at A4

**LOCALITY MAP**



Western Australia

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CREATED BY	CHECKED	APPROVED
CD		
HORIZONTAL DATUM: GDA94		PROJECTION: MGA
HEIGHT DATUM: N/A		METADATA RECORDED: N
DATE	FILE LOCATION	
18/10/05	N:\6116642\GIS\APRS\6116642.APR	
REVISION	DRAWING NO / LAYOUT NAME	
0	6116642-G1	



**Toodyay Road Passing Lanes EIA**

**FIGURE 2  
 Passing Lanes 1, 2 & 4**



410183.334mE

6474094.837mN



Appendix B

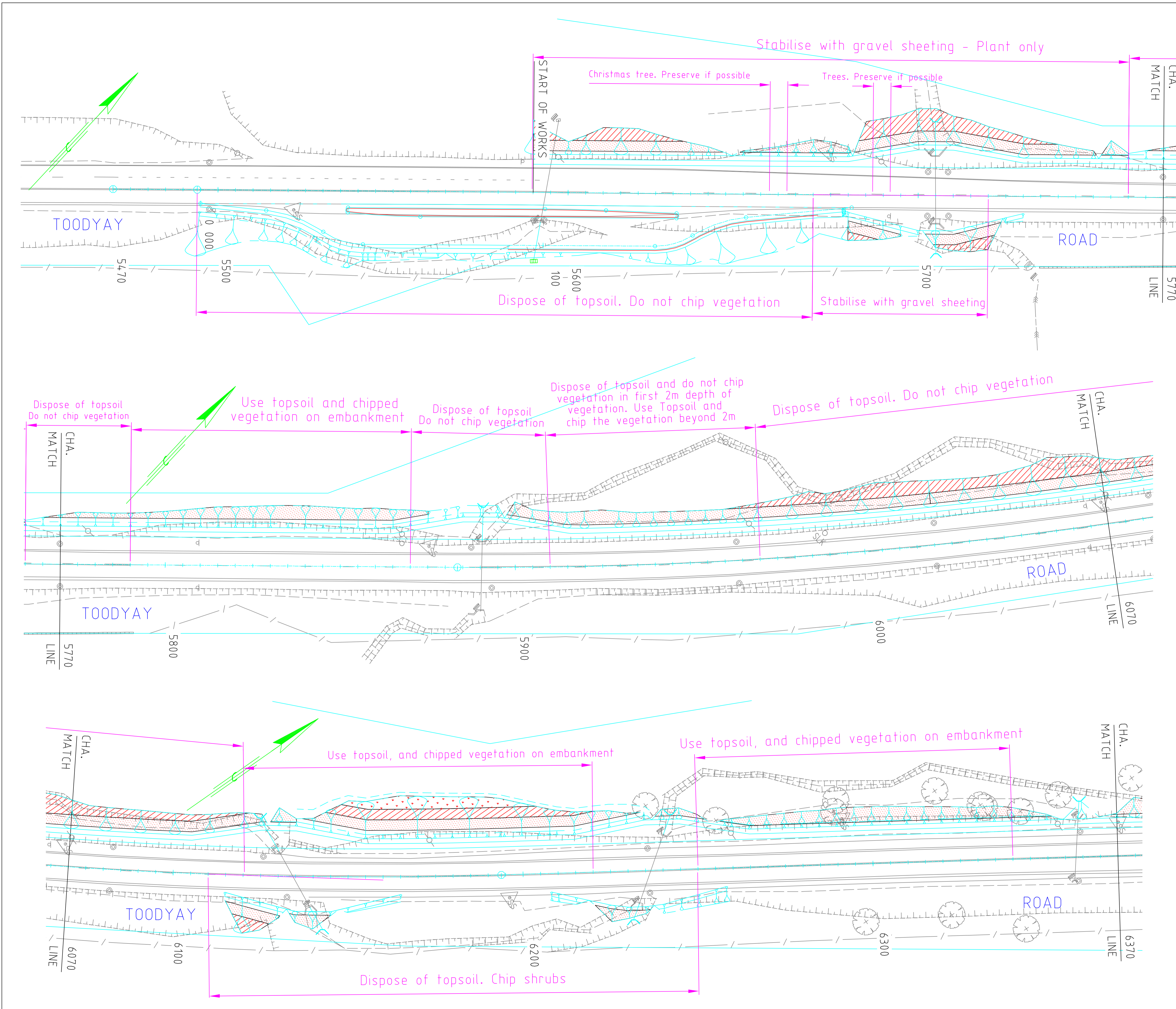
## Landscape Detail Drawings

(Developed by KBR, 2005, with amendments by GHD, 2005)

Passing Lane 1 & Truck Bay

Passing Lane 2

Passing Lane 4



AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 02.12.04
0	ISSUED FOR CONSTRUCTION	P.JAMES 01.02.05
1	NOTE 2 AMENDED	P.JAMES 21.03.05

**NOTES**

- ALL EUCALYPTUS AND CORYMBIA SEEDLINGS WILL BE STAKED.
- TREE GUARDS WILL BE PUT AROUND ALL OTHER SEEDLINGS. TREE GUARDS WILL CONSIST OF THREE BAMBOO OR PLASTIC STAKES SURROUNDED BY A UV RESISTANT PLASTIC GUARD.
- A 10g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.

**LEGEND**

	ZONE 1
	ZONE 2
	ZONE 3

1. REFER TO 0448-2537 FOR LANDSCAPING TABLES.

**METADATA**

GROUND SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAPPING SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAIN ROADS PROJECT ZONE:	HUG 94
HEIGHT DATUM:	AHD

**Kellogg Brown & Root Pty Ltd**  
**KBR**

Kellogg Brown & Root Pty Ltd ABN 91 007 660 317  
 Level 2, Capital Centre, 256 St George's Terrace  
 Perth, Western Australia 6000

