



NATIVE VEGETATION CLEARANCE ASSESSMENT



KI PIPELINE



KI LINKS

4 JANUARY 2019



BOTANICAL ENIGMERASE

Michelle Haby- 0407 619 229
Daniel Rowley- 0467 319 925
ABN- 59 766 096 918

PO Box 639
Kingscote SA 5223
enigmerase@bigpond.com

Citation: Haby, M and Rowley, D.J. (2018) Native Vegetation Assessment- KI Pipeline, Internal report to KI Links.

This report was researched and prepared by



**Botanical
Enigmerase**

Email: enigmerase@bigpond.com.au

in accordance with the agreement between, on behalf of and for the exclusive use of

KI Links

Michelle Haby is the only Native Vegetation Council accredited consultant on Kangaroo Island specialising on Kangaroo Island flora, accredited to prepare reports for clearance consent under Section 28 of the *Native Vegetation Act 1991* and applications made under one of the *Native Vegetation Regulations 2017*.

DISCLAIMER

Any representation, statement, opinion or advice, expressed or implied in this publication is made in good faith. Botanical Enigmerase is not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever, which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect to any representation, statement of advice referred to here.



**Botanical
Enigmerase**

TABLE OF CONTENTS

Table of Contents	3
List of Figures	3
List of Tables	3
Application Details	4
1.0 Background	5
2.0 Assessment of Native Vegetation	7
3.0 Assessment against the Clearance Principles	9
4.0 Addressing the Legislation	17
5.0 Significant Environmental Benefit	20
6.0 EPBC Act	23
7.0 Recommendation	28
8.0 Bibliography	29
Appendix 1 KI Pipeline Methodology	31
Appendix 2 Native Plant Species Recorded	33
Appendix 3 Introduced Plant Species Recorded	38
Appendix 4 Significant Wildlife Species	40
Appendix 5 Segment Photographs	41
Appendix 6 Bushland Assessment Summaries	43
Appendix 7 Roadside Survey Summaries	44

LIST OF FIGURES

Figure 1- Location of Proposed Pipeline	5
Figure 2- KI Narrow-leaved Mallee Woodland	24
Figure 3- Nationally Threatened Plant Populations	26

LIST OF TABLES

Table 1- Vegetation Assessment Segments	7
Table 2- Plant Species Diversity Assessment	9
Table 3- Wildlife Habitat Assessment	10
Table 4- Rare Plant Assessment	11
Table 5- Vegetation Communities Recorded	13
Table 6- Native Vegetation Communities Assessment	14
Table 7- Remnancy Assessment	15
Table 8- Wetland Assessment	15
Table 9- Amenity Assessment	16
Table 10- Regulation 12(34) Assessment	17
Table 11- Risk Assessment	17
Table 12- Area of Impact	18
Table 13- SEB Obligation	21
Table 14- Significant Environmental Benefit	22
Table 15- Nationally Threatened Flora Species Recorded	25
Table 16- Nationally Threatened Terrestrial Fauna recorded within 5km	27



APPLICATION DETAILS

Applicant	KI Links
Representative	Mr Mark McIntosh
Address	113 Avon Rd , Rye, Vic 3941
Telephone	
Mobile Telephone	0409 823 826
Email	flash@telaustralia.com.au

Property

Owner	Kangaroo Island Council and DPTI
Local Government Area	Kangaroo Island
Roads	Hog Bay Road and Arranmore Road

Inspection

Accredited Consultant	Michelle Haby
Bushland Assessment	19, 25, 26,31 October 2018, 2, 7, 9, 15, 19 November 2018

Clearance Proposal

Area/trees	1.14ha
Purpose	Installation of SA Water Pipeline
Relevant Regulations	Regulation 12(34)
Level of Risk	Level 4 (Prior to consideration of Moderating Factors)
Proposed SEB	TBA

Flora

Native Species	214
Weed Species	80
Significant Species	32

Fauna

Significant Species	75
----------------------------	----



1.0 BACKGROUND

The proposed pipeline will be established between the corner of Arranmore Road and Playford Highway and the proposed Kangaroo Island Links project near Pelican Lagoon, Figure 1. The pipeline is a joint venture between a number of developers and SA Water. Once completed the pipeline will become a SA Water asset and be maintained by SA Water.

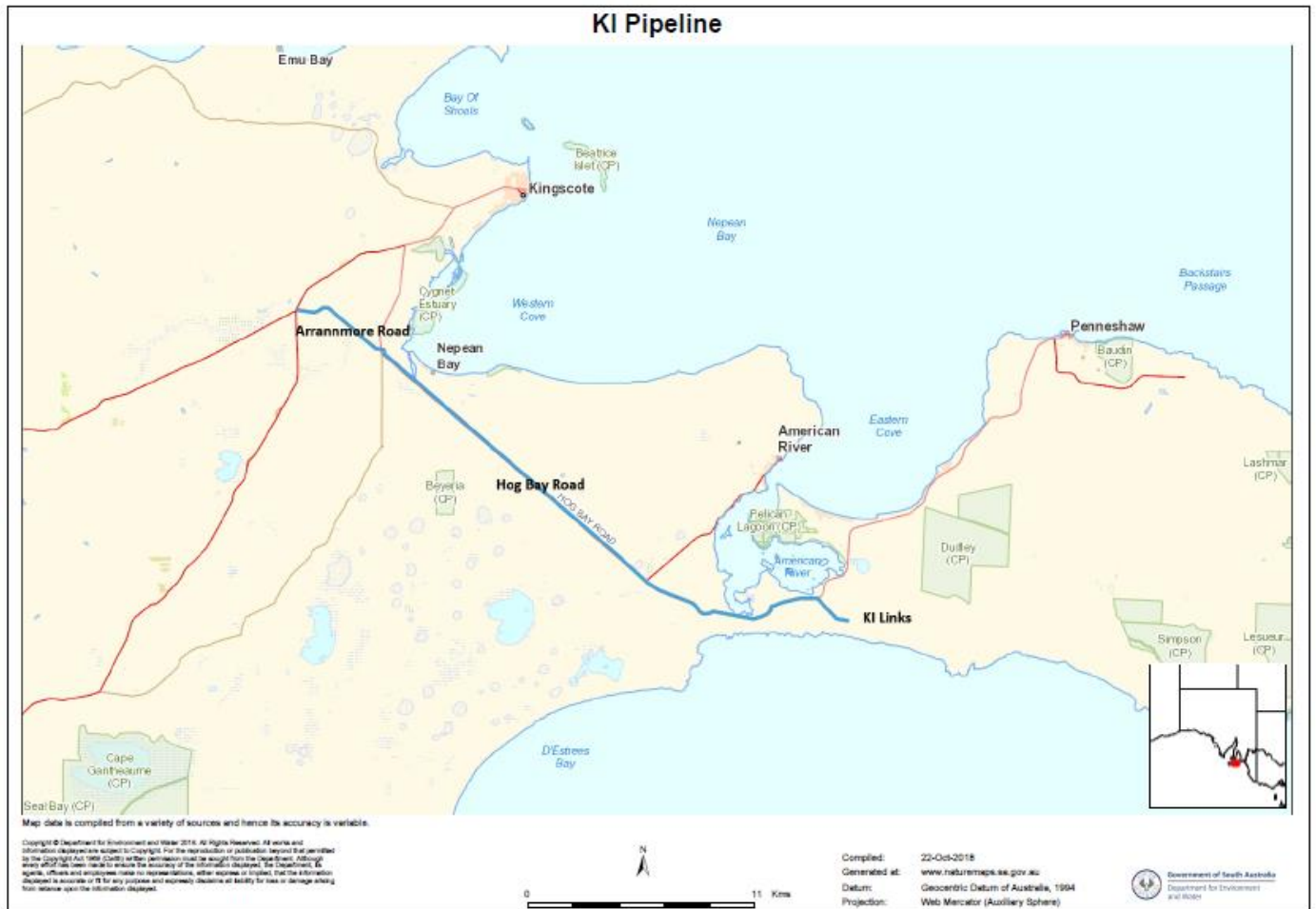


Figure 1- Location of Proposed Pipeline

Detailed plans, Attachment 2, including Google Earth Pro Tour, have been developed for the proposed location of the pipeline within the road reserve. The pipeline will be installed within 1m beyond the white post but may come closer to the road or further away depending on vegetation and other construction considerations. The pipeline will generally be on the “north side” of the road avoiding Telstra and other services which are mostly on the “south side”.

The specific location of the pipeline within the road reserve is not fixed and as a result can avoid any issue that may arise including avoiding significant plant species and minimising the native vegetation clearance of significant areas. Collection of native plant seed has commenced to ensure seed stock is available if rehabilitation and offsets are required. Appendix 1 provides an outline of the methodology that will be utilised for the KI Pipeline project.

