

MINUTES forming ENCLOSURE to

TSD 2011/20071/01

VEGETATION SURVEY SUMMARY

2011/097

PROJECT:

Gawler East Link Road
Between Potts Road and Cork Road

TRANSPORT SERVICES DIVISION (TSD) INTERNAL CLEARANCE REQUIREMENTS

Does this site contain vegetation requiring approval under TSD Vegetation Removal Policy? <i>(tick relevant box)</i>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Number of trees/shrubs requiring approval under TSD Vegetation Removal Policy.	See Report	
m ² of vegetation requiring approval under the TSD Vegetation Removal Policy.	See Report	

DEVELOPMENT ACT, 1993

Does this site contain vegetation which is covered by the Development Act? <i>(tick relevant box)</i>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Council Name : Town of Gawler		
Number of trees requiring approval under the Development Act <i>(excluding those which are also covered by the Native Vegetation Act, 1991)</i>	See Report	

NATIVE VEGETATION ACT, 1991

Does this site contain vegetation which is covered by the Native Vegetation Act? <i>(tick relevant box)</i>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
Number of trees/shrubs requiring approval under the Native Vegetation Act <i>(including those which are also covered by the Development Act, 1993)</i>	See Report	
m ² of vegetation requiring approval under the Native Vegetation Act	See Report	
Vegetation clearance at this site is likely to be considered at serious variance with the following Principles of Clearance under the Native Vegetation Act:		
Native vegetation should not be cleared if in the opinion of the Council <i>(tick relevant box(es))</i> :		
<input type="checkbox"/> a) it comprises a high level of diversity of plant species;		
<input checked="" type="checkbox"/> b) it has significance as a habitat for wildlife;		
<input type="checkbox"/> c) it includes plants of a rare, vulnerable or endangered species;		
<input type="checkbox"/> d) the vegetation comprises the whole, or part, of a plant community that is rare, vulnerable or endangered;		
<input checked="" type="checkbox"/> e) it is significant as a remnant of vegetation in an area which has been extensively cleared;		
<input checked="" type="checkbox"/> f) it is growing in, or in association with, a wetland environment;		
<input checked="" type="checkbox"/> g) it contributes significantly to the amenity of the area in which it is growing or is situated;		
<input type="checkbox"/> Other variance issues are likely to be highlighted by the NRM Board or the local council. See Main Report		

COMMONWEALTH ENVIRONMENT PROTECTION & BIODIVERSITY CONSERVATION ACT, 1999

Is this site within, near or contain a declared Ramsar Wetland or any other threatened environment; and/or contains, or is likely to contain, species (flora & fauna) which is/are covered by the Commonwealth Environment Protection & Biodiversity Conservation Act? <i>(tick relevant box)</i>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
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BROOM RAPE

Is this site situated within the designated Branched broomrape (<i>Orobancha ramosa</i>) area? <i>(tick relevant box)</i>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
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PHYTOPHTHORA

The site is located within the following Phytophthora Potential Threat Area <i>(tick relevant box)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Nil or Low Potential Threat				
Moderate Potential Threat				
High Potential Threat				

VEGETATION SURVEY MAIN REPORT
2011/097

PROJECT:

Gawler East Link Road

Between Potts Road and Cork Road

1. GENERAL

The following report indicates the state of the existing vegetation as surveyed and its landscape and/or ecological significance. The survey was undertaken in accordance with Transport Services Division (TSD) Guideline, VE 101, Vegetation Survey Guidelines.

The vegetation survey was undertaken east of the Gawler Township between Potts Road and Cork Road. The survey area consists of parcels of land mainly held in the name of the Commissioner of Highways, with the remaining owned either by the Gawler Council or private landholders.

The survey assesses the potential impacts to vegetation arising from the development of a new road, which aims to link Potts Road to a new Delfin Lend Lease residential development called Springwood. This new road is likely to be constructed within a 50m wide corridor; however the survey has documented all vegetation in the Commissioner of Highways land to provide:

- a more comprehensive basis for the assessment of threatened flora and fauna species
- additional information in case of design modification.

Two road alignments have been proposed so far and differ at the southern extent where the new road joins Potts Road (Knet#6721886). The original alignment (Original / Eastern) travels along Bowman Court and utilises some existing infrastructure. The alternative alignment (Alternative / Western) occurs west of the original and will avoid an area containing suitable habitat for the EPBC Vulnerable Flinders Ranges Worm Lizard (*Aprasia pseudopulchella*). This alignment also avoids impacting a group of hollow bearing Mallee Box (*Eucalyptus porosa*) which provide habitat for native bird species.

Note : Impacts for both alignments are estimates only and give some indication of numbers, set asides and approvals. Estimated impacts are based on the Concept Design for both alternatives dated 30/04/12. Impacts for the installation/relocation of services, storm water and other secondary infrastructure have not been included.