DRAWING NUMBER/DOCUMENT ID: PEC276

DESIGNED / DRAWN	RM / BLA	OCT 04
VERIFIED	D. LINTO	18/03/05
DIRECTOR	P. JAMES	21/03/05

Government of Western Australia  
**MAIN ROADS**  
 Western Australia

METROPOLITAN REGION  
 WATERLOO CRESCENT Telephone (08) 9323 4111 EAST PERTH 6004 Fax (08) 9323 4430

FILE NUMBER: A 1

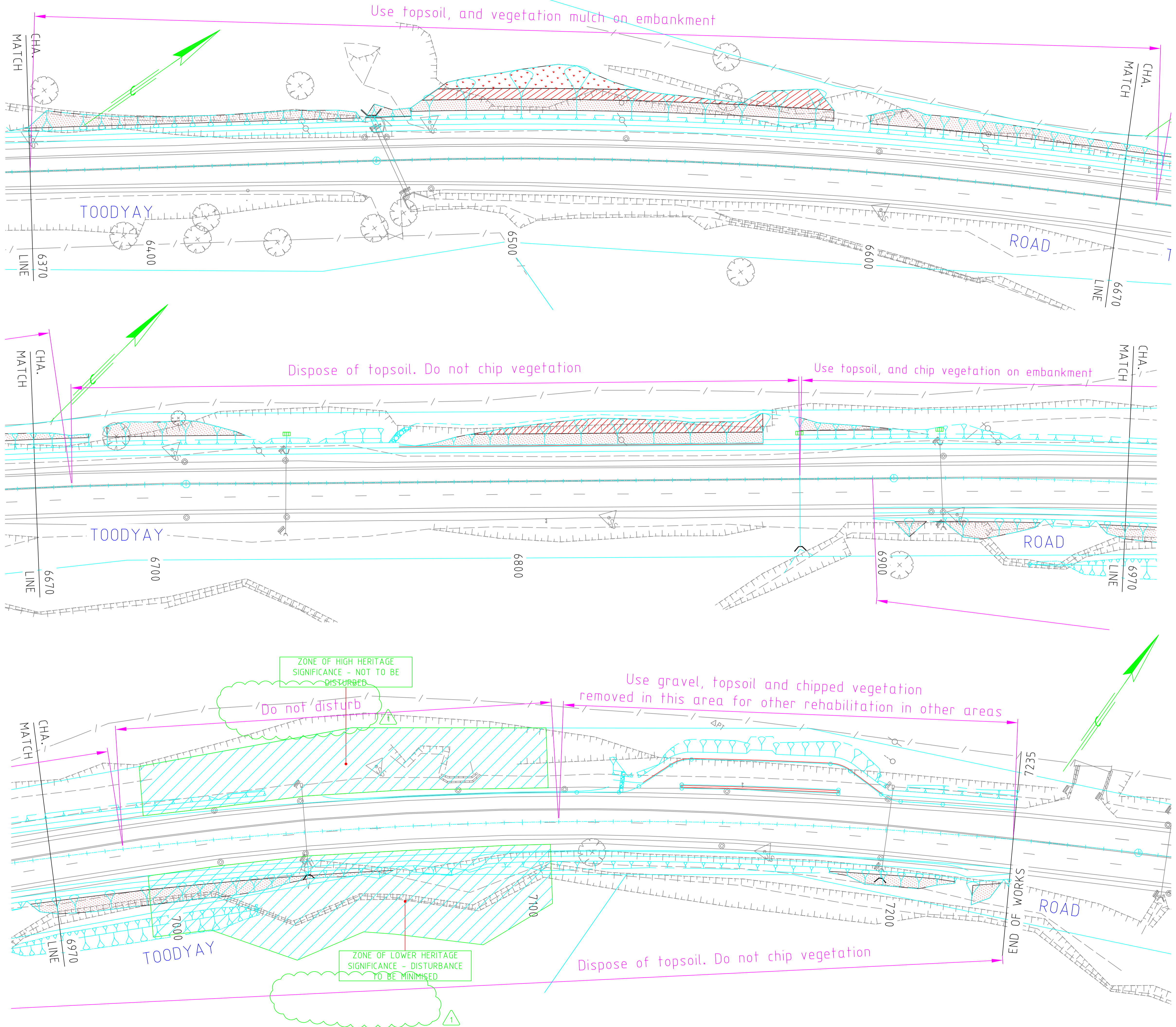
**APPROVED**

TOODYAY ROAD (H33)  
 PASSING LANE 1 & TRUCK BAY  
 SLK 5.47 TO SLK 7.24  
 LANDSCAPING LAYOUT  
 SHEET 1 OF 2

LOCAL AUTHORITY SHIRE OF SWAN (109)

DRAWING TYPE	DRAWING NUMBER	AMEND.
14:00	0448-2552	1

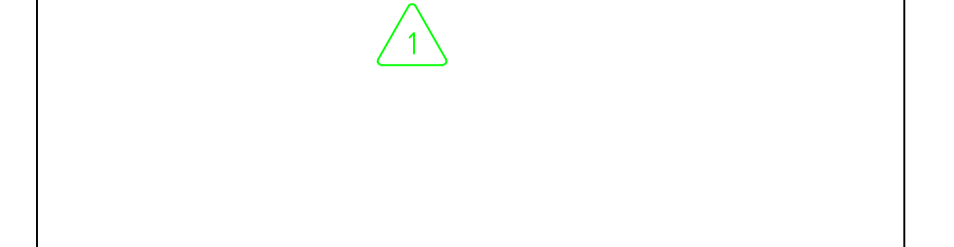
SCALE 1:500 MICROFILM DATE



AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 02.12.04
D	ISSUED FOR CONSTRUCTION	P.JAMES 01.02.05
1	NOTES AMENDED	P.JAMES 21.03.05

**NOTES**

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- A 10g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.



**LEGEND**

- Zone 1: Diagonal hatching
- Zone 2: Cross-hatching
- Zone 3: Dotted pattern

1. REFER TO 0448-2537 FOR LANDSCAPING TABLES.

**METADATA**

GROUND SURVEY STANDARD: 67-08-37, 67-08-43  
 DATE OF CAPTURE: AUGUST 2004  
 MAPPING SURVEY STANDARD: 67-08-37, 67-08-43  
 DATE OF CAPTURE: AUGUST 2004  
 MAIN ROADS PROJECT ZONE: HUG 94  
 HEIGHT DATUM: AHD

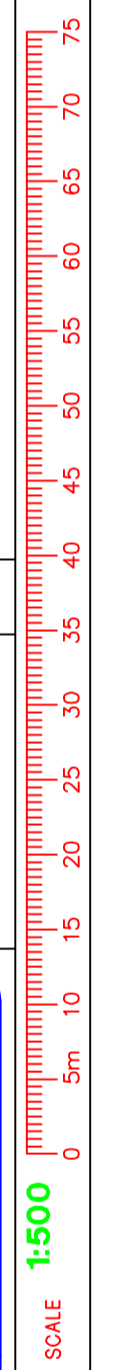
**Kellogg Brown & Root Pty Ltd**  
**KBR**  
 Kellogg Brown & Root Pty Ltd ABN 91 007 660 317  
 Level 2, Capital Centre, 256 St George's Terrace  
 Perth, Western Australia 6000

DRAWING NUMBER/DOCUMENT ID: PEC276  
 DESIGNED / DRAWN: RM / BLA OCT 04  
 VERIFIED: D. LINTO 18/03/05  
 DIRECTOR: P. JAMES 21/03/05

Government of Western Australia  
**MAIN ROADS** Western Australia  
 METROPOLITAN REGION  
 WATERLOO CRESCENT Telephone (08) 9323 4111 EAST PERTH 6004 Fax (08) 9323 4430