The following approvals have been received for the project -
Kangaroo Island Council:

Permit to install a pipeline in a road reserve



Natural Resources Kangaroo Island:

Permit to undertake Water Affecting Activities

The following approvals are being sought for the project and background information has been sent to the relevant authorities for approval-

DPTI:

Approval to install an SA Water pipeline within a DPTI road

Native Vegetation Council:

Clearance Application with Native Vegetation Council

The proponents of the pipeline have negotiated with the Native Vegetation Council, in line with SA Water requirements, that the Significant Environmental Benefit, if required, will be based on actual clearance undertaken. As a result this Native Vegetation Assessment provides a “worst case scenario” for the amount of clearance required for the project. Clearance of native vegetation will be avoided where possible.

Botanical Enigmerase was commissioned to undertake this Vegetation Assessment. The assessment was undertaken for the entire pipeline route, including where clearance is not proposed. The Bushland Assessment Spreadsheets developed as part of this Vegetation Assessment will be utilised to finalise the Significant Environmental Benefit requirements for the project.



2.0 ASSESSMENT OF NATIVE VEGETATION

The proposed pipeline route was divided into 11 segments, Table 1, for ease of assessment.

Segment	Road	Start	End	Length	Survey Date	Width Chain
GG1	Aranmore Road	Playford Highway	Angle Pole Road	2	19-Oct-18	3
GG2	Aranmore Road	Angle Pole Road	Hog Bay Road	3	25-Oct-18	1
GJC	Grace James Corner	Aranmore Road- North	Elsegood Road- South		25-Oct-18	
XX2	Hog Bay Road	Elsegood Road	Western Cove Road	3	25-Oct-18	1
XX1	Hog Bay Road	Western Cove Road	Minoil Road	2	26-Oct-18	1
WW	Hog Bay Road	Minoil Road	Red Banks Road	4	31-Oct-18	3
VV	Hog Bay Road	Red Banks Road	Moores Road	8	07-Nov-18	3
UU	Hog Bay Road	Moores Road	American River Road	2	15-Nov-18	3
TT	Hog Bay Road	American River Road	Muston Road	5	15-Nov-18	1
SS3	Hog Bay Road	Muston Road	Ratcliffe Road	3	19-Nov-18	1
SS2	Hog Bay Road	Ratcliffe Road	Davies Road	3	19-Nov-18	1

Table 1- Vegetation Assessment Segments

2.1 Flora Assessment

The flora assessment of the proposed pipeline route was designed to identify any significant areas along the pipeline route that may impact on the project. As a result the survey area was much larger than the proposed clearance areas to ensure all issues were identified prior to the commencement of construction.

The flora along the proposed route was assessed using standard roadside survey methodology adopted by DEW on Kangaroo Island as follows-

- The pipeline route was walked with the primary focus of surveying flora within 10m of the white post;
- Native vegetation communities were identified with the start and end location of each community recorded with a hand-held GPS to an accuracy of <5m;
- A complete species list of all native and introduced plant species was produced for each identified vegetation community;
- Nationally Threatened, State Listed or Regionally Significant plant species populations were identified and their location recorded with a hand-held GPS to an accuracy of <5m;
- Presence of the Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community was identified and recorded with a hand-held GPS to an accuracy of <5m;
- Proclaimed introduced plant species populations were identified and their location recorded with a hand-held GPS to an accuracy of <5m; and
- Survey data relating to records of Nationally Threatened, State Listed or Regionally Significant plant species was recorded following BDBSA Minimum Data Standards and provided to BDBSA for uploading.

Each segment along the pipeline route was then divided into sites based on the native vegetation community. A total of 45 Sites were established along the pipeline route of which only 26 have clearance proposed. Appendix 2 and 3 provide the full list of plant species observed and the segment in which they were observed.

The flora assessment has identified a number of significant areas along the pipeline route. When considering the flora assessment it is important to note the following-

- Not all sites along the pipeline route are proposed to have clearance, only 26 sites have proposed clearance;
- The maximum clearance will be 0.5m as-
 - A cleared area of 1m is required on the vegetation side of the white post to install the pipeline;
 - There is currently a minimum of 0.5m cleared on the vegetation side of the white post; and
 - Where the current cleared area is >1m on the vegetation side of the white post, no clearance will occur; and
- Most of the vegetation is “leaning” over (ie not growing within) the 1m on the vegetation side of the white post.

Most of the significant areas identified as part of the flora assessment will not be impacted by the installation of the pipeline

Additionally, the flora assessment included the south side of the road to be consistent with all other roadside vegetation surveys undertaken on Kangaroo Island. The additional data has been added to the “north side” data to develop summaries of each segment, Appendix 7. This information provides a summary of each site on both sides of the road.

This report ONLY reports on the north side of the road where the pipeline route is proposed.

2.2 Fauna Assessment

The potential fauna to occur along the pipeline route was determined utilising the following-

1. Fauna recorded within 5km of each segment, Table 1;
2. Fauna likely to occur within the Benchmark Community based on the *Threatened Fauna Habitats Spreadsheet*; and
3. Observations of fauna including tracks and traces while undertaking the flora assessment.

Marine fauna were removed from the above comprehensive list and then the remaining fauna status was assessed utilising *Gillam, S. and Urban, R. (2014)* to reduce the list to Nationally Threatened, State Listed and Regionally Significant fauna only.

Appendix 4 provides the list of significant fauna and the segment they are likely to occur in.

As the proposed clearance is a maximum of 0.5m wide next to a major road, a detailed fauna survey of the clearance areas is very unlikely to provide any further information. The clearance is also unlikely to impact on the fauna any more than the major road.



3.0 ASSESSMENT AGAINST THE CLEARANCE PRINCIPLES

The flora assessment showed the width of the road reserve has a significant impact on the native plant diversity of the road reserve. Three chain (or 60m) road reserves within the survey area had a noticeably greater diversity than one chain (or 20m) road reserves. The road carriageway is located on the south side of the road reserve within part segment VV and segment UU resulting in this narrow strip of native vegetation being low in diversity.

The detailed Native Vegetation Assessment, following, has been undertaken using the Native Vegetation Council Clearance Principles as a basis for determining the significance. The large number of sites, 45, has required the information to be summarised to a greater level than normal. This assessment has also been utilised to determine the Risk Assessment, refer Section 4.2.

Appendix 6 provides the Summary Scoresheets from the Bushland Assessment Spreadsheets and Appendix 7 summarises the flora within each segment and site for both sides of the road. The Bushland Assessment Spreadsheets are available as an attachment in electronic format.

3.1 Plant Species Diversity- Principle a

Table 2 provides the Native Plant Species Diversity Score to determine the variance to the Plant Species Diversity Principle.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Native Plant Diversity Score	30	30	30	18	27	30	30
Variance to Principle	Seriously	Seriously	Seriously	At	Seriously	Seriously	Seriously
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Native Plant Diversity Score	30	15	21	30	30	24	30
Variance to Principle	Seriously	At	Seriously	Seriously	Seriously	Seriously	Seriously
	XX1	Segment WW					
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Native Plant Diversity Score	30	30	30	30	30	30	30
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Native Plant Diversity Score	30	30	30	21	30	30	30
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Native Plant Diversity Score	30	30	30	30	30	30	30
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	Segment UU			Segment TT			
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Native Plant Diversity Score	30	30	30	30	30	30	30
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	Segment SS3		SS2				
	Site 1	Site 2	Site 1				
Native Plant Diversity Score	30	30	30				
Variance to Principle	Seriously	Seriously	Seriously				

Table 2- Plant Species Diversity Assessment

Note- The shaded sites have NO clearance proposed.

Appendix 2 provides the list of native plant species recorded as part of the Bushland Assessments.



Appendix 3 provides the list of introduced plant species recorded as part of the Bushland Assessments.

Moderating Factors

Less than 10% of the native vegetation within 5km of each site will be impacted.