Information/impacts will need to be re-assessed once a final alignment has been selected and detailed design completed.

2. DEVELOPMENT ACT, 1993

This site is located in The Town of Gawler (Council). Current Development Act 1993 requirements in regard to 'Regulated/Regulated Significant Trees' for this council area are as follows:

- ***Regulated Tree** - Any tree with a trunk circumference of 2.0m or more – or, in the case of trees with multiple trunks, that have trunks with a total circumference of 2.0m or more and an average circumference of 625mm or more – measured at a point 1.0m above natural ground level; or
- ***Regulated Significant Tree** - Any tree with a trunk circumference of 3.0m or more – or, in the case of trees with multiple trunks, that have trunks with a total circumference of 3.0m or more and an average circumference of 625mm or more – measured at a point 1.0m above natural ground level; or

- Any tree identified as a significant tree in a Development Plan
- * Excludes species which are exempt under the Development Act

57 trees met the requirements of the Act, photo / tree numbers: 55, 56, 57, 58, 81, 82, 99, 106, 114, 115, 116, 117, 120, 121, 122, 124, 125, 126, 127, 128, 132, 134, 135, 136, 137, 138, 139, 140, 144, 145, 146, 147, 148, 149, 150, 152, 155, 156, 158, 159, 160, 161, 162, 163, 169, 170, 171, 174, 177, 178, 184, 186, 191, 192, 421, 423, 425.

The Original/Eastern Alignment impacts the most trees - up to 19 may be removed or major pruned.

Note – Several other large trees, which met Development Act size criteria, exist within the survey boundary. However, these are remnant trees and occur in the area covered by the Native Vegetation Act. As the Native Vegetation Act takes precedence over the Development Act in regard to Regulated or Regulated Significant Trees, these trees have not been included in the above count [refer to the Native Vegetation component of this report (part 4) for further information].

3. GENERAL SITE DESCRIPTION

The land use surrounding the survey area consists of council parklands (Dead Man's Pass), private residential properties (including several semi rural sized blocks), an old sand quarry which is part of the Lend Lease residential development and the Para Woodlands Reserve.

The survey area lies within the Environmental Association of Rosedale (3.3.1) which Laut et al (1977) describes "as a undulating rolling plain on shale with broad floodplains and a cover of open parklands over sown pastures". The majority of the survey area still features open parklands however, flood plain areas to the west are now covered in residential housing.

Vegetation within the survey comprises 5 plant associations, as discussed below.

Plant Association 1 - Amenity planting

This association occurs in three areas covering approximately 7.3ha and are as follows:

Area 1

Is located in private properties adjacent to Bowman Court. The vegetation features Australian and exotic tree and shrub species.

Area 2

Is located along One Tree Hill Road and consists of an avenue of *Eucalyptus cladocalyx* (Sugar Gum). These trees are typically large and provide an effective 'visual entrance' to the township of Gawler. Several of the sugar gums have hollows which provide habitat for native fauna.

Area 3

Is an area of amenity tree/shrub plantings located close to the South Para River. The plantation is part of previous revegetation efforts by council and, while plants are not local South Australian species, they still provide habitat for local native fauna species.

Plant Association 2 - Exotic grassland +/- exotic shrubs

The exotic grass and shrub association covers approximately 59.5ha and dominates the survey area, particularly within land parcels owned by the Commissioner of Highways. This land is leased to a local sheep grazer, who has run stock (sheep) for a number of years. Because of the heavy grazing the presence and extent of all species was difficult to determine. The most common identifiable species are: *Aspodelus fistulosus* (Onion Weed), *Avena spp.* (Wild Oat), *Heliotropium europaeum* (Potato Weed), *Olea europaea* (European Olive) and *Schinus molle* (Pepper Tree). Native grasses species are scattered through the association and generally occur at less than 5% coverage. Species recorded include *Austrostipa blackii* (Crested Spear-grass), *Austrostipa sp.* (Spear-grass), *Austrodanthonia caespitosa* (Common Wallaby-grass), *Austrodanthonia sp.* (Wallaby-grass) and *Enneapogon nigricans* (Black Heads). The areas where native grasses occur at greater than 5% density are discussed separately below in Plant Association 5.

Plant Association 3 - *Eucalyptus porosa* grassy woodland (area and isolated trees)

The *Eucalyptus porosa* woodland association mainly occurs in gullies within the Commissioner of Highways land and covers approximately 8.1ha. It is believed the association would have once dominated the area, however past land clearance and grazing has significantly reduced its distribution. The association features mature *Eucalyptus porosa*, a number of which contain hollows of a size to provide significant habitat for local bird, reptile and mammal species. Very few juvenile *E. porosa* were recorded, which is likely a result of the heavy stock grazing.