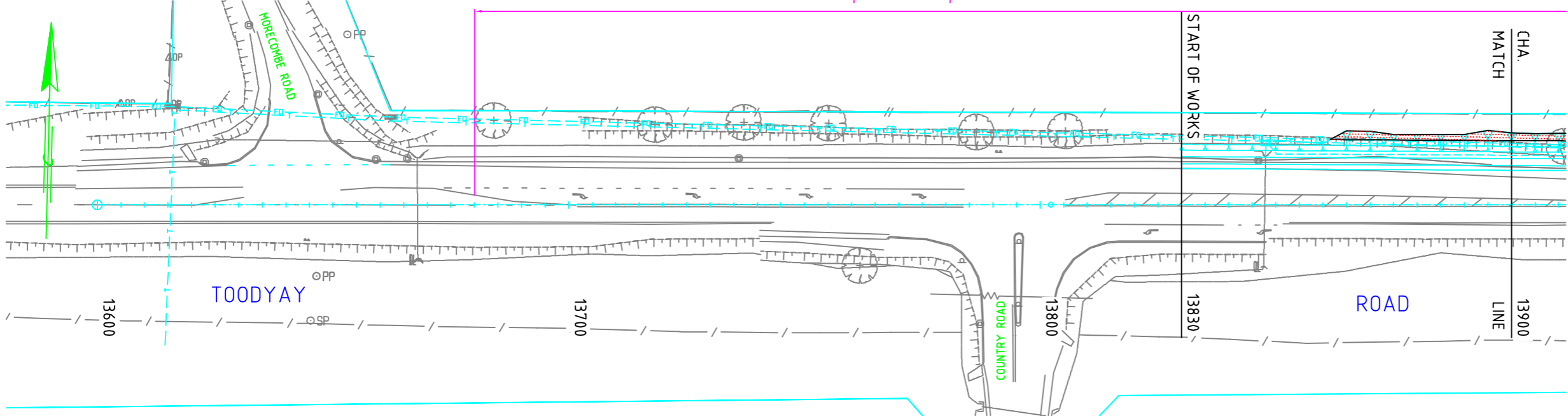
FILE NUMBER: TOODYAY ROAD (H33)  
 PASSING LANE 1 & TRUCK BAY  
 SLK 5.47 TO SLK 7.24  
 LANDSCAPING LAYOUT  
 SHEET 2 OF 2

LOCAL AUTHORITY: SHIRE OF SWAN (109)	DRAWING TYPE: 14:00	DRAWING NUMBER: 0448-2553	AMEND.: 1
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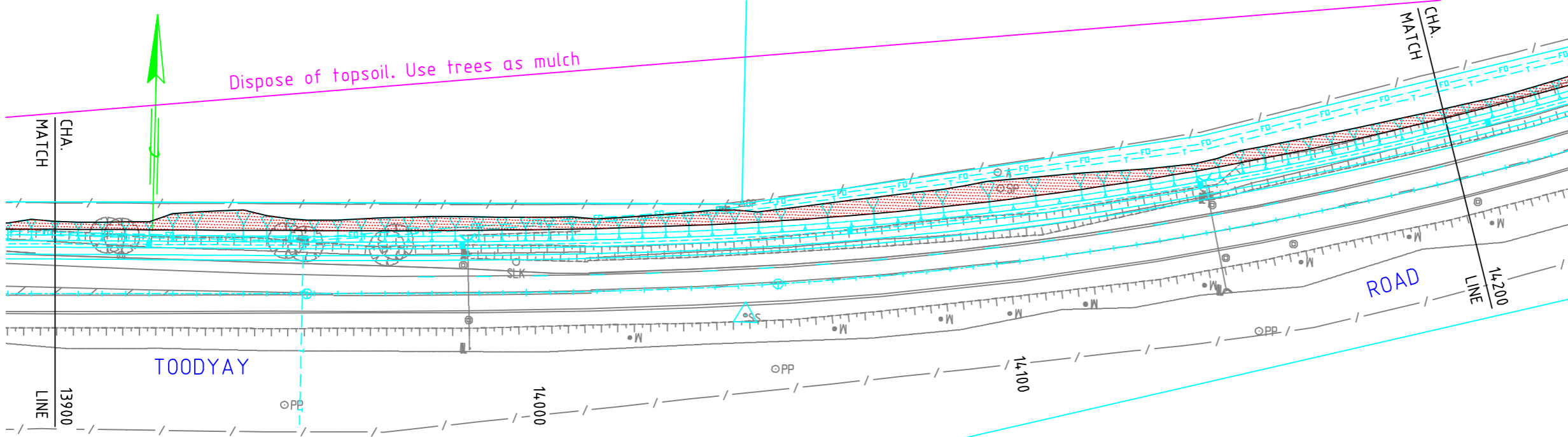


MICROFILM DATE: A 1

Dispose of topsoil. Use trees as mulch

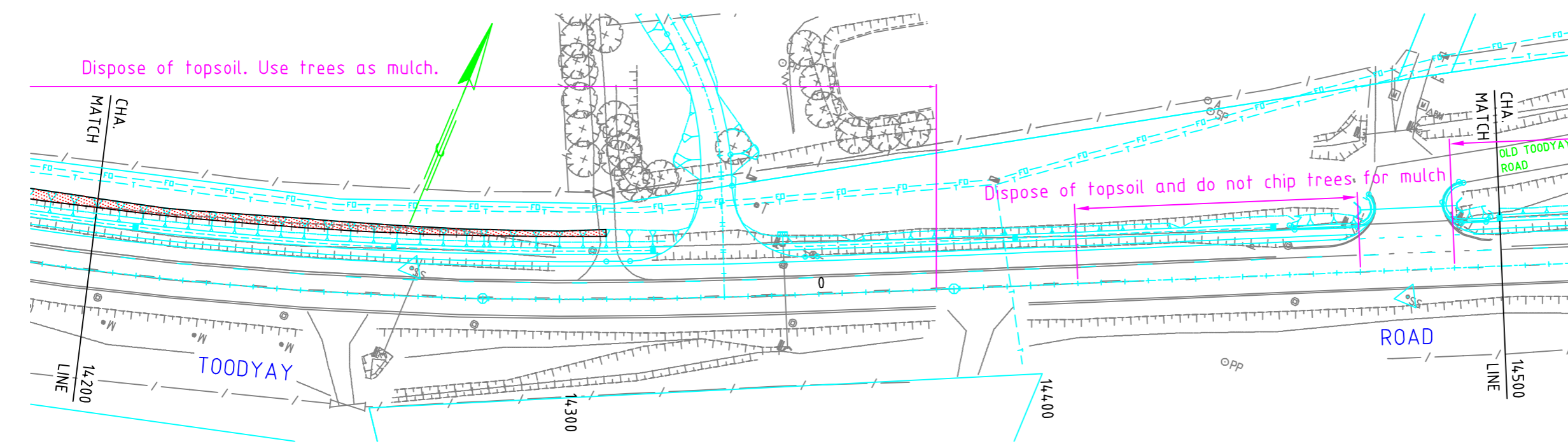


Dispose of topsoil. Use trees as mulch



Dispose of topsoil. Use trees as mulch.

Dispose of topsoil and do not chip trees for mulch



AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 20.12.04
0	ISSUED FOR CONSTRUCTION	P.JAMES 21.03.05

- NOTES**
- REFER TO 0448-2588 FOR LANDSCAPING TABLE.
  - ALL EUCALYPTUS AND CORYMBIA SEEDLINGS WILL BE STAKED.
  - TREE GUARDS WILL BE PUT AROUND ALL OTHER SEEDLINGS. TREE GUARDS WILL CONSIST OF THREE BAMBOO OR PLASTIC STAKES SURROUNDED BY A UV RESISTANT PLASTIC GUARD.
  - A 19g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.