3.2 Wildlife Habitat- Principle b

Table 3 provides the Threatened Fauna Score and Unit Biodiversity Score to determine the variance to the Wildlife Habitat Principle.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	81.65	52.14	84.29	34.74	70.88	71.13	63.64
Variance to Principle	Seriously	At	Seriously	At	Seriously	Seriously	Seriously
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	69.23	28.51	45.66	99.46	60.63	49.94	58.05
Variance to Principle	Seriously	At	At	Seriously	Seriously	At	At
	XX1	Segment WW					
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	84.99	86.82	61.05	64.40	62.96	100.74	75.47
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	87.97	87.97	84.23	45.57	74.88	55.48	82.03
Variance to Principle	Seriously	Seriously	Seriously	At	Seriously	At	Seriously
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	82.76	71.86	58.73	59.55	84.59	77.94	76.46
Variance to Principle	Seriously	Seriously	At	At	Seriously	Seriously	Seriously
	Segment UU		Segment TT				
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Threatened Fauna Score	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Unit Biodiversity Score	76.48	73.72	60.18	54.89	66.56	63.38	55.40
Variance to Principle	Seriously	Seriously	Seriously	At	Seriously	Seriously	At
	Segment SS3		SS2				
	Site 1	Site 2	Site 1				
Threatened Fauna Score	0.10	0.10	0.10				
Unit Biodiversity Score	56.89	62.38	49.13				
Variance to Principle	At	Seriously	At				

Table 3- Wildlife Habitat Assessment

Note- The shaded sites have NO clearance proposed.

Appendix 4 provides the list of significant wildlife species recorded by Naturemaps within 5km of each Segment excluding marine wildlife.

Moderating Factors

The proposed clearance will not have a significant impact on threatened fauna as the amount of clearance is minimal and the clearance is along a major road.



3.3 Rare Plant Species- Principle c

Table 4 provides the Threatened Flora Score to determine the variance to the Rare Plant Species Principle.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Threatened Flora Score	0.04	0.04	0.10	0.04	0.02	0.02	0
Variance to Principle	At	At	Seriously	At	At	At	Not
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Threatened Flora Score	0	0	0	0.10	0	0	0.02
Variance to Principle	Not	Not	Not	Seriously	Not	Not	At
	Segment WW						
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Threatened Flora Score	0.02	0.08	0.10	0.02	0.08	0.10	0.10
Variance to Principle	At	Seriously	Seriously	At	Seriously	Seriously	Seriously
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Threatened Flora Score	0.08	0.08	0.10	0.08	0.08	0.08	0.08
Variance to Principle	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously	Seriously
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Threatened Flora Score	0.08	0.10	0.04	0.04	0.08	0.08	0.08
Variance to Principle	Seriously	Seriously	At	At	Seriously	Seriously	Seriously
	Segment UU		Segment TT				
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Threatened Flora Score	0.08	0.08	0.04	0.08	0.02	0	0
Variance to Principle	Seriously	Seriously	At	Seriously	At	Not	Not
	Segment SS3		SS2				
	Site 1	Site 2	Site 1				
Threatened Flora Score	0	0.02	0				
Variance to Principle	Not	At	Not				

Table 4- Rare Plant Assessment

Note- The shaded sites have NO clearance proposed.

Appendix 2 includes the status of all native plant species recorded as part of the Bushland Assessments.

Moderating Factors

The proposed clearance will not have a significant impact on threatened flora as the amount of clearance is minimal and procedures have been adopted to prevent removal where possible.

The flora assessment recorded Nationally Threatened, State Listed and Regionally Significant plant populations within 10m on the vegetation side of the white post. As the proposed clearance is within 1m of the vegetation side of the white post information shows that less than 10% of individual plants will be affected within the immediate vicinity of each clearance area.

3.4 Rare Plant Communities-Principle d

The Bushland Assessment identified 20 native vegetation communities, Table 5.

Data	Bushland Assessments Kangaroo Island Floristic Vegetation Mapping NatureMaps
Status Source	<i>Willoughby, N, Oppermann, A., Innes, R.W. (2001)</i>



Provisional List Of Threatened Ecosystems Of South Australia (DEH 2009)				
ID	Description	Status		
		AU	SA	KI
KI0204	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , +/- <i>Eucalyptus rugosa</i> , +/- <i>Eucalyptus oleosa</i> ssp. <i>ampliata</i> mid mallee woodland over <i>Melaleuca lanceolata</i> , <i>Acacia uncifolia</i> , <i>Lasiopetalum schulzenii</i> shrubs over <i>Orthrosanthus multiflorus</i> , <i>Correa</i> sp, <i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i> , <i>Senecio odoratus</i> , <i>Myoporum insulare</i> shrubs			
KI0206	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Melaleuca lanceolata</i> , <i>Eucalyptus rugosa</i> mid open mallee woodland over <i>Acacia uncifolia</i> , +/- <i>Leucopogon parviflorus</i> , +/- <i>Myoporum insulare</i> , +/- <i>Melaleuca gibbosa</i> , +/- <i>Acacia longifolia</i> ssp. <i>sophorae</i> shrubs over +/- <i>Correa</i> sp, +/- <i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>			
KI0210	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus cosmophylla</i> , <i>Eucalyptus albopurpurea</i> , +/- <i>Eucalyptus cneorifolia</i> , +/- <i>Eucalyptus fasciculosa</i> mid open mallee woodland over <i>Allocasuarina muelleriana</i> ssp. <i>notocolpica</i> , +/- <i>Allocasuarina striata</i> , +/- <i>Banksia marginata</i> , +/- <i>Hakea rostrata</i> shrubs			RA
KI0212	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus albopurpurea</i> , +/- <i>Eucalyptus cneorifolia</i> , +/- <i>Eucalyptus cosmophylla</i> , +/- <i>Eucalyptus fasciculosa</i> mid mallee woodland over <i>Melaleuca uncinata</i> (NC), <i>Allocasuarina muelleriana</i> ssp. <i>notocolpica</i> , <i>Allocasuarina striata</i> , +/- <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , +/- <i>Thryptomene ericaea</i> shrubs over <i>Correa</i> sp, <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC)			
KI0215	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus albopurpurea</i> , <i>Eucalyptus leptophylla</i> , +/- <i>Eucalyptus cneorifolia</i> , +/- <i>Eucalyptus cosmophylla</i> mid mallee woodland over <i>Leptospermum myrsinoides</i> , +/- <i>Banksia marginata</i> , +/- <i>Acacia myrtifolia</i> var. <i>myrtifolia</i> , +/- <i>Melaleuca uncinata</i> (NC), +/- <i>Thryptomene ericaea</i> shrubs over <i>Bertya rotundifolia</i> , <i>Adenanthos macropodanus</i> , +/- <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , +/- <i>Lasiopetalum schulzenii</i> , +/- <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC)			
KI0220	<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , +/- <i>Eucalyptus cneorifolia</i> , <i>Eucalyptus albopurpurea</i> , <i>Eucalyptus rugosa</i> , +/- <i>Callitris gracilis</i> mid mallee woodland over <i>Melaleuca lanceolata</i> , <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> , <i>Leucopogon parviflorus</i> , <i>Acacia leiophylla</i> shrubs over <i>Correa</i> sp, <i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i> , <i>Acrotriche patula</i> , <i>Lasiopetalum schulzenii</i> , <i>Beyeria lechenaultii</i> shrubs			RA
KI0406	<i>Eucalyptus rugosa</i> , <i>Eucalyptus oleosa</i> ssp. <i>ampliata</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , +/- <i>Eucalyptus cneorifolia</i> , +/- <i>Eucalyptus gracilis</i> mid mallee woodland over <i>Melaleuca lanceolata</i> , +/- <i>Acacia uncifolia</i> shrubs over <i>Acrotriche patula</i> , <i>Dodonaea humilis</i> , <i>Lasiopetalum schulzenii</i> , +/- <i>Leucopogon parviflorus</i> shrubs			RA
KI0802	<i>Eucalyptus albopurpurea</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus leptophylla</i> , +/- <i>Eucalyptus fasciculosa</i> , +/- <i>Eucalyptus cosmophylla</i> mid mallee woodland over <i>Melaleuca uncinata</i> (NC), <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC), <i>Choretrum glomeratum</i> var. <i>glomeratum</i> , <i>Banksia marginata</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> shrubs over <i>Correa</i> sp, <i>Bertya rotundifolia</i> shrubs			
KI1103	<i>Eucalyptus cneorifolia</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus rugosa</i> mid open mallee forest over <i>Melaleuca lanceolata</i> , <i>Acacia paradoxa</i> , <i>Choretrum glomeratum</i> var. <i>glomeratum</i> , <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC) shrubs over <i>Prostanthera aspalathoides</i> , <i>Correa</i> sp shrubs	CR	E	
KI1104	<i>Eucalyptus cneorifolia</i> , <i>Eucalyptus albopurpurea</i> , +/- <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , +/- <i>Eucalyptus cosmophylla</i> mid mallee woodland over <i>Melaleuca uncinata</i> (NC), <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC), <i>Allocasuarina striata</i> , <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , <i>Allocasuarina muelleriana</i> ssp. <i>notocolpica</i> shrubs over <i>Thryptomene ericaea</i> , <i>Correa</i> sp, <i>Grevillea lavandulacea</i> ssp. <i>rogersii</i> , <i>Adenanthos terminalis</i> shrubs	CR	E	
KI1106	<i>Eucalyptus cneorifolia</i> , <i>Eucalyptus albopurpurea</i> , <i>Eucalyptus phenax</i> ssp. <i>compressa</i> , +/- <i>Eucalyptus cosmophylla</i> , +/- <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> mid mallee woodland over <i>Melaleuca uncinata</i> (NC), <i>Thryptomene ericaea</i> , <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC), <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , +/- <i>Callistemon rugulosus</i> var. <i>rugulosus</i> (NC) shrubs over <i>Correa</i> sp shrubs	CR	E	
KI1107	<i>Eucalyptus cneorifolia</i> , <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> , <i>Eucalyptus cosmophylla</i> , <i>Eucalyptus albopurpurea</i> , <i>Eucalyptus fasciculosa</i> mid mallee woodland over <i>Melaleuca brevifolia</i> , <i>Melaleuca gibbosa</i> , <i>Acacia calamifolia</i> (NC), <i>Callistemon rugulosus</i> var. <i>rugulosus</i> (NC), <i>Hakea rugosa</i> shrubs	CR	E	
KI1109	<i>Eucalyptus cneorifolia</i> , <i>Eucalyptus albopurpurea</i> , <i>Eucalyptus phenax</i> ssp. <i>compressa</i> , +/- <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> mid mallee woodland over <i>Melaleuca uncinata</i> (NC), <i>Thryptomene ericaea</i> , <i>Grevillea ilicifolia</i> var. <i>ilicifolia</i> (NC), <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> , <i>Callistemon rugulosus</i> var. <i>rugulosus</i> (NC) shrubs over <i>Correa</i> sp shrubs	CR	E	
KI1201	<i>Myoporum insulare</i> , <i>Leucopogon parviflorus</i> , <i>Olearia axillaris</i> , <i>Acacia leiophylla</i> tall open shrubland over <i>Pimelea flava</i> ssp. <i>flava</i> , <i>Orthrosanthus multiflorus</i> , +/- <i>Acacia longifolia</i> ssp. <i>longifolia</i> , +/- <i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i> shrubs			RA
KI1304	<i>Melaleuca halmaturorum</i> , <i>Melaleuca brevifolia</i> , <i>Melaleuca lanceolata</i> low open woodland over <i>Melaleuca acuminata</i> ssp. <i>acuminata</i> , <i>Melaleuca gibbosa</i> , <i>Acacia paradoxa</i> , <i>Leucopogon parviflorus</i> shrubs over <i>Eutaxia microphylla</i> var. <i>microphylla</i> shrubs			