The middle stratum contains regular populations of exotic tree/shrub species such as: *Olea europaea* (European Olive), *Schinus molle* (Pepper Tree) and *Lycium ferocissimum* (African Boxthorn). These plants often occur under the canopy of the *E. porosa* and were likely carried in by local birds. Two remnant shrub species were recorded towards the eastern extent of the survey: *Acacia acinacaea* (Gold Dust Wattle) and *Bursaria spinosa* (Sweet Bursaria), see photos 374 and 384.

Exotic grass species dominate the lower stratum, especially: *Ehrharta* spp. (Veldt Grass), *Brachypodium distachyon* (False Brome), *Hordeum vulgare* (Barley Grass) and *Avena* spp. (Wild Oat). Native *Austrostipa*, *Austrodanthonia* and *Vittadina* species were regularly observed and contributed to 1-30% vegetation coverage depending on the location. The majority of the *E. porosa* woodland areas contain between 1-5% coverage of native grasses; however the gully on the far eastern side of the survey (photos 371 – 408) contain areas with 20-30% coverage of native understory species. This eastern gully also features the greatest diversity of native species and includes species such as: *Lomandra* spp. (Iron-grass), *Elymus scaber* (Emu Grass), *Maireana brevifolia* (Short-leaf Bluebush), *Enchylaena tomentosa* (Ruby Saltbush) and *Teucrium racemosum* (Germander). This species density and diversity is likely to have occurred throughout all the *E. porosa* woodland areas if heavy grazing had not transpired.

Generally, substantial loss of plant richness was noted throughout the lower stratum. While the gully on the eastern side (photo 371-408) contained moderate diversity of species, the overall condition class of this plant association is considered to be **H** (heavy¹) and as such is a **poor** example of a *Eucalyptus porosa* **grassy woodland** association.

Plant Association 4 - *Eucalyptus camaldulensis* var. *camaldulensis* woodland over native grasses +/- sedgeland

This association covers a 2.3ha area along the South Para River riparian zone and extends east towards the old quarry site. The upper stratum varies from magnificent 100+ year old large scattered *Eucalyptus camaldulensis* to dense clumps of juvenile trees 1-10 years old. The large trees often contain hollows and high perching points which are important for native bird species.

The middle stratum consists of exotic shrub species on the river's edge and embankments, especially: *Olea europaea* (European Olive), *Schinus molle* (Pepper Tree) and *Lycium ferocissimum* (African Boxthorn).

The main South Para River channel features a dense population of *Phragmites australis* (Common Reed) in the lower stratum. However, lower stratum in the creek line to the east is dominated by *Juncus* species (Rushes), *Cyperus* species (Sedges) and *Bolboschoenus caldwellii* (Sea Club-rush). In pockets where the water is deeper *Typha domingensis* (Narrow-leafed Bulrush) dominates. A few exotic species occur along the edge of the main channel and accounted for less than 5% of the vegetation coverage. The density of exotic species increases as the distance from the water course increases, with embankment areas containing between 10-90% coverage of exotics. Common species include: *Aster subulatus* (Wild Aster), *Cynodon dactylon* (Couch), *Piptatherum miliaceum* (Rice Millet) and *Digitaria sanguinalis* (Crab Grass).

No substantial loss of plant richness was noted in the main water channel. However, the embankment areas have experienced substantial species loss in the middle and lower strata due to land clearance and weed invasion. The condition class of the water channel is considered to be **S2** (slight weed

¹ An Update of the Conservation Status of Major Plant Associations of South Australia, Neagle 1995

invasion²). However the whole riparian area, including embankment is considered to be M (moderate weed invasion) and as such is a **fair** example of a *Eucalyptus camaldulensis woodland*.

Plant Association 5 - Native grassland +/- herbs

The native grassland +/- herb association covers approximately 3.2ha and is generally located in small areas of the open paddocks owned by the Commissioner of Highways, or as scattered populations in council road reserves and along the South Para River. In these areas native grass species contribute between 5-70% coverage. Areas containing higher density and diversity tend to occur in areas that are further from water sources for domestic stock animals or in areas with steep terrain, see photo 107. Each area contains approximately 1-4 native species; however more species, especially annuals and geophytes are likely to be identified should a follow-up survey be conducted in spring. Common genera are: *Austrostipa*, *Austrodanthonia*, *Vittadina*, *Enneapogon* and *Aristida*.

Exotic grasses and herbs were common in and around this association. Areas containing high density exotic species are included in plant association 2, which is discussed separately.

Substantial loss of plant distribution was noted within the survey area, with remnant species being confined to relatively isolated populations near steeper areas. The condition class of this plant association is therefore considered to be M (moderate³) and is a **fair** example of a **native grassland +/- herb** association.