**LEGEND**

	ZONE 1
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**METADATA**

GROUND SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAPPING SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAIN ROADS PROJECT ZONE:	HUG 94
HEIGHT DATUM:	AHD

**Kellogg Brown & Root Pty Ltd**  
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 Perth, Western Australia 6000

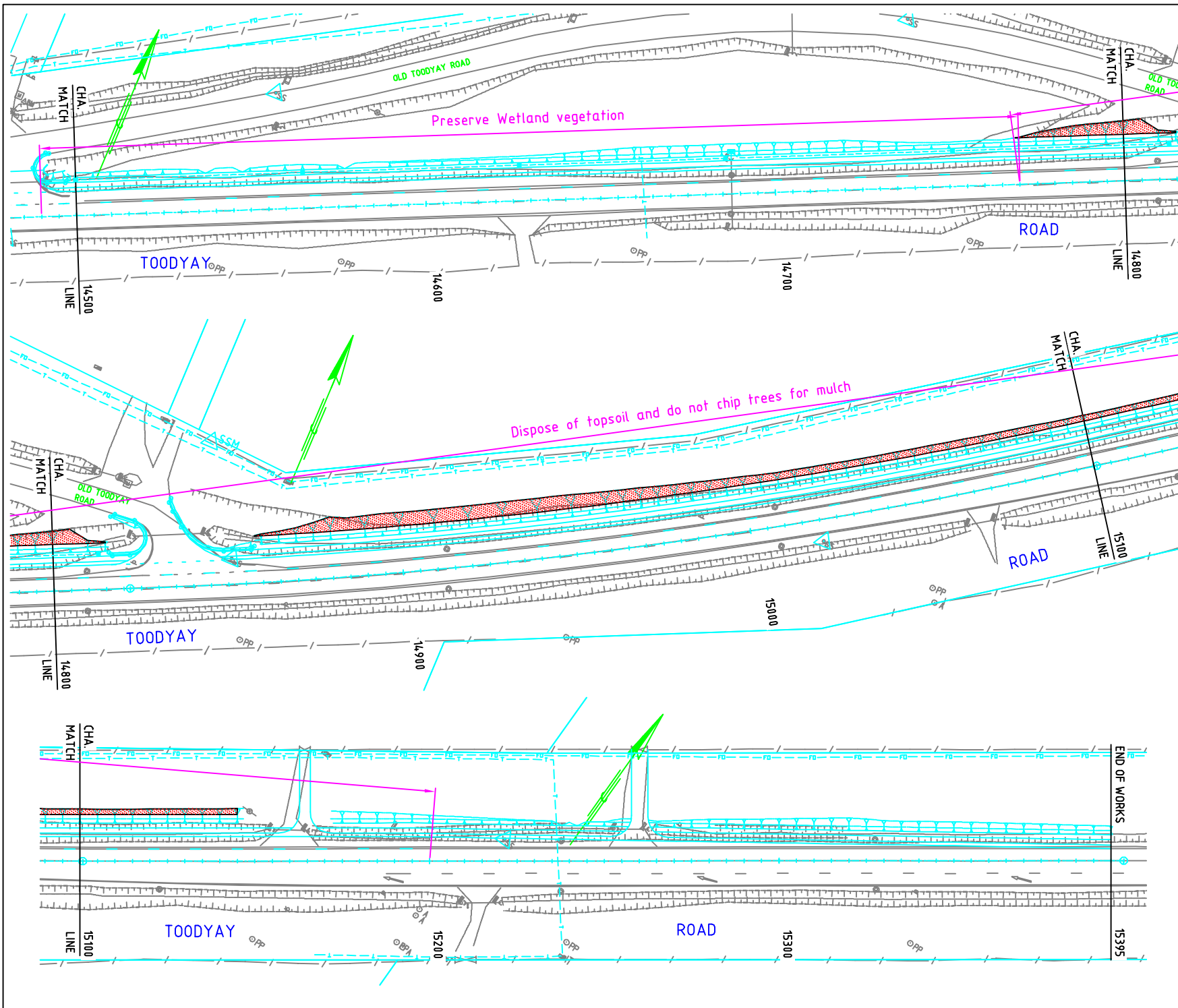
DRAWING NUMBER/DOCUMENT ID	PEC276
DESIGNED / DRAWN	RM / BLA OCT 04
VERIFIED	D. LINTO 22/03/05
DIRECTOR	P. JAMES 21/03/05

Government of Western Australia  
**MAIN ROADS**  
 Western Australia

METROPOLITAN REGION  
 WATERLOO CRESCENT EAST PERTH 6004  
 Telephone (08) 9323 4430 Fax (08) 9323 4111

FILE NUMBER	
APPROVED	
TOODYAY ROAD (H33) PASSING LANE 2 SLK 13.83 - SLK 15.40 LANDSCAPING LAYOUT SHEET 1 OF 2	
LOCAL AUTHORITY	SHIRE OF SWAN (1091)
DRAWING TYPE	DRAWING NUMBER
14:00	0448-2587
	1

SCALE 1:5000 MICROPLUM DATE A 1



AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 20.12.04
B	ISSUED FOR CONSTRUCTION	P.JAMES 21.03.05

**NOTES**

1. ALL EUCALYPTUS AND CORYMBIA SEEDLINGS WILL BE STAKED.
2. TREE GUARDS WILL BE PUT AROUND ALL OTHER SEEDLINGS. TREE GUARDS WILL CONSIST OF THREE BANDED OR PLASTIC STAKES SURROUNDED BY A UV RESISTANT PLASTIC GUARD.
3. A 10g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.

**LEGEND**

ZONE 1

**METADATA**

GROUND SURVEY STANDARD: 67-08-37, 67-08-43  
 DATE OF CAPTURE: AUGUST 2004  
 MAPPING SURVEY STANDARD: 67-08-37, 67-08-43  
 DATE OF CAPTURE: AUGUST 2004  
 MAIN ROADS PROJECT ZONE: HUG 94  
 HEIGHT DATUM: AHD

**Kellogg Brown & Root Pty Ltd**  
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 Level 2, Capital Centre, 256 St George's Terrace  
 Perth, Western Australia 6000