KI2001	<i>Leucopogon parviflorus</i> , <i>Olearia axillaris</i> , <i>Myoporum insulare</i> , +/- <i>Melaleuca lanceolata</i> , +/- <i>Acacia uncinata</i> mid open shrubland over <i>Kunzea pomifera</i> , <i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i> , <i>Pimelea flava</i> ssp. <i>flava</i> , <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> shrubs			RA
KI2201	<i>Melaleuca brevifolia</i> , <i>Melaleuca gibbosa</i> , +/- <i>Melaleuca halmaturorum</i> mid shrubland			RA
KI2301	<i>Melaleuca halmaturorum</i> , <i>Melaleuca brevifolia</i> tall open shrubland			RA
KI2302	<i>Melaleuca halmaturorum</i> , +/- <i>Melaleuca brevifolia</i> tall open shrubland over <i>Sclerostegia arbuscula</i> , <i>Suaeda australis</i> , <i>Sarcocornia blackiana</i> , <i>Sarcocornia quinqueflora</i> shrubs			RA
KI3501	<i>Allocasuarina muelleriana</i> ssp. <i>notocolpica</i> , +/- <i>Melaleuca uncinata</i> (NC), <i>Eucalyptus cneorifolia</i> , <i>Allocasuarina verticillata</i> tall shrubland over <i>Thryptomene ericaea</i> , <i>Acacia paradoxa</i> , <i>Calytrix tetragona</i> over <i>Hibbertia australis</i> shrubs			RA

Table 5- Vegetation Communities Recorded

Table 6 provides the native vegetation communities of each site to determine the variance to the Rare Plant Communities Principle. Section 5.1 describes the EPBC Act threshold criteria.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Vegetation Community	KI 1104	KI 3501	KI 1104		KI 1107	KI 1104	KI 1107
EPBC Act Threshold			YES				
AUS Status	CR		CR		CR	CR	CR
SA Status	E		E		E	E	E
KI Status	TH	RA	TH		TH	TH	TH
Variance to Principle	Seriously	Not	Seriously	Not	Seriously	Seriously	Seriously
	GG2		Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Vegetation Community	KI 1103	KI 2302	KI 1304	KI 1103	KI 2302	KI 2302	KI 0802
EPBC Act Threshold				YES			
AUS Status	CR			CR			
SA Status	E			E			
KI Status	TH	RA		TH	RA	RA	TH
Variance to Principle	Seriously	Not	Not	Seriously	Not	Not	Not
	XX1		Segment WW				
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Vegetation Community	KI 1104	KI 1109	KI 0212	KI 1201	KI 2301	KI 1104	KI 0212
EPBC Act Threshold	YES					YES	
AUS Status	CR	CR				CR	
SA Status	E	E				E	
KI Status	TH	TH	TH	RA	RA	TH	TH
Variance to Principle	Seriously	Seriously	Not	Not	Not	Seriously	Not
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Vegetation Community	KI 1104	KI 1104	KI 1106	KI 0206	KI 1104	KI 0212	KI 1104
EPBC Act Threshold	YES	YES	YES		YES		YES
AUS Status	CR	CR	CR		CR		CR
SA Status	E	E	E		E		E
KI Status	TH	TH	TH		TH	TH	TH
Variance to Principle	Seriously	Seriously	Seriously	Not	Seriously	Not	Seriously
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Vegetation Community	KI 1104	KI 0215	KI 0210	KI 2201	KI 1103	KI 1106	KI 1104
EPBC Act Threshold	YES				YES	YES	
AUS Status	CR				CR	CR	CR
SA Status	E				E	E	E
KI Status	TH	TH	RA	RA	TH	TH	TH
Variance to Principle	Seriously	Not	Not	Not	Seriously	Seriously	Seriously
	Segment UU			Segment TT			



	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Vegetation Community	KI 1107	KI 1104	KI 0215	KI 0206	KI 0204	KI 0406	KI 1201
EPBC Act Threshold	YES						
AUS Status	CR	CR					
SA Status	E	E					
KI Status	TH	TH	TH			RA	RA
Variance to Principle	Seriously	Seriously	Not	Not	Not	Not	Not
	Segment SS3		SS2				
	Site 1	Site 2	Site 1				
Vegetation Community	KI 1201	KI 0220	KI 2001				
EPBC Act Threshold							
AUS Status							
SA Status							
KI Status	RA	RA	RA				
Variance to Principle	Not	Not	Not				

Table 6- Native Vegetation Communities Assessment

Note- The shaded sites have NO clearance proposed.

Moderating Factors

The proposed clearance will not have a significant impact on threatened plant communities as the amount of clearance is minimal and, as the majority of the vegetation is “leaning” over the worksite, most of the clearance will not require removal of vegetation.

The clearance will not have a significant impact on the Nationally Threatened Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community due to the small amount of clearance, Section 6. The clearance is also less than 10% of each vegetation community.

3.5 Remnancy- Principle e

Table 7 provides the Environmental Association Remnancy data and Total Biodiversity Score to determine the variance to the Remnancy Principle.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
IBRA Association	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet
Remnancy	27	27	27	27	27	27	27
Total Biodiversity Score	0.82	0.00	2.53	0.00	0.00	0.00	2.55
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
IBRA Association	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet	Cygnet
Remnancy	27	27	27	27	27	27	27
Total Biodiversity Score	0.00	0.00	0.00	4.97	0.00	0.00	0.00
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	XX1	Segment WW					
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
IBRA Association	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley
Remnancy	21	21	21	21	21	21	21
Total Biodiversity Score	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
IBRA Association	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley
Remnancy	21	21	21	21	21	21	21



Total Biodiversity Score	0.00	0.00	3.87	0.34	0.97	0.61	1.39
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
IBRA Association	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley	Amberley
Remnancy	21	21	21	21	21	21	21
Total Biodiversity Score	1.66	6.90	0.82	3.99	3.00	1.99	2.75
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	Segment UU		Segment TT				
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
IBRA Association	Amberley	Amberley	Amberley	Amberley	Gantheaume	Gantheaume	Gantheaume
Remnancy	21	21	21	21	88	88	88
Total Biodiversity Score	4.63	3.43	0.90	2.85	5.16	4.12	4.29
Variance to Principle	Not	Not	Not	Not	Not	Not	Not
	Segment SS3		SS2				
	Site 1	Site 2	Site 1				
IBRA Association	Gantheaume	Gantheaume	Gantheaume				
Remnancy	88	88	88				
Total Biodiversity Score	6.66	3.06	2.95				
Variance to Principle	Not	Not	Not				

Table 7- Remnancy Assessment

Note- The shaded sites have NO clearance proposed.