4. NATIVE VEGETATION

Data, complying with the Native Vegetation Act, 1991 was collected in plant associations 3, 4 and 5 as described above and for a total of 349 individual trees and shrubs. Please note that significant native vegetation occurs within the south western part of the survey site, between photos 65-193. However, this vegetation is outside of the boundary of the Act and therefore is not included in the discussion for this part of the report.

4.1 **Assessment of the plant associations as surveyed (including some individual trees and shrubs. Further details as per attached data sheets), using the relevant Principles of Clearance under the Native Vegetation Act, 1991**

Native vegetation should not be cleared if in the opinion of the Native Vegetation Council –

a) It comprises a high level of diversity of plants;

A total of 41 indigenous plant species was recorded within the survey area. See attached species lists for details.

Plant Association 3 - *Eucalyptus porosa* grassy woodland (area and isolated trees)

Plant Association 3 contains 26 species and reflects moderate diversity for the association. However, most of these species only occur in the gully on the eastern side (photos 371 – 408). The majority of the *Eucalyptus porosa* grassy woodland areas only contain 1-5 species and are classed as low diversity areas.

Plant Association 4 - *Eucalyptus camaldulensis* var. *camaldulensis* woodland over native grasses +/- sedgeland

Plant association 4 contains 18 species and reflects moderate retention of diversity along the South Para River and surrounding wetland areas.

² An Update of the Conservation Status of Major Plant Associations of South Australia, Neagle 1995

³ An Update of the Conservation Status of Major Plant Associations of South Australia, Neagle 1995

Plant Association 5 - Native grassland +/- herbs

Plant association 5 (PA5) contains 16 species and reflects moderate diversity.

The development of the road is likely to require the removal of vegetation within each of these associations. However, the majority of road construction works will occur within a 50m wide corridor. This impact is not likely to have a significantly affect on the diversity of vegetation in each association as areas of each association will remain unaffected.

Because the gully on the eastern side (photos 371 – 408), which contains the most diverse area of native vegetation, will be impacted by works, vegetation clearance is **considered to be seriously at variance** with Principle (a).

b) It has significance as a habitat for wildlife;

The survey site supports areas of *Eucalyptus porosa* grassy woodland, *E. camaldulensis* woodland and native grasslands. The size, density, floristic combination and proximity to other vegetation links/corridors are considered sufficient to provide suitable habitat for EPBC and NPWS rated species. A fauna survey and assessment conducted by Kellogg Brown & Root (KBR) revealed the following species as occurring or potentially occurring in the area, refer to Gawler East Link Road Fauna Survey (KBR 2012):

Fauna Type	Name	Conservation status*		Plant Association	Observed ² Yes/No	Comments
		SA	EPBC			
Reptile	<i>Aprasia pseudopulchella</i> Flinders Ranges Worm-lizard	-	V	3, 4, 5	Y	This species was non-confirmed observed at a site in the Gawler East area by KBR in 2009.
Bird	<i>Gallinago hardwickii</i> Latham's Snipe		M	4	Y	Recorded in reed beds (KBR 2009).
Bird	<i>Merops ornatus</i> Rainbow Bee-eater		M	3, 4	Y	Approximately 20 individuals were recorded in the quarry precinct (KBR 2010) and along the South Para River (KBR 2012).
Bird	<i>Falcunculus frontatus</i> Crested Shrike-tit	R	-	4	Y	Observed by KBR during Feb. 2012 within riparian woodland areas.
Bird	<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater	V	-	4	Y	Observed by KBR during Feb. 2012 within riparian woodland areas.
Mammal	<i>Trichosurus vulpecular</i> Common Brush-tail Possum	R	-	4	Y	Observed by KBR during Feb. 2012 within riparian woodland areas.
Bird	<i>Falco peregrines</i> Peregrine Falcon	R	-	3, 4	Y	Recorded at the quarry (KBR 2010).
Bird	<i>Corcorax melanorhamphos</i> White-winged Chough	R	-	3, 4	Y	Multiple breeding pairs in mallee box woodland areas (KBR 2009). The species is also listed in the regional recovery plan for the area.
Amphibian	<i>Pseudophryne bibronii</i> Brown Toadlet, Bibron's Toadlet	R	-	4	Y	This species was recorded near Gawler in 2008 (A. Shackley, pers. comm. with KBR, Nov. 2008). It is likely to still occur along some of the better quality riparian sites and grassland areas.

*SA = South Australia; U = Uncommon; R = Rare; V = Vulnerable; E = Endangered; X = Extinct; M = Migratory

Note if species is/are listed on the Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) then that Act will apply

The presence of rated fauna and their preferred habitat infers vegetation in Plant Associations 3 and 4 provides significant habitat value for wildlife.