DESIGNED / DRAWN: RM / BLA OCT 04  
 VERIFIED: D. LINTO 22/03/05  
 DIRECTOR: P. JAMES 21/03/05

**Government of Western Australia**  
**MAIN ROADS**  
 Western Australia

**METROPOLITAN REGION**  
 WATERLOO CRESCENT EAST PERTH 6004  
 Telephone (08) 9323 4430 Fax (08) 9323 4111

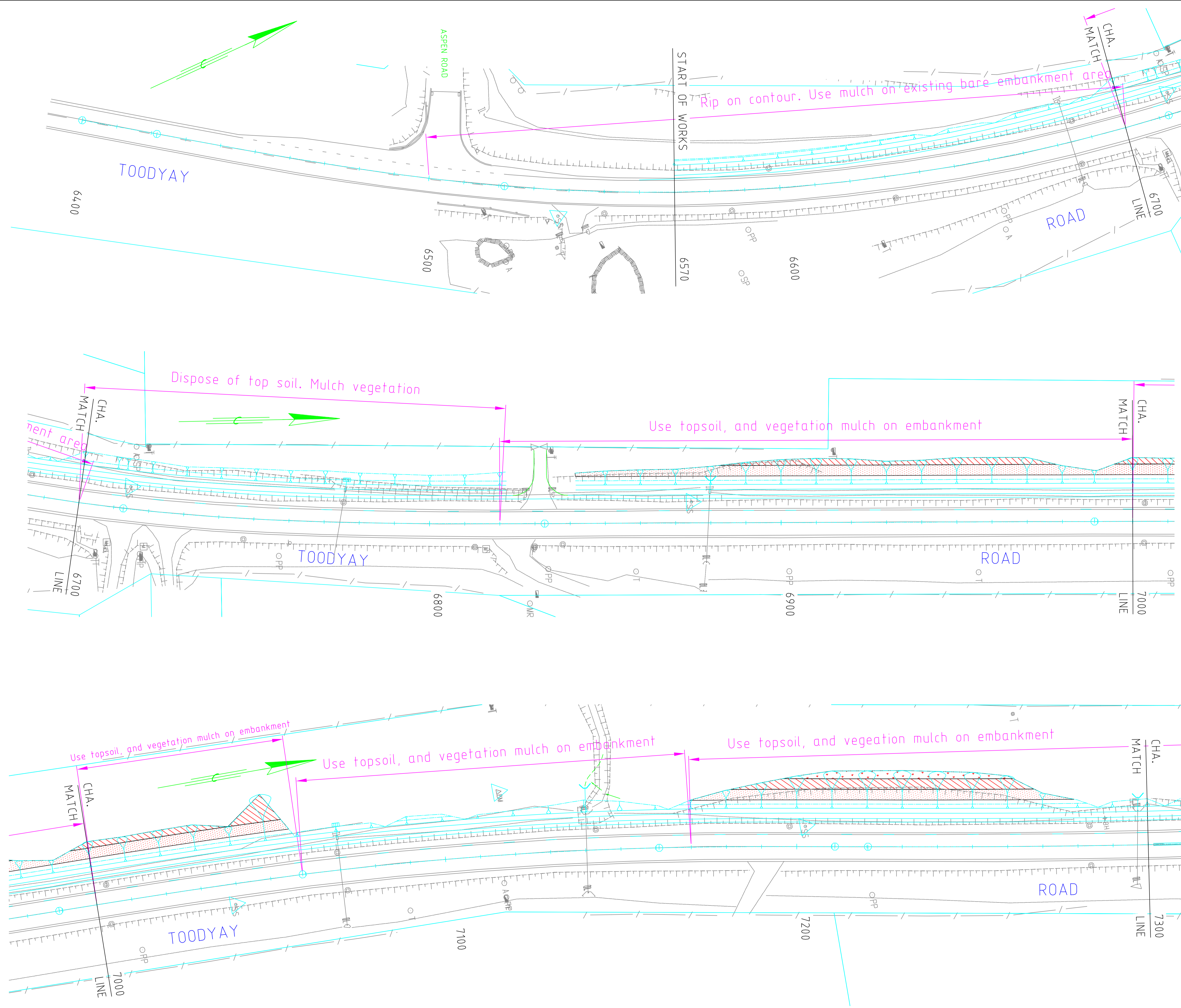
FILE NUMBER: **TOODYAY ROAD (H33)**  
 APPROVED: **PASSING LANE 2**  
**SLK 13.83 - SLK 15.40**  
**LANDSCAPING LAYOUT**  
**SHEET 2 OF 2**

LOCAL AUTHORITY: SHIRE OF SWAN I18R  
 DRAWING TYPE: DRAWING NUMBER: **0448-2588** AMEND: **1**

14:00

SCALE 1:500  
 METRIC DATE





AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 14.01.05
0	ISSUED FOR CONSTRUCTION	P.JAMES 18.03.05

**NOTES**

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- A 10g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.

**LEGEND**

	ZONE 1
	ZONE 2
	ZONE 3

1. REFER TO 0448-2614 FOR LANDSCAPING TABLES.

**METADATA**

GROUND SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAPPING SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAIN ROADS PROJECT ZONE:	HUG 94
HEIGHT DATUM:	AHD

**Kellogg Brown & Root Pty Ltd**  
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 Kellogg Brown & Root Pty Ltd ABN 91 007 660 317  
 Level 2, Capital Centre, 256 St George's Terrace  
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DRAWING NUMBER/DOCUMENT ID	PEC276	
DESIGNED / DRAWN	RM / BLA	OCT 04
VERIFIED	D. LINTO	18/03/05
DIRECTOR	P. JAMES	18/03/05

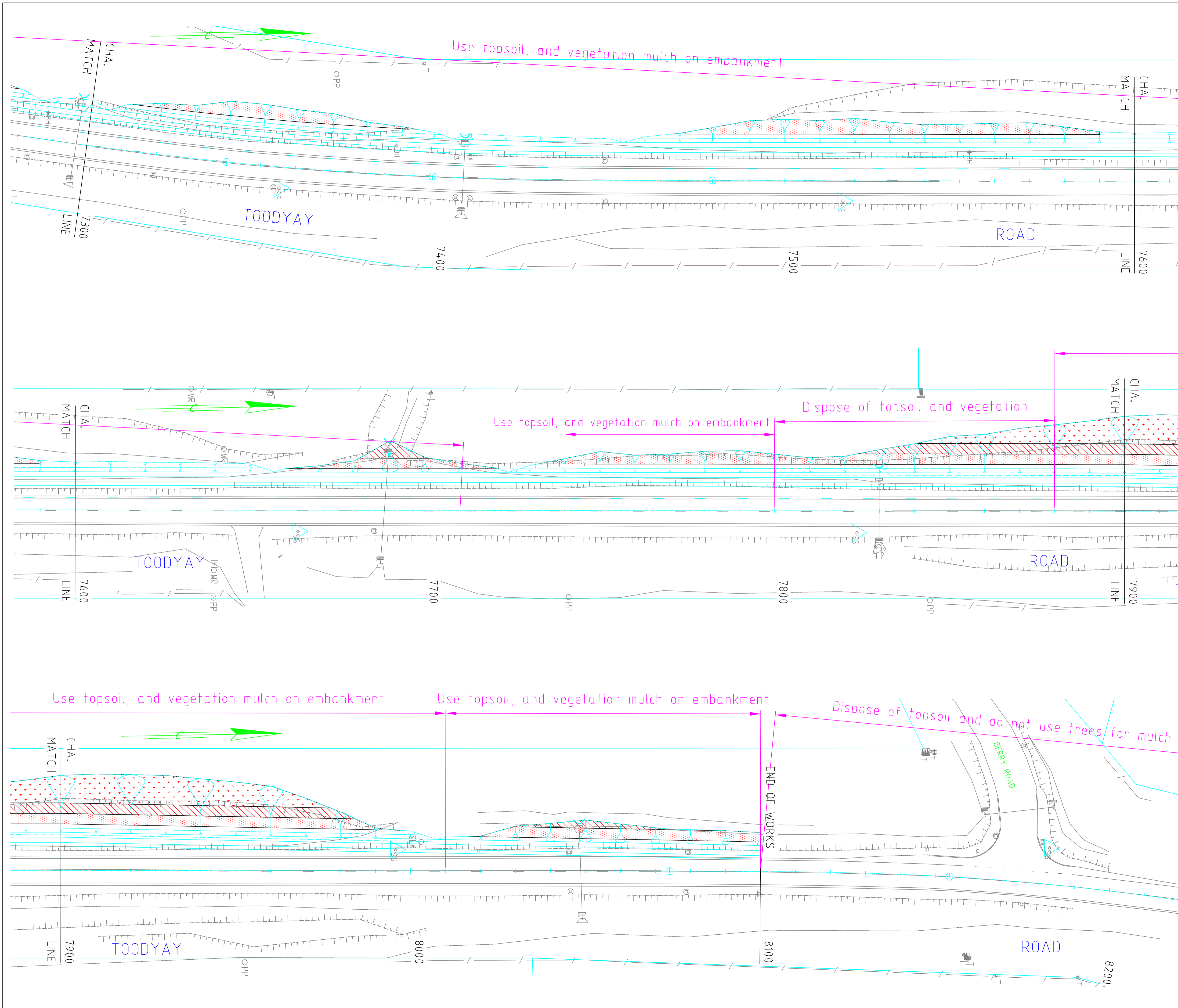
Government of **Western Australia** **MAIN ROADS** Western Australia  
 METROPOLITAN REGION  
 WATERLOO CRESCENT EAST PERTH 6004  
 Telephone (08) 9323 4430 Fax (08) 9323 4111