Moderating Factors

The vegetation is of good quality therefore not applicable.

3.6 Wetland- Principle f

The definition of a wetland, for the purpose of this principle is-

- land permanently or temporarily underwater or waterlogged that must have surface water or waterlogging of sufficient frequency and/or duration to effect the biota; and/or
- if the area is defined on 1:50,000 series topographic map as either a perennial or intermittent lake or land subject to inundation.

Table 8 assesses the impact on the sites identified as a wetland to determine the variance to the Wetland Principle.

	XX2	XX1
	Site 3	Site 1
Significant Impact	No	No
Quality of Wetland	Good	Good
Area of Impact	0.00 ha	0.00 ha
Variance to Principle	At	At

Table 8- Wetland Assessment

Note- The shaded sites have NO clearance proposed.

Moderating Factors

The proposed clearance will not have a significant impact on the wetland and a Water Affecting Activity Permit has been obtained.

3.7 Amenity- Principle g

The Amenity Principle is assessed utilising the following criteria.

1	Location of the trees
----------	-----------------------



	<ul style="list-style-type: none"> e.g. near a township, adjacent to a main road or tourist route
2	Cultural or historical values and local community views
3	Number and distribution of trees to be cleared <ul style="list-style-type: none"> how many trees will be retained? would removal of the trees change the landscape character?
4	Species and size of trees <ul style="list-style-type: none"> large trees generally have more impressive landscape quality red gums, because of their size, are often considered of high landscape value
5	Condition and shape <ul style="list-style-type: none"> trees suffering extensively from dieback are not generally aesthetically pleasing well-shaped trees may be considered of greater landscape quality.

Table 9 assesses the amenity value of the proposed clearance area to determine the variance to the Amenity Principle.

Location of Trees	Where clearance occurs the distance between the white post and the native vegetation will be increase to 1m The proposed clearance will in effect widen the existing road envelop by a maximum of 0.5m.
Cultural Value	No cultural or historical values
Number and Distribution	Up to a 0.5m strip will be removed
Species and size	As described in this report
Condition	Good quality vegetation and species diversity
Variance to Principle	Not

Table 9- Amenity Assessment



4.0 ADDRESSING THE LEGISLATION

The *Native Vegetation Act 1991* regulates the clearance of native vegetation in South Australia. Applications to clear native vegetation are considered by the Native Vegetation Council under-
Section 28 of the *Native Vegetation Act*; or
Division 5 of the *Native Vegetation Regulations 2017*.

Regulation 12(34) Infrastructure of the *Native Vegetation Regulations 2017* has been determined to be the most appropriate assessment for the clearance for the proposed pipeline.

4.1 Regulation 12(34) “Infrastructure” of the *Native Vegetation Regulations 2017*

Table 10 is the assessment of the proposed clearance for the pipeline under Regulation 12(34).

Clearance incidental to the construction or expansion of a building or infrastructure where it is deemed the clearance is in the public interest; and	Clearance will be a maximum of 0.5m beyond the white post. Clearance will only occur where absolutely necessary and cannot be avoided.
Clearance is required in connection with the provision of infrastructure or services to a building or place provided that consent under the Development Act 1993 has been obtained; and/or	The installation is a SA Water Pipeline that is essential for the delivery of potable water to the Kangaroo Island Community. Development consent is not required
Clearance is undertaken in accordance with an NVC- approved Standard Operating Procedure	As required and described within this report.

Table 10- Regulation 12(34) Assessment

4.2 Risk Assessment

Table 11 undertakes a Risk Assessment of the clearance for the KI Pipeline.

Total Biodiversity Score	77.43
Clearance Area (ha)	1.14
Seriously at variance to Clearance Principle	a, b, c, d
Risk Level	4

Table 11- Risk Assessment

Moderating Factors

The Risk Assessment of the proposed clearance for the pipeline is influenced by the following factors-

- The clearance is a maximum of 0.5m wide;
- 19 sites have 0ha clearance;
- Moderating factors outlined in Section 3.0;
- The application is considered “worst case scenario”; and
- The clearance is along a major road.

4.3 Area of Impact

A total of 1.14 ha, Table 11, maybe cleared as a result of the construction of the pipeline. 0ha of clearance is proposed on 19 of the 45 sites.



Table 12 outlines the area of impact for the proposed clearance for the KI Pipeline.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Clearance Area (ha)	0.01	0.00	0.03	0.00	0.00	0.00	0.04
	GG2		Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Clearance Area (ha)	0.00	0.00	0.00	0.05	0.00	0.00	0.00
	Segment WW						
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Clearance Area (ha)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Clearance Area (ha)	0.00	0.00	0.046	0.0075	0.013	0.011	0.017
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Clearance Area (ha)	0.02	0.096	0.014	0.067	0.0355	0.0255	0.036
	Segment UU			Segment TT			
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Clearance Area (ha)	0.0605	0.0465	0.015	0.052	0.075	0.065	0.0775
	Segment SS3		SS2	TOTAL			
	Site 1	Site 2	Site 1				
Clearance Area (ha)	0.121	0.049	0.06	1.14			

Table 12- Area of Impact

Note- The shaded sites have NO clearance proposed.

4.4 Mitigation Hierarchy

4.4.1 Avoidance

As a rule, clearance of native vegetation during the construction of the pipeline will be avoided where possible. The following general constraints have been placed on the project which will make total avoidance of clearance unachievable-

- DPTI have stated the pipeline must be installed between the white post and the vegetation; and
- Telstra services, optical fibre primarily, is located on the south side of road.

As a result of the above, the pipeline will be installed on the north side of the road however if difficulties occur it can be positioned on the south side.

The construction methodology, detailed in Appendix 1, has been developed to minimise the clearance required. The methodology has the following characteristics-

- Materials will be stored on existing cleared areas;
- The trench will be excavated with a "off set" trencher- the excavation will occur behind the wheel of the machine closest to the vegetation;
- The excavated material will be placed on the road;
- The trench will be open for minimal time;
- The pipeline will be covered and excavated material tidied as quickly as possible as the project proceeds; and
- Worksite tidy up will occur as the project proceeds and as a result there will be no need to return to the site.

As a result of the above, a cleared area of 1m on the vegetation side of the white post is all that is required. No clearance will occur where-



- The cleared area between the white post and the vegetation is greater than 1m; and
- Where an alternate pathway through the vegetation occurs.

4.4.2 Minimisation

The installation of the pipeline requires 1m of clearance on the vegetation side of the white post. The vegetation is generally “leaning over” this area and will not require full removal. The majority of the clearance will be trimmed of the vegetation to achieve the 1m work zone.

There is some flexibility to where the pipeline is installed within the 1m work zone and the pipeline does not need to be installed in a “straight line”. As a result it is possible, in many cases, to avoid significant plant species and communities. Significant plant species and populations will be flagged ahead of the excavation crews to enable avoidance where possible.

4.4.3 Rehabilitation and Restoration

The pipeline is required to be installed in accordance with SA Water Specifications. These specifications stipulate how the pipe must be backfilled within the trench. These specifications allow for some of the original material to be returned. This also prevents material being taken off-site.

The reinstatement of the pipeline trench will include placing the excavated top soil back on top of the trench. The top soil will be excavated and placed on the road (as described above) and then returned to the trench after a minimum amount of time. The trench will be closed each night.

Trimmed vegetation will be [placed over the trench, following reinstatement, where possible and the vegetation will be left in a state that reflects good road verge management, similar to what is achieved along Hog Bay Road by DPTI.

As an additional backup, seed from a number of significant plant species has been collected and propagation of these plants has commenced. These will be planted on site following completion of construction and at the appropriate time of year. Some seed will also be scattered over the backfilled trench following reinstatement.

4.4.4 Offset

A payment to the native vegetation fund will be made as an offset, refer Section 5.0 for calculations.

The proponents of the pipeline have negotiated with the Native Vegetation Council, in line with SA Water requirements, that the Significant Environmental Benefit, if required, will be based on actual clearance undertaken. To achieve this the following will occur-

1. Prior to any clearance occurring, the excavation contractor will consider alternatives with site manager;
2. The extent of clearance will be determined prior to clearance;
3. Any significant species or communities will be located prior to clearance;
4. Actual clearance will be measured and documented;
5. Actual clearance will be entered into the Bushland Assessment Spreadsheets developed as part of the Flora Assessment related to this report;
6. Any clearance beyond calculated in this report, Section 4.3, reported to NVC; and
7. Final report detailing all clearance provided to NVC.