Using the Points Scoring System developed by the Department of Environment and Natural Resources (DENR), 349 trees/shrubs were also assessed individually. 343 of these trees/shrubs scored above the cut-off point and have significant habitat value for wildlife.

Clearance of vegetation in plant association 3 and 4 and individual trees/shrubs (see attached data sheets and plans) for both proposals is therefore considered to be **seriously at variance** with Principle (b).

c) ***It includes plants of a rare, vulnerable or endangered species;***

No species surveyed have a national or state rating of rare, vulnerable or endangered (Lang & Kraehenbuehl, Florist, Version 2.0d, updated February 2009). However, the EPBC Protected Matters Report and a search of the DENR threatened flora database revealed the following species have been recorded or are likely to occur in the region. See list below and attached species list for further information.

Species	Conservation status ¹		Observed ² Yes/No	Comments
	NPW	EPBC		
<i>Austrostipa densiflora</i> : Dense Spear-grass	R	-	N	Recorded within the past 10 yrs. 2.5km SE from the survey area, along the South Para River.
<i>Austrostipa multispiculis</i> : Small Seed Spear-grass	R	-	N	Recorded within the past 10 yrs. 2.5km SE from the survey area, along the South Para River.
<i>Euphrasia collina subsp. osbornii</i> : Osborns Eyebright	E	E	N	The species is generally recorded in mallee scrubland but has also been found growing in sclerophyll forest/woodlands. Preferred vegetation association not present within the survey area, therefore highly unlikely to occur within the survey area.
<i>Glycine latrobeana</i> : Clover glycine	V	V	N	The plant occurs in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. Populations are generally isolated and fragmented. In the Mount Lofty Ranges it is has been recorded within the Belair and Scott Creek Conservation Parks. It is highly unlikely to occur within the survey area.
<i>Olearia pannosa subsp. pannosa</i> : Silver Daisy-bush	V	V	N	Species is a shrub and would have been obvious if it occurred within the survey area. Therefore it is not present and not likely to occur.
<i>Prasophyllum pallidum</i> : Pale Leek-orchid	R	V	N	The species prefers well-grassed open forests from the Flinders Ranges to the Northern and Southern Lofty regions of South Australia. Due to heavy grazing it is highly unlikely to occur within the survey area.
<i>Prasophyllum pruinosum</i> : Plum Leek-orchid	V	E	N	The species prefers open woodland habitats; usually with an overstorey of <i>Eucalyptus fasciculosa</i> , <i>E. leucoxylo</i> n, <i>Acacia leucoxylo</i> n and <i>Callitris gracilis</i> . Preferred vegetation association not present within the survey area, therefore the species is highly unlikely to occur within the survey area.
<i>Thelymitra cyanapicata</i> : Blue Top Sun-orchid	E	CE	N	The Blue Top Sun-orchid is endemic to South Australia, where it is only known from one location on the Fleurieu Peninsula, near Kuitpo. Therefore it is highly unlikely to occur within the survey area.

The survey area has been heavily disturbed by past land clearance and grazing. The degraded environment is highly unlikely to support populations of EPBC listed species discussed above.

Additionally, vegetation associations known to support species do not occur on site. Therefore, it is highly unlikely for any EPBC flora species to occur within the boundary of the survey.

The survey revealed regular populations of *Austrostipa* species. The DENR threatened species database showed NPW Act protected *Austrostipa* sub species occur in the region, however none were observed during the survey.

The clearance/disturbance of vegetation at within the survey area is **not** considered seriously at variance with Principle (c).

d) The vegetation comprises the whole, or a part, of a plant community that is rare, vulnerable or endangered;

None of the 3 remnant plant associations (*Eucalyptus porosa* grassy woodlands, *Eucalyptus camaldulensis* grassland +/- sedgeland and Native grasslands) within the survey area are included on the Provisional List of Threatened Ecosystems of South Australia⁴ and therefore do not form the whole or part of a rare, vulnerable or endangered community.

A previous vegetation survey by KBR for Delfin Lend Lease over 2008 to 2010⁵, revealed the occurrence of the EPBC Critically Endangered Iron-grass Natural Temperate Grassland of South Australia within one land parcel close to the boundary of the current survey area. The eastern gully, discussed at photo 383 (the northern hill face) and photo 398 (the southern hill face) features a very open *Eucalyptus porosa* grassy woodland which contains species associated with the listed ecological community: *Lomandra multiflora* ssp. *dura*, *L. densiflora*, *Austrostipa* ssp., *Austrodanthonia* spp, *Dianella revoluta*, *Vitadina* sp. and *Maireana brevifolia*. However, the gully has been degraded by stock grazing and contains less than 15 native species. Therefore, it does not contain sufficient diversity to meet the criteria of the Iron-grass Natural Temperate Grassland.