FILE NUMBER  
 APPROVED  
 TOODYAY ROAD (M26)  
 PASSING LANE 4  
 SLK 6.57 TO SLK 8.1  
 LANDSCAPING LAYOUT  
 SHEET 1 OF 2

DRAWING TYPE	DRAWING NUMBER	AMEND.
14:00	0448-2615	1

SCALE 1:500

MICROFILM DATE A 1



AMENDMENTS		
No.	DESCRIPTION	APPROVED & DATE
A	ISSUED FOR 85% REVIEW	P.JAMES 14.01.05
0	ISSUED FOR CONSTRUCTION	P.JAMES 18.03.05

**NOTES**

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- TREE GUARDS WILL BE PUT AROUND ALL OTHER SEEDLINGS. TREE GUARDS WILL CONSIST OF THREE BAMBOO OR PLASTIC STAKES SURROUNDED BY A UV RESISTANT PLASTIC GUARD.
- A 10g FERTILISER TABLET SUITABLE FOR NATIVE PLANTS WILL BE PUT AT THE BASE OF EACH PLANTING HOLE.

**LEGEND**

- ZONE 1
- ZONE 2
- ZONE 3

1. REFER TO 0448-2614 FOR LANDSCAPING TABLES.

**METADATA**

GROUND SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAPPING SURVEY STANDARD:	67-08-37, 67-08-43
DATE OF CAPTURE:	AUGUST 2004
MAIN ROADS PROJECT ZONE:	HUG 94
HEIGHT DATUM:	AHD

**Kellogg Brown & Root Pty Ltd**  
**KBR**

Kellogg Brown & Root Pty Ltd ABN 91 007 660 317  
 Level 2, Capital Centre, 256 St George's Terrace  
 Perth, Western Australia 6000

DRAWING NUMBER/DOCUMENT ID:	PEC276
DESIGNED / DRAWN:	RM / BLA OCT 04
VERIFIED:	D. LINTO 18/03/05
DIRECTOR:	P. JAMES 18/03/05

Government of **Western Australia** **MAIN ROADS**  
 Western Australia

**METROPOLITAN REGION**

WATERLOO CRESCENT EAST PERTH 6004  
 Telephone (08) 9323 4430 Fax (08) 9323 4111

FILE NUMBER: \_\_\_\_\_  
 APPROVED: \_\_\_\_\_

**TOODYAY ROAD (M26)**  
 PASSING LANE 4  
 SLK 6.57 TO SLK 8.1  
**LANDSCAPING LAYOUT**  
 SHEET 2 OF 2

LOCAL AUTHORITY SHIRE OF SWAN (109)

DRAWING TYPE	DRAWING NUMBER	AMEND.
14:00	0448-2616	1

SCALE 1:500  
MICROFILM DATE A 1



Appendix C

## Proposed Treatments at the Passing Lanes

Passing Lane 1 and Truck Bay

Passing Lane 2

Passing Lane 4

Passing Lane 1 and Truck Bay					
Side	Location		Issue	Recommendations	
	Start	End		Site preparation	Revegetation
LHS	Creekline adjacent to this		Watsonia throughout watercourse	Control this weed prior to roadworks	
LHS	SLK 5.59	SLK 5.76	Steep	Stabilise with gravel sheeting	Plant only
LHS	SLK 5.66		Old Christmas trees	Preserve if possible	
LHS	SLK 5.69		Large Marri and Wandoo ~ 20 m from culvert	Preserve if possible. Use rock stabilisation at this location.	
LHS	SLK 5.76	SLK 5.79	Dense Pennisetum sp	Dispose of topsoil. Do not mulch	Seed and plant
LHS	SLK 5.79	SLK 5.87	Good vegetation, low weeds	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 5.87	SLK 5.91	Watsonia throughout watercourse	Dispose of topsoil. Do not mulch.	Seed and plant
LHS	SLK 5.91	SLK 5.97	weeds in zimmer or vegetation adjacent to road. Good vegetation beyond this	Dispose of topsoil and do not mulch in first 2 m of vegetation. Use topsoil and mulch vegetation beyond this point.	Seed and plant
LHS	SLK 5.97	SLK 6.01	Watsonia throughout watercourse	Dispose of topsoil. Do not mulch.	Seed and plant
LHS	SLK 6.01	SLK 6.04	weeds in zimmer or vegetation adjacent to road. Good vegetation beyond this	Dispose of topsoil and do not mulch in first 2 m of vegetation. Use topsoil and mulch vegetation beyond this point.	Seed and plant
LHS	SLK 6.04	SLK 6.12	Weed infestation	Dispose of topsoil. Do not mulch	Seed and plant
LHS	SLK 6.12	SLK 6.22	Good vegetation, low weeds	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 6.22	SLK 6.25	Watsonia throughout watercourse	Dispose of topsoil. Do not mulch.	Seed and plant
LHS	SLK 6.25	SLK 6.34	Good vegetation, low weeds	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 6.34	SLK 6.37	Weed infestation	Dispose of topsoil. Do not mulch	Seed and plant
LHS	SLK 6.37	SLK 6.68	Good vegetation, low weeds	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 6.68	SLK 6.88	Weed infestation	Dispose of topsoil. Do not mulch	Seed and plant
LHS	SLK 6.88	SLK 6.99	Good vegetation, low weeds	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 6.99	SLK 7.11	Zone of high heritage significance	Do not disturb	Do not disturb
LHS	SLK 7.11	SLK 7.235	Good vegetation, low weeds	Use gravel, topsoil, and mulched vegetation removed in this area for other rehabilitation in other areas.	None recommended
RHS	Truck Bay		Weed infestation	Dispose of topsoil. Do not mulch.	None recommended
RHS	SLK 5.67	SLK 5.72	Steep	Stabilise with gravel sheeting	Plant only
RHS	SLK 6.11	SLK 6.16	Weed infestation	Dispose of topsoil. Mulch shrubs	Seed and plant
RHS	SLK 6.9	SLK 7.06	Weed infestation	Dispose of topsoil. Do not mulch	Seed and plant
RHS	SLK 7.0	SLK 7.235	Weed infestation	Dispose of topsoil. Do not mulch	Seed and plant
RHS	SLK 6.2	SLK 6.25	Weed infestation	Dispose of topsoil. Mulch shrubs	Seed and plant