5.0 SIGNIFICANT ENVIRONMENTAL BENEFIT

5.1 SEB Obligation

The SEB Obligation for the installation of the pipeline has been calculated as follows-

Clearance Area (ha)	1.14
Total Biodiversity Score	77.21
SEB Points Required	81.33

The SEB Obligation for the proposed clearance for the installation of the pipeline has been calculated as follows, Table 13-

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Clearance Area (ha)	0.01	0.00	0.03	0.00	0.00	0.00	0.04
Unit Biodiversity Score	81.65	52.14	84.29	34.74	70.88	71.13	63.64
Total Biodiversity Score	0.82	0.00	2.53	0.00	0.00	0.00	2.55
SEB Points Required	0.86	0.00	2.66	0.00	0.00	0.00	2.67
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Clearance Area (ha)	0.00	0.00	0.00	0.05	0.00	0.00	0.00
Unit Biodiversity Score	69.23	28.51	45.66	99.46	60.63	49.94	58.05
Total Biodiversity Score	0.00	0.00	0.00	4.97	0.00	0.00	0.00
SEB Points Required	0.00	0.00	0.00	5.22	0.00	0.00	0.00
	XX1	Segment WW					
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Clearance Area (ha)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unit Biodiversity Score	84.99	86.82	61.05	64.40	62.96	100.74	75.47
Total Biodiversity Score	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEB Points Required	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Clearance Area (ha)	0.00	0.00	0.046	0.0075	0.013	0.011	0.017
Unit Biodiversity Score	87.97	87.97	84.23	45.57	74.88	55.48	82.03
Total Biodiversity Score	0.00	0.00	3.87	0.34	0.97	0.61	1.39
SEB Points Required	0.00	0.00	4.07	0.36	1.02	0.64	1.46
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Clearance Area (ha)	0.02	0.096	0.014	0.067	0.0355	0.0255	0.036
Unit Biodiversity Score	82.76	71.86	58.73	59.55	84.59	77.94	76.46
Total Biodiversity Score	1.66	6.90	0.82	3.99	3.00	1.99	2.75
SEB Points Required	1.74	7.24	0.86	4.19	3.15	2.09	2.89
	Segment UU		Segment TT				
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Clearance Area (ha)	0.0605	0.0465	0.015	0.052	0.075	0.065	0.0775
Unit Biodiversity Score	76.48	73.72	60.18	54.89	66.56	63.38	55.40
Total Biodiversity Score	4.63	3.43	0.90	2.85	5.16	4.12	4.29
SEB Points Required	4.86	3.60	0.95	3.00	5.42	4.33	4.51
	Segment SS3		SS2	TOTAL			
	Site 1	Site 2	Site 1				
Clearance Area (ha)	0.121	0.049	0.06		1.14		
Unit Biodiversity Score	56.89	62.38	49.13				
Total Biodiversity Score	6.66	3.06	2.95		77.21		
SEB Points Required	7.23	3.21	3.10		81.33		



Table 13- SEB Obligation

Note- The shaded sites have NO clearance proposed.

5.2 Achieving a SEB

The proponents of the pipeline have negotiated with the Native Vegetation Council, in line with SA Water requirements, that the Significant Environmental Benefit, if required, will be based on actual clearance undertaken. At this stage the proposal is for a payment to the Native Vegetation Fund.

Based on the estimated clearance of 1.14ha, the amount to achieve the SEB is as follows-

Hectares Required	10.15
OR	
Payment into the Fund	\$51,937.53
Administration Fee	\$2,867.48

The Significant Environmental Benefit for the clearance under Regulation 12(34) has been calculated as follows, Table 14.

	Segment GG1					GG2	
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 1	Site 2
Hectares Required	0.11	0.00	0.33	0.00	0.00	0.00	0.33
OR							
Payment into the Fund	\$507.95	\$0.00	\$1,573.18	\$0.00	\$0.00	\$0.00	\$1,583.59
Administration Fee	\$27.94	\$0.00	\$86.52	\$0.00	\$0.00	\$0.00	\$87.10
	GG2	GJC	Segment XX2			XX1	
	Site 3	Site 1	Site 1	Site 2	Site 3	Site 1	Site 2
Hectares Required	0.00	0.00	0.00	0.65	0.00	0.00	0.00
OR							
Payment into the Fund	\$0.00	\$0.00	\$0.00	\$3,093.74	\$0.00	\$0.00	\$0.00
Administration Fee	\$0.00	\$0.00	\$0.00	\$170.16	\$0.00	\$0.00	\$0.00
	XX1	Segment WW					
	Site 3	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Hectares Required	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR							
Payment into the Fund	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Administration Fee	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	WW		Segment VV				
	Site 7	Site 8	Site 1	Site 2	Site 3	Site 4	Site 5
Hectares Required	0.00	0.00	0.51	0.04	0.13	0.08	0.18
OR							
Payment into the Fund	\$0.00	\$0.00	\$2,573.14	\$226.99	\$646.52	\$405.27	\$926.13
Administration Fee	\$0.00	\$0.00	\$141.52	\$12.48	\$36.56	\$22.29	\$50.94
	Segment VV						
	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
Hectares Required	0.22	0.91	0.11	0.52	0.39	0.26	0.36
OR							
Payment into the Fund	\$1,099.30	\$4,581.24	\$546.09	\$2,649.72	\$1,994.42	\$1,319.98	\$1,828.00
Administration Fee	\$60.46	\$251.97	\$30.03	\$145.73	\$109.69	\$72.60	\$100.54
	Segment UU			Segment TT			
	Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	Site 5
Hectares Required	0.61	0.45	0.12	0.37	0.68	0.54	0.56
OR							
Payment into the Fund	\$3,151.84	\$2,336.22	\$629.07	\$1,989.11	\$3,596.23	\$2,871.06	\$2,992.46
Administration Fee	\$173.36	\$128.44	\$34.60	\$109.40	\$197.74	\$157.91	\$164.59



	Segment SS3		SS2	TOTAL		
	Site 1	Site 2	Site 1			
Hectares Required	0.90	0.40	0.39	10.15		
OR						
Payment into the Fund	\$4,725.43	\$2,098.28	\$1,992.57	\$51,937.53		
Administration Fee	\$269.90	\$115.41	\$109.60	\$2,867.48		

Table 14- Significant Environmental Benefit

Note- The shaded sites have NO clearance proposed.

Following completion of construction, NVC will be provided with a full report detailing the extent of the clearance and SEB obligations.



6.0 EPBC ACT

The *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* is Commonwealth legislation that protects national environmental matters. Actions that have, or are likely to have, a “significant impact” on a matter of national environmental significance require approval from the Australian Government Minister for the Environment.

6.1 Threatened Ecological Communities

Kangaroo Island has 2 listed nationally threatened ecological communities. The Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community was recorded during the Bushland Assessment.

The Conservation Advice for Kangaroo Island Narrow-leaved Mallee (*Eucalyptus cneorifolia*) Woodland under the *EPBC Act 1999* states the minimum condition of a patch, for the purposes of considering any potentially significant detrimental actions to the ecological community.

A patch of roadside vegetation, including native vegetation on the neighbouring properties, is protected under the *EPBC Act* as the Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community if the following criteria are met-

1. Kangaroo Island Narrow-leaved Mallee is the dominant or co-dominant species where a mature tree canopy occurs. Other species may be present in the tree canopy, as described in the canopy layer description, above, but are never dominant on their own. The tree canopy cover reaches up to 60-100% in long unburnt sites; **and**
2.
 - a. At that point, the shortest cross-sectional mature canopy width of the vegetation is 60 metres or more. Mature canopy width is measured from canopy edge to canopy edge, ignoring canopy breaks within the vegetation of up to 20 metres. This means that strips of the ecological community along each side of a road can effectively be treated as part of a single area of vegetation where the width of the roadside break is 20 metres or less; **or**
 - b. Where two separate areas of the ecological community at least 60 metres wide are connected by a narrow section of the ecological community, e.g. a strip along only one side of the road, the narrow section is included in the patch if it is more than five metres wide and less than 500 metres long (i.e. the separation between the two wide areas is less than 500 metres).

The Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community is considered of High Quality if the following criteria are also met-

3. The total continuous area of the ecological community is one hectare or more; **and**
4. The cover of non-indigenous plant species in the understorey layers is less than 50% of the total perennial cover of the understorey layers; **and**
5. Four or more native plant species are present above-ground in the understorey layers across the patch.