Vegetation clearance required for either proposal is **not** considered to be seriously at variance with Principle (d).

e) It is significant as a remnant of vegetation in an area which has been extensively cleared;

The survey site, which has been heavily degraded by grazing, is located within the Hundreds of Munno Para, Nuriootpa, Barossa and the Rosedale Environmental Association(3.3.1), which in 2002, were estimated to retain 3.9%, 5.5%, 20.5% and 9.2% respectively of their original native vegetation cover⁶. These figures are very low – to moderate and overall reflect marginal retention of remnancy.

The land directly surrounding the survey site has been cleared for agricultural and residential purposes. Some areas of remnant vegetation have been retained to the east of the site in the Para Woodlands Reserve and along the South Para River.

Both proposals will Clearance of vegetation within the survey area is therefore considered to be **seriously at variance** with Principle (e).

f) It is growing in, or in association with, a wetland environment;

The South Para River transverse part of the site and this riparian area forms the majority of Plant Association 4: *Eucalyptus camaldulensis* woodland +/- sedgeland association. The site also contains annual drainage lines and a tributary flowing from the north eastern side of the survey area. The majority of the wetland areas are shallow or dry and covered in dense *Phragmites australis* (Common Reed). However, at the south eastern extent of the survey the South Para River has a permanent pool of deeper water surrounded by *Typha domingensis* (Bulrush).

⁴ Department of Environment and Heritage, SA, 2001.

⁵ Kellogg Brown and Root Pty Ltd, 2010. Gawler East Ecological Survey Unpublished report

⁶ Department of Environment and Heritage, SA, Updated December 2002

The proposed road development will involve construction of a bridge structure and framework. This will have a significant short term impact through the removal of native vegetation and disruption to the water channel. The *Phragmites* and other native plants are likely to re-establish from surrounding vegetation within a relatively short time frame; however, long term impacts on water quality and fauna movement are unknown at this stage. Environmental monitoring, rehabilitation and water sensitive construction measures should be included into any design and construction contracts to reduce the size, extent and long term impact to this area.

Clearance of vegetation within the survey area is therefore considered to be **seriously at variance** with Principle (f).

g) It contributes significantly to the amenity of the area in which it is growing or is situated;

The survey occurs across open paddocks with areas of Eucalyptus woodland and grassland communities. The open woodland environment provides high amenity value to local residents and would have contributed to their decision to purchase land in the area. The new road will mostly occur within a 50m wide corridor in the middle of the open land parcels. This will dissect the open woodlands areas and significantly affect the overall feel and amenity of the area.

Clearance of vegetation within the survey area is therefore considered to be **seriously at variance** with Principle (g).

h) Other variance issues which are likely to be highlighted by the NRM Board and/or local council

The construction of the road will involve the establishment of stormwater services to remove water from the road surface quickly and effectively. This is likely to direct run-off / stormwater to outlet points along the South Para River. This can impact: natural water movement, the quantity and intensity of water movements, soil and river bank erosion, sedimentation and turbidity within the water channel. This impact is likely to be exacerbated if proposed high-medium density housing be constructed over the open land parcels. The current road concept designs do not include stormwater infrastructure and an assessment against the principle is not applicable at this time. However, extensive water modelling and should be undertaken to reduce the impact on soil erosion, water quality and the intensity and frequency of flood events.

5. OTHER INFORMATION

5.1 Declared and/or Environmental Weeds⁸

The dominant declared and/or environmental weeds (see attached species list for complete list) noted within the survey site are as follows:

Species	Common Name	Comments
** Arundo donax	Giant Reed	A dense population occurs along the edge of the South Para River.
+ Asphodelus fistulosus	Onion Weed	Commonly occurring in open paddocks.
** Avena fatua + barbata	Wild Oat	Commonly occurring in open paddocks.
+ Cynara cardunculus	Artichoke Thistle	Commonly occurring in open paddocks.
** Ehretaria longiflora + calycina	Annual/Perennial Veldt Grass	Commonly occurring in open paddocks.
+ Lyctium ferocissimum	African Boxhorn	Mainly observed near the South Para River.

⁷ Natural Resources Management Act 2004

⁸ TSD Environmental Weeds List

Species	Common Name	Comments
+ <i>Marrubium vulgare</i>	Horhound	Commonly occurring in open paddocks.
+ <i>Olea europaea</i>	European Olives	Common through most of the survey area.
** <i>Pennisetum villosum</i>	Feathertop Grass	A moderately dense population occurs on the southern side of the south western gully, photos 61 – 105.
** <i>Scabiosa atropurpurea</i>	Pincushion	Commonly occurring in open paddocks.
+ <i>Schinus mollee</i>	Pepper Tree	Common through most of the survey area.