<b>Passing Lane 2</b>					
<b>Side</b>	<b>Location</b>		<b>Issue</b>	<b>Recommendations</b>	
	<b>Start</b>	<b>End</b>		<b>Site preparation</b>	<b>Revegetation</b>
LHS	SLK 13.68	SLK 14.38	Weed infestation	Dispose of topsoil. Use trees as mulch	Seed and plant
LHS	SLK 14.38	SLK 14.41	Good shrubland adjacent to roadworks area	Preserve shrubland	None recommended
LHS	SLK 14.41	SLK 14.47	Weed infestation	Dispose of topsoil and do not use trees for mulch	Seed and plant
LHS	SLK 14.49	SLK 14.77	Good Melaleuca wetland adjacent to roadworks area	Preserve wetland vegetation	None recommended
LHS	SLK 14.77	SLK 15.2	Weed infestation	Dispose of topsoil and do not use trees for mulch	Seed and plant

<b>Passing Lane 4</b>					
<b>Side</b>	<b>Location</b>		<b>Issue</b>	<b>Recommendations</b>	
	<b>Start</b>	<b>End</b>		<b>Site preparation</b>	<b>Revegetation</b>
LHS	SLK 6.5	SLK 6.7	Bare white clay embankment	Rip on contour. Use mulch on existing bare embankment area	Seed and plant
LHS	SLK 6.7	SLK 6.82	Weed infestation	Dispose of topsoil. Mulch vegetation	Seed and plant
LHS	SLK 6.82	SLK 7.0	Good Marri Wandoo woodland	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 7.0	SLK 7.06	Previous MRWA revegetation	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 7.06	SLK 7.17	Native Wandoo woodland	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 7.17	SLK 7.71	Previous MRWA revegetation	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 7.71	SLK 7.74	Lovegrass infestation	Dispose of topsoil and do not use vegetation for mulch	Seed and plant
LHS	SLK 7.74	SLK 7.80	Good Marri Wandoo woodland	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 7.80	SLK 7.88	Weed infestation	Dispose of topsoil and vegetation	Seed and plant
LHS	SLK 7.88	SLK 8.01	Previous MRWA revegetation	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 8.01	SLK 8.1	Native Wandoo woodland	Use topsoil, and vegetation mulch on embankment	Seed and plant
LHS	SLK 8.1	SLK 8.3	Weed infestation in Wandoo woodland	Dispose of topsoil and do not use trees for mulch	Seed and plant



Appendix D

## Plant Species and Supply

Species recommended at Passing Lane 1 and the Truck Bay

Species recommended at Passing Lane 2

Species recommended at Passing Lane 4

Species and Estimated Quantities




List of seed suppliers

Species recommended at Passing Lane 1 and the Truck Bay

Genus	Species	Seed*				Plant**	Size			Revegetation Method	
		Direct Seeding	Will Germinate	Seed Unavailable	Poor Germination	Tube stock	Zone 1 (<600mm height)	Zone 2 (<4m height, stem <100mm diameter)	Zone 3 (no height restriction)	Direct Seed	Plant
Acacia	nervosa		a	a		a	a	a	a		a
Acacia	pulchella	a	a			a		a	a	a	
Allocasuarina	humilis	a	a			a		a	a	a	a
Andersonia	lehmanniana	a				a	a	a	a	a	a
Anigozanthos	sp.	a				a		a	a	a	
Astroloma	pallidum	a					a	a	a	a	
Chorizema	?dicksonii	a						a	a	a	
Corymbia	calophylla	a	a			a			a	a	a
Dryandra	sessilis	a	a			a			a	a	
Dryandra	squarrosa/armata	a				a			a	a	
Grevillea	endlicheriana	a				a		a	a	a	a
Grevillea	synapheae	a					a	a	a	a	
Hakea	lissocarpha				a	a		a	a		a
Hakea	trifurcata				a	a		a	a		a
Hovea	trisperma	a	a			a	a	a	a	a	
Kennedia	prostrata	a	a			a	a	a	a	a	a
Lechenaultia	biloba	a				a		a	a	a	
Lepidosperma	sp.					a	a	a	a		a
Mesomelaena	tetragona	a					a	a	a	a	
Neurachne	alopeкуроidea		a	a		a	a	a	a		a
Patersonia	occidentalis	a	a			a		a	a	a	
Petrophile	biloba	a						a	a	a	
Philothea	spicata	a					a	a	a	a	
Pimelea	suaveolens	a						a	a	a	
Sollya	heterophylla	a	a			a	a	a	a	a	
Thysanotus	patersonii	a					a	a	a	a	
Viminaria	juncea			a		a		a	a		a
Xanthorrhoea	preissii	a	a			a			a	a	

Notes: \*Information sourced from Geoff Cockerton, Landcare Services

\*\*Information sourced from APACE Revegetation Catalogue

-  Species can be direct seeded and planted from tubestock
-  Species can direct seeded
-  Species can be planted from tubestock



Species recommended at Passing Lane 2

Genus	Species	Seed*				Plant**	Size			Revegetation Method	
		Direct Seeding	Will Germinate	Seed Unavailable	Poor Germination		Zone 1 (<600mm height)	Zone 2 (<4m height, stem <100mm diameter)	Zone 3 (no height restriction)	Direct Seed Zone 1 only	Plant Zone 1 only
Acacia	nervosa	a	a	a	a	a	a	a	a		Plant Zone 1 only
Acacia	wildenowiana	a	a	a	a	a	a	a	a		a
Andersonia	lehmanniana	a				a	a	a	a	a	
Astroloma	pallidum	a					a	a	a		
Burchardia	umbellata/multiflora	a	a				a	a	a	a	
Daviesia	horrida/preissii	a	a	a		a	a	a	a		a
Grevillea	synapheae	a					a	a	a	a	
Hovea	trisperma	a	a			a	a	a	a	a	
Mesomelaena	tetragona	a					a	a	a	a	
Philotheca	spicata	a					a	a	a	a	
Sollya	heterophylla	a	a			a	a	a	a	a	
Thysanotus	patersonii	a					a	a	a	a	