Nineteen sites, Table 6, along the survey route were identified as Kangaroo Island Narrow-leaved Mallee communities as part of the Bushland Assessment. Thirteen of these sites were determined to meet the Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community criteria.

Figure 2 shows the locations of the Kangaroo Island Narrow-leaved Mallee Woodland Ecological Community.



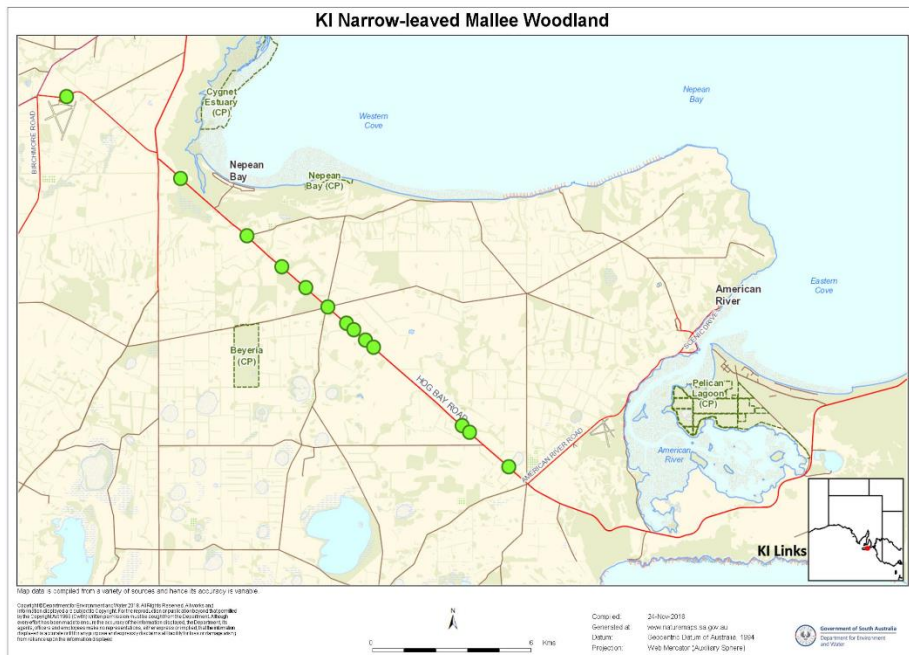


Figure 2- KI Narrow-leaved Mallee Woodland

6.1.1 Significant Impact Assessment

The Significant Impact Guidelines under the *EPBC Act 1999* provide the Significant Impact Criteria for Critically Endangered and Endangered Ecological Communities as follows-

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community;
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- adversely affect habitat critical to the survival of an ecological community;
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community’s survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
 - assisting invasive species, that are harmful to the listed ecological community, to become established, or;
 - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or;
- interfere with the recovery of an ecological community.

The relevant Significant Impact Guidelines in relation to Local Government also states-

- **Routine vegetation management** to maintain existing roads in or adjacent to a World Heritage property, a National Heritage place, a Ramsar wetland or a listed threatened species or ecological community would not normally be expected to have a significant impact on a matter of national environmental significance.



- A proposed **new road** through a World Heritage property, a National Heritage place, or a Ramsar wetland or a road that would require clearing of native vegetation that contains nationally listed threatened species or ecological communities is likely to be significant under the EPBC Act and should be referred to the minister. It will also be necessary to consider the environment of the Great Barrier Reef Marine Park if the proposed new road occurs immediately adjacent to the Great Barrier Reef Marine Park.
- Where **road verge maintenance** is carried out regularly (for example, every one or two years) it would not be expected to have a significant impact on a critically endangered or endangered plant species. On the other hand, if a population of a **critically endangered or endangered plant species** becomes established on a road verge (because the verge has not been graded or weeded for a number of years), then clearing that road verge is likely to have a significant impact on a matter of national environmental significance.
- **Widening an existing road** would not normally be expected to be significant under the EPBC Act where the road verge has previously been cleared or the vegetation beside the road has been heavily modified. However, if road widening would require removal of native vegetation that contains critically endangered or endangered plant species or ecological communities, it is likely to have a significant impact and should be referred to the minister.

As discussed throughout this report the proposed clearance for the proposed pipeline will consist of the following-

- Avoidance of clearance and significant species will occur where possible;
- Maximum of 0.5m on the vegetation side of the white post where the distance between the white post and vegetation is <1m;
- Primarily vegetation trimming will occur;
- No clearance beyond 1m between the vegetation and white post;
- Full reinstatement and tidy up will occur at the end of each day;
- Clearance will “look” like verge management when complete.

The proposed installation of the pipeline will not have a significant impact on the Kangaroo Island Narrow-leaved Mallee Woodland.

6.2 Threatened Plant Species

Kangaroo Island has 18 listed nationally threatened plant species. Four Nationally Threatened flora species were recorded along the proposed pipeline route, north side of road, Table 15.

Name	Status		
	AU	SA	KI
<i>Beyeria subtecta</i>	VU	E	EN
<i>Leionema equestre</i>	EN	E	EN
<i>Olearia microdisca</i>	EN	E	VU
<i>Spyridium eriocephalum</i> var. <i>glabrisepalum</i>	VU	E	EN

Table 15- Nationally Threatened Flora Species Recorded

118 populations of nationally threatened plant species consisting of four species, primarily *Beyeria subtecta*, were recorded along the KI Pipeline route, being the north side of the road. These populations are not necessarily within the proposed clearance zone, but within the vicinity of the proposed works.

Figure 3 shows the location of populations of Nationally Threatened Plant species.

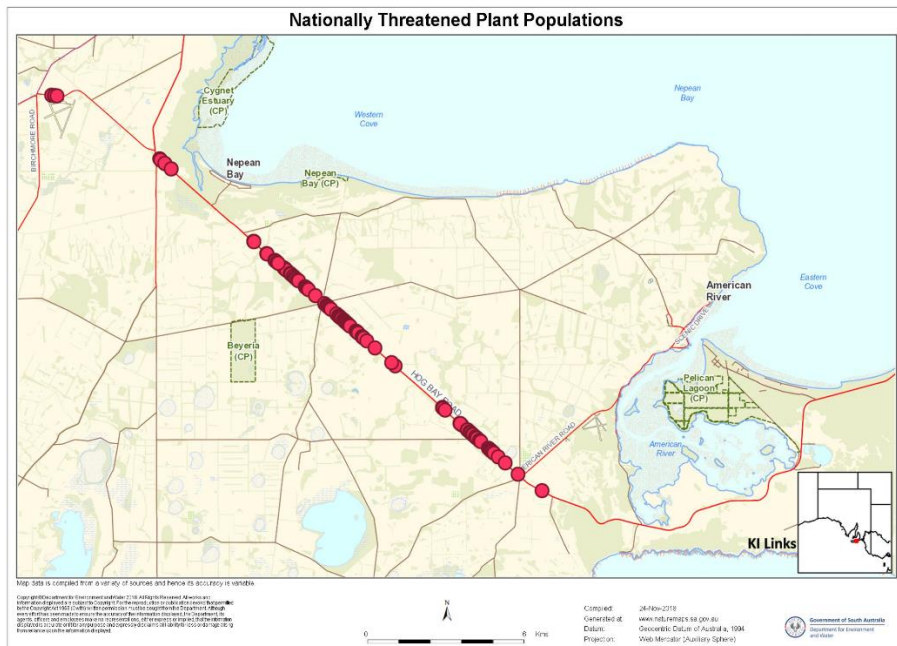


Figure 3- Nationally Threatened Plant Populations

6.2.1 Significant Impact Assessment

The Significant Impact Guidelines under the *EPBC Act 1999* provide the Significant Impact Criteria for Critically Endangered and Endangered Species as follows-

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

The relevant Significant Impact Guidelines in relation to Local Government, are provided in Section 6.1.1.

As discussed throughout this report the proposed clearance for the proposed pipeline will consist of the following-

- Avoidance of clearance and significant species will occur where possible;
- All nationally threatened plants will be located prior to commencement of works to assist in determining how to avoid;
- Maximum of 0.5m on the vegetation side of the white post where the distance between the white post and vegetation is <1m;
- Primarily vegetation trimming will occur;



- No clearance beyond 1m between the vegetation and white post;
- It is estimated <10 individual nationally threatened plants will be impacted by the construction;
- Full reinstatement and tidy up will occur at the end of each day;
- Clearance will “look” like verge management when complete.

The proposed installation of the pipeline will not have a significant impact on the Nationally Threatened plant species along the proposed pipeline route.