+ Plants which are declared species under the Natural Resources Management Act 2004
 ** Plants which are considered environmental weeds (TSD Environmental Weeds List)

A reduction, using various control techniques, of these species within the areas of remnant vegetation will provide a substantial benefit to both the under and middle storey strata. An eradication program may be considered as part mitigation under the Native Vegetation Act.

5.2 Branched Broomrape

This site is not located within the designated Branched Broomrape (*Orobanche ramosa*) quarantine area.

5.3 Phytophthora

This site is located in a **Moderate Potential Threat Phytophthora** area and, although the survey site substantially meets the criteria for medium risk, it is located greater than 10km from a known infestation (note - an unconfirmed site is located 9.3km to the east).

The survey area is therefore assessed as a **Low Risk Site** and controls will not be required (refer TSD Operational Instruction 21.3 [Phytophthora (Dieback) Control].

5.4 Possible Stockpiling Sites

Areas considered suitable for stockpiling material or storage sites were not noted as part of the survey. However, there were vast areas of open paddocks free of native vegetation that would be suitable.

5.5 Possible Seed/Vegetative Material (for propagation) Collection Sites

The following areas contain appropriate species in sufficient numbers to provide the quantity of seed/vegetative material (for propagation) required for revegetation. These areas are within a 5 kilometre radius of the construction site and as such are considered to contain seed/vegetative material of the same/similar provenance.

Collection Site No	Comment	GPS		Feature/Landmark
		Easting	Northing	
1	South Para River Riparian Zone – <i>Eucalyptus carnaldulensis</i> grassy woodland.	294520	6167753	
2	Commissioner Hwy land (the surveyed site) – <i>Eucalyptus porosa</i> grassy woodland. However some areas have limited diversity and / or density.	294209	6167475	Normally in gullies or along sleeper hill slopes.
3	Para Woodlands Reserve – Permits / permission may be required.			
4	Defin Land Lease– Maybe able to salvage plants prior to residential development.	295240	6168255	Occurs directly east of the survey area and contains remnant woodlands and Lomandra grasslands.

6. IMPACT OF ROADWORKS

6.1 Direct Impacts

The development and construction of a link road through Gawler East will have a direct impact on areas of remnant native vegetation, amenity plantings and areas of exotic shrubs and grasses. Two alignment concept have been proposed; see plan attached (Kne#6721886). The original alignment utilises Bowman Court to connect the new road to Potts Road. The alternative alignment occurs west of the original and will directly connect to Potts Road. The alternative alignment is preferred from an environmental point of view, as it has a lower impact on areas containing suitable habitat for EPBC Act and NPW Act protected fauna and will have less impact to Native Vegetation and vegetation protected by the Development Act.

The impacts in this report are based on a concept design (dated 30/04/2012), which is yet to include the location and requirements for electrical services and stormwater. Discussions with project managers and road designers include incorporating stormwater management structures within the new road formation. These structures are likely to cause direct impacts to vegetation through increased intensity and duration of flood events. Prolonged or increased inundation can directly affect the health and stability of trees upstream and can cause tree failure over time. Prolonged inundation will also modify the conditions for lower stratum vegetation and can make it less favourable for native species. These impacts will have to be included in future vegetation impact assessments once final designs are complete.

6.2 Indirect Impacts

The development of the road is likely to cause vegetation removals over a 50m wide corridor. However, the installation of the road will facilitate high-medium residential development over the surrounding land parcels, which contain some significant areas of native vegetation and native fauna habitat. Therefore the road construction, which will lead to future land development may have an indirect impact on the surrounding native flora and fauna species.

7. APPROVALS AND SET ASIDES

Prior to construction works approval to impact vegetation is required through the appropriate delegating authority. The following impacts are based on the current concept design (dated 30/04/12) for the two proposed alignments and are an estimate only.