Notes: \*Information sourced from Geoff Cockerton, Landcare Services

\*\*Information sourced from APACE Revegetation Catalogue

Species can be direct seeded and planted from tubestock

Species can direct seeded

Species can be planted from tubestock

Species recommended at Passing Lane 4

Genus	Species	Seed*				Plant**	Size			Revegetation Method			
		Direct Seeding	Will Germinate	Seed Unavailable	Poor Germination	Tube stock	Zone 1 (<600mm height)	Zone 2 (<4m height, stem <100mm diameter)	Zone 3 (no height restriction)	SLK6.5 to SLK 8	Roadside Drain and Woorooloo Brook	Direct Seed	Plant
Acacia	pulchella	a	a			a		a	a	r	r	a	
Allocasuarina	fraseriana/huegeliana	a	a			a			a		r	a	
Andersonia	lehmanniana	a				a	a	a	a			a	
Astroloma	pallidum	a					a	a	a		r	a	
Bossiaea	ornata	a	a			a		a	a		r	a	
Burchardia	umbellata/multiflora	a	a				a	a	a	r		a	
Calothamnus	quadrifidus	a	a			a		a	a		r	a	
Corymbia	calophylla	a	a			a			a		r	a	
Dianella	revoluta	a						a	a	r		a	
Dryandra	sessilis	a	a			a			a			a	
Eucalyptus	marginata	a	a			a			a		r	a	a
Eucalyptus	wandoo	a	a			a			a	r	r	a	a
Grevillea	synapheae	a					a	a	a			a	
Hakea	prostrata				a	a			a	r	r		a
Hovea	trisperma	a	a			a	a	a	a			a	
Hypocalymma	angustifolium	a	a			a		a	a		r	a	
Kennedia	prostrata	a	a			a	a	a	a	r		a	
Leucopogon	oxycedrus/propinquus	a						a	a	r		a	
Macrozamia	riedlei	a	a			a		a	a		r	a	
Mesomelaena	tetragona	a					a	a	a			a	
Philotheca	spicata	a					a	a	a			a	
Phyllanthus	calycinus	a	a			a		a	a	r	r	a	
Sollya	heterophylla	a	a			a	a	a	a			a	
Thysanotus	patersonii	a					a	a	a			a	
Xanthorrhoea	preissii	a	a			a			a	r	r	a	a

Notes: \*Information sourced from Geoff Cockerton, Landcare Services

\*\*Information sourced from APACE Revegetation Catalogue


Species can be direct seeded and planted from tubestock

Species can direct seeded

Species can be planted from tubestock

Passing Lane 1  
Zone 1 (3907m2)

Species	No. Plants	Seed Amount (g)
Acacia	100	
Acacia	nervosa	
Andersonia	lehmanniana	100
Anigozanthos	manglesii	
Astroloma	pallidum	100
Grevillea	synapheae	150
Hovea	trisperma	300
Kennedia	prostrata	100
Lepidosperma	sp.	100
Mesomelaena	tetragona	100
Neurachne	atopocuroidea	150
Patersonia	occidentalis	100
Sollya	heterophylla	150
Thysanotus	patersonii	50
<b>TOTALS</b>	<b>750</b>	<b>1300</b>

Passing Lane 1  
Zone 2 (1047m2)

Species	No. Plants	Seed Amount (g)
Acacia	nervosa	40
Acacia	pulchella	
Allocastraria	humilis	50
Anigozanthos	manglesii	10
Astroloma	pallidum	20
Chorizema	dicksonii	20
Grevillea	endlicheriana	20
Grevillea	synapheae	20
Hakea	lissocarpha	30
Hakea	trifurcata	30
Hovea	trisperma	30
Kennedia	prostrata	40
Lechenaultia	biloba	30
Mesomelaena	tetragona	20
Patersonia	occidentalis	10
Petrophile	biloba	20
Philotheca	spicata	10
Pimelea	suaveolens	10
Sollya	heterophylla	20
Viminaria	juncea	20
<b>TOTALS</b>	<b>230</b>	<b>300</b>

Passing Lane 1  
Zone 3 (367m2)

Species	No. Plants	Seed Amount (g)
Acacia	pulchella	10
Allocastraria	humilis	5
Corymbia	calophylla	30
Dryandra	sessilis	20
Dryandra	squarrosa/armata	10
Grevillea	endlicheriana	10
Grevillea	synapheae	10
Hakea	lissocarpha	10
Hakea	trifurcata	10
Hovea	trisperma	10
Patersonia	occidentalis	10
Petrophile	biloba	10
Philotheca	spicata	10
Pimelea	suaveolens	5
Sollya	heterophylla	5
Viminaria	juncea	10
Xanthorrhoea	preissii	10
<b>TOTAL</b>	<b>90</b>	<b>125</b>

Passing Lane 2  
Zone 1 (1917m2)

Species	No. Plants	Seed Amount(g)
Acacia nervosa	100	
Acacia wildenowiana	60	
Andersonia lehmanniana		50
Astroloma pallidum		50
Burchardia umbellata/multiflora		30
Daviesia horrida/preissii	100	
Grevillea synapheae	60	50
Hakea lissocarpa	100	40
Hovea trisperma		80
Kennedia prostrata	100	40
Leschenaultia biloba	80	
Mesomelaena tetragona		50
Patersonia occidentalis		50
Philotheca spicata	50	50
Sollya heterophylla	80	80
Thysanotus patersonii		30
<b>TOTALS</b>	<b>730</b>	<b>600</b>

Passing Lane 4  
Zone 1  
(2517 m2)

Species	No. Plants	Seed Amount(g)
Andersonia		30
Aristoloma		30
Burchardia		50
Grevillea		70
Hovea		100
Kennedia	100	100
Leschenaultia	100	
Mesomelaena		30
Paterosnia	100	
Phllotheca		30
Sollya	100	75
Thysanotus		30
<b>TOTAL</b>	<b>400</b>	<b>545</b>

Passing Lane 4  
Zone 2  
(1049m2)

Species	No. Plants	Seed Amount (g)
Acacia		20
Andersonia		10
Aristoloma		10
Bossiaea		40
Burchardia		20
Calothamnus		10
Dianella		10
Grevillea		30
Hovea	30	30
Hypocalymma		10
Kennedia	50	40
Leucopogon		20
Macrozamia		500
Mesomelaena		10
Phllotheca		10
Phyllanthus		20
Sollya	50	20
<b>TOTAL</b>	<b>130</b>	<b>810</b>

Passing Lane 4  
Zone 3  
(883m2)

Species	No. Plants	Seed Amount (g)
Acacia		30
Allocasuarina		10
Andersonia		10
Aristoloma		10
Bossiaea		30
Burchardia		10
Calothamnus		10
Corymbia	20	
Dianella		10
Dryandra		20
Eucalyptus	20	
Eucalyptus	40	
Grevillea		20
Hakea	20	
Hovea		20
Hypocalymma		10
Leucopogon		10
Macrozamia		500
Mesomelaena		10
Phllotheca		10
Phyllanthus		30
Sollya		30
Xanthorrhoea	30	20
<b>TOTAL</b>	<b>130</b>	<b>800</b>



### **List of Seed and Plant Suppliers**

The following list of seed and plant suppliers also have expertise in revegetation services. They are listed in alphabetical order.

- » APACE Western Australia
  - <http://web.argo.net.au/apace/index.html>
- » Landcare Services
  - Phone : 9274 7122
- » Tranen Revegetation Systems
  - <http://www.tranen.com.au/projects.htm>



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