Vegetation Type	Original Alignment (Eastern)	Alternative Alignment (Western)
<p>Native Vegetation (Covered by Native Vegetation Act)</p>	<p><u>Impact</u> Removal - 33 trees and 1.02ha Major prune – 5 trees.</p> <p><u>Impact Level</u> Impact Level 3 - raised from level 2 due to serious variance with principles b, e, f and g.</p> <p><u>Approval</u> Director, Projects and the Native Vegetation Council. EPBC Act referral and approval will be required</p> <p><u>Set aside</u> 37.699ha or, if approved, a \$175,883.96 payment into the Native Vegetation Fund. <u>Note</u> - additional set asides may be imposed during EPBC Act approval process.</p>	<p><u>Impact</u> Removal - 33 trees and 1.02ha Major prune – 5 trees.</p> <p><u>Impact Level</u> Impact Level 3 - raised from level 2 due to serious variance with principles b, e, f and g.</p> <p><u>Approval</u> Director, Projects and the Native Vegetation Council. EPBC Act referral may be required</p> <p><u>Set aside</u> 37.699ha or, if approved, a \$175,883.96 payment into the Native Vegetation Fund. <u>Note</u> - additional set asides may be imposed during EPBC Act approval process.</p>
<p>Regulated Trees & Regulated Significant Trees (Covered by the Development Act)</p>	<p><u>Impact</u></p> <p><u>Removals</u> Regulated Trees - 7 Regulated Significant Trees - 9</p> <p><u>Major Prune</u> Regulated Trees - 2 Regulated Significant Trees - 1</p> <p><u>Approval</u> Director, Projects and the Development Assessment Commission (DAC).</p> <p><u>Set aside</u> Regulated Trees – 2:1 replacement – 14 trees Regulated Significant Trees – 3:1 replacement – 27 trees</p> <p><u>Total Set Aside</u> - 41 trees, or, if approved, a \$3,075.00 payment into the relevant fund. <u>Note</u> - additional set asides may be imposed by DAC</p>	<p><u>Impact</u></p> <p><u>Removals</u> Regulated Trees - 2 Regulated Significant Trees - 2</p> <p><u>Major Prune</u> Regulated Trees - 2 Regulated Significant Trees - 1</p> <p><u>Approval</u> Director, Projects and the Development Assessment Commission (DAC).</p> <p><u>Set aside</u> Regulated Trees – 2:1 replacement – 4 trees Regulated Significant Trees – 3:1 replacement – 6 trees</p> <p><u>Total Set Aside</u> - 10 trees, or, if approved, a \$750.00 payment into the relevant fund. <u>Note</u> - additional set asides may be imposed by DAC</p>

Vegetation Type	Original Alignment (Eastern)	Alternative Alignment (Western)
<p>Native Vegetation (Not covered by Native Vegetation Act)</p>	<p>Impact Removal - 6 trees and 0.61ha.</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside 2:1 replacement - 12 trees and 1.22ha.</p>	<p>Impact Removal - 6 trees and 0.313ha.</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside 2:1 replacement - 12 trees and 0.626ha.</p>
<p>Amenity Plants</p>	<p>Impact Removal - 175 plants and 0.363ha. Major prune – 2 plants.</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside 1:1 replacement - 175 plants and 0.363ha.</p>	<p>Impact Removal - 9 plants and 0.498ha. Major prune – 2 plants.</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside 1:1 replacement - 9 plants and 0.498ha.</p>
<p>Declared and Environmental Weeds (Meeting DPTI size requirements)</p>	<p>Impact Removal - 35 trees</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside No Set Aside is required</p>	<p>Impact Removal - 17 trees</p> <p>Approval Senior Environment Officer (SEMO).</p> <p>Set aside No Set Aside is required</p>

8. RECOMMENDATIONS

The following recommendations are made:

- As it is anticipated that additional plant species will be present in spring a follow up vegetation survey is advised to ensure any species with ratings, which may exist in the survey area, are recorded.
- An additional fauna survey to ascertain the existence of the Flinders Ranges Worm lizard, will be requested if the Original/Eastern Alignment is the preferred option and may still be requested if the Alternative/Western Alignment is selected. It is advised that a fauna survey in the spring be scheduled now to avoid unnecessary delays to the approval process.
- Every effort should be made to minimise the overall disturbance to vegetation outside the extent of works. Areas of native vegetation or amenity planting should be fenced off during construction to prevent accidental damage. The positioning of vehicle compounds and site offices should not be located under or near any trees of significance.
- A suitable landscape remediation plan should be implemented to offset the loss of any vegetation from proposed works. Vegetation restoration works should focus on improving areas with degraded Iron-grass remnants, as well as replacing the larger native tree species (*Eucalyptus camaldulensis* and *Eucalyptus porosa*) through planting on site.
- Any impacted native plants suitable for transplantation (particularly those in the South Para River area) should be lifted and stored in an approved facility (eg. A nursery) and re-planted after construction.
- Where removal of large trees with hollows is unavoidable, the hollows should be relocated into nearby surrounding vegetation at a suitable height, aspect and alignment.
- Fauna management strategies recommended in the Gawler East Link Road Fauna Survey Report (KBR 2012) should be implemented to reduce the impact of construction on native species.
- Water sensitive stormwater design should be implemented to ensure run-off water is effectively managed to have a minimal impact on surrounding water environments, such as the South Para River, and to reduce erosion.
- Consideration of creating heritage agreements prior to the hand over or selling of excess DPTI land following construction, should be undertaken for those areas containing remnant plant associations (3, 4 and 5). This will hopefully ensure the continuation of native vegetation associations in this area into the future and provide some protection from further developments.

Specialist Services staff are available for further assistance and advice if required.

Tanya Schneider

Checked by

Environment Officer

D. Sloan

20/06/2012

Coordinator Vegetation Services
CONTRACTS & ENVIRONMENT SECTION
/ /