6.3 Threatened Fauna Species

Kangaroo Island has 14 listed nationally threatened terrestrial (excluding marine) fauna species. Nine nationally threatened terrestrial fauna species have been recorded with 5km of the site of the proposed pipeline, Table 16

Scientific Name	Common Name	Status		
		AU	SA	KI
BIRDS				
<i>Botaurus poiciloptilus</i>	Australian Bittern	EN	V	
<i>Calidris canutus</i>	Red Knot	EN		EN
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR		EN
<i>Calidris tenuirostris</i>	Great Knot	CR	R	EN
<i>Calyptorhynchus lathami halmaturinus</i>	Glossy Black Cockatoo	EN	E	EN
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V	CR
<i>Sternula nereis</i>	Fairy Tern	VU	E	CR
MAMMALS				
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (SA mainland and KI)	EN	V	
<i>Tachyglossus aculeatus multiaculeatus</i>	Short-beaked Echidna	EN		

Table 16- Nationally Threatened Terrestrial Fauna recorded within 5km

6.3.1 Significant Impact Assessment

The Significant Impact Guidelines under the *EPBC Act 1999* provide the Significant Impact Criteria for Critically Endangered and Endangered Species, 6.2.1 and relevant Significant Impact Criteria in relation to Local government, 6.1.1, relate to Nationally Threatened Fauna.

As discussed throughout this report the proposed clearance for the proposed pipeline will consist of the following-

- Avoidance of clearance;
- Maximum of 0.5m on the vegetation side of the white post where the distance between the white post and vegetation is <1m;
- Primarily vegetation trimming will occur;
- No clearance beyond 1m between the vegetation and white post;
- Works are along a major road;
- Full reinstatement and tidy up will occur at the end of each day (no trench will be open at night);
- Clearance will “look” like verge management when complete.

The proposed installation of the pipeline will not have a significant impact on the Nationally Threatened fauna species recorded near the proposed pipeline route.

7.0 RECOMMENDATION

1. Proposed clearance for the installation of the KI Pipeline be approved under Regulation 12(34) of the *Native Vegetation Regulations 2017*.
2. The Significant Environmental Benefit be determined based on actual clearance from the construction phase of the project.



8.0 BIBLIOGRAPHY

Atlas of Living Australia, <http://www.ala.org.au/>

Baxter, C. (2015) *Birds of Kangaroo Island: a photographic field guide*, ATF Ltd.

Biosecurity SA (2015) *Declared Plants of South Australia 2015*,
http://pir.sa.gov.au/biosecurity/weeds_and_pest_animals/plant_pests_in_south_australia/plant_policies

Commonwealth of Australia (2013) *Matters of National Environmental Significance- Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment.

Commonwealth of Australia (2014) *Kangaroo Island Narrow-leaved Mallee (Eucalyptus cneorifolia) Woodland: a nationally-protected ecological community*. Department of the Environment.

Department of Environment and Heritage (2001) *Provisional List Of Threatened Ecosystems Of South Australia*, (in progress) unpublished and provisional list.

Department of Environment, Water and Natural Resources, *Kangaroo Island Floristic Vegetation Mapping*

Department of Environment, Water and Natural Resources *NatureMaps*
<https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx>

Environment Protection and Biodiversity Conservation Act (1999) *Conservation Advice for Kangaroo Island Narrow leaved Mallee (Eucalyptus cneorifolia) Woodland*

Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments*, Kangaroo island NRM Region. Department of Environment, Water and Natural Resources South Australia.

Haby, M (2011) *Stokes Bay Road Kangaroo Island Roadside Vegetation Assessment*, Internal report to Kangaroo Island Council.

Haby, M and Rowley, D.J. (2013) *Native Vegetation Assessment- Eastern Ring Route*, Internal report to Kangaroo Island Council.

Haby, M and Rowley, D.J. (2015) *Native Vegetation Assessment- Springs Road*, Internal report to Kangaroo Island Council.

Haby, M and Rowley, D.J. (2016) *Native Vegetation Assessment Bomb Alley*, Internal Vegetation Survey to Natural Resources Kangaroo Island.

Haby, M and Rowley, D.J. (2016) *Pelican Lagoon Closed Road SEB Hectares*, Internal report to Kangaroo Island Council.

Haby, M and Rowley, D.J. (2017) *Native Vegetation Assessment- North Coast Road (Stokes Bay Road to Pratts Road)*, Internal report to Kangaroo Island Council.



Haby, M and Rowley, D.J. (2017) *Native Vegetation Assessment- North Coast Road (Johncock Road to Playford Highway)*, Internal report to Kangaroo Island Council.

Haby, M and Rowley, D.J. (2018) *Kangaroo Island Roadside Vegetation Surveys*, Internal report to Department for Environment and Water.

Jessop, J., Dashorst, GRM, and James, FM (2006) *Grasses of South Australia- An illustrated guide to the native and naturalised species*, Wakefield Press.

Kangaroo Island Flora and Fauna Club Inc (2017) *Native Orchids of Kangaroo Island- A Field Guide* Griffin Press

Milne, T and McCallum (2012) *Bushland Condition Monitoring Manual: Benchmark Communities for Kangaroo Island*, Nature Conservation Society of South Australia

Native Vegetation Council *Threatened Fauna Habitats* Spreadsheet, http://www.environment.sa.gov.au/managing-natural-resources/native-vegetation/Managing_native_vegetation/BushRAT

Native Vegetation Council (2017) *Guide for Applications to Clear Native Vegetation*, Native Vegetation Council, Government of South Australia

Native Vegetation Council (2017) *Guide to the Native Vegetation Regulations 2017*, Native Vegetation Council, Government of South Australia

Native Vegetation Council (2017) *Policy for Significant Environmental Benefit*, Native Vegetation Council, Government of South Australia

Native Vegetation Council (2017) *Guide for Calculating Significant Environmental Benefit*, Native Vegetation Council, Government of South Australia

Native Vegetation Council (2017) *Native Vegetation Council (NVC) Scattered Tree Assessment Manual*, Native Vegetation Council, Government of South Australia

Native Vegetation Council (2017) *Native Vegetation Council (NVC) Bushland Assessment Manual*, Native Vegetation Council, Government of South Australia

Overton, B and D (2012) *Discover Kangaroo Island's Native Plants*, Environmental Realist.

Willoughby, N, Oppermann, A., Innes, R.W. (2001) *Biodiversity Plan for Kangaroo Island, South Australia*, Department for Environment and Heritage, South Australia



APPENDIX 1 KI PIPELINE METHODOLOGY

Works Methodology Statement 300mm Pipeline Cygnet River to Pelican Lagoon (KI Links) Pipeline- Stage 1

Background: This project is specifically about the construction of the pipeline, information about how the pipeline will be constructed and the requirements for the construction program.

The pipeline will be established between the corner of Arranmore Road and Playford Highway and the proposed Kangaroo Island Links project near Pelican Lagoon. The pipeline is a joint venture between a number of developers and SA Water. Once completed the pipeline will become a SA Water asset and be maintained by SA Water.

Approvals required:

Kangaroo Island Council:

Permit to install a pipeline in a road reserve- RECEIVED

DPTI:

Approval to install an SW Water pipeline within a DPTI road

Native Vegetation:

Clearance Assessment will be completed by mid-November 2018 to lodge a Clearance Application with Native Vegetation Council

Water Affecting Activities

Each watercourse was identified and an appropriate crossing methodology assigned- Permit RECEIVED from NRKI.

Location: Detailed plans have been provided for the proposed location of the pipeline within the road reserve. The pipeline will be installed within 1m beyond the white post but may come closer to the road or further away depending on vegetation and other construction constraints. The pipeline will generally be on the "north side" of the road avoiding Telstra and other services which are mostly on the "south side".

Community Benefit: Stage 1 of the pipeline will be designed to include, as a minimum-

- Connection point for the Airport on Arranmore Road;
- Connection point for Nepean Bay at intersection of Hog Bay Road and Western Cove Road;
- Connection point for American River at intersection of Muston Road and Hog Bay Road;
- Four Standpipes for CFS and community use.

Project Timeline:

Mobilization-	January 2019
Materials to Site-	January 2019
Construction-	From February/March 2019 for 3-6 months

Construction Communication Strategy: A strategy for communicating to the public will be developed in partnership with KIC and include Islander Newspaper articles and mail outs. An outline of the strategy is as follows-

- Newspaper article about 6 weeks prior to commencement to advise construction will occur;
- Mail out and newspaper article about 2 weeks prior to commencement to advise of detailed work program timelines;
- Ongoing progress reports in newspaper primarily;
- Mail out and newspaper articles on completion.

Above is a draft proposal that will be discussed with KIC on an ongoing basis.

Pre Start works:

DBYD plans printed and Assets located: Specialist Telstra Asset locator to be employed. Proving of Fiber Optic and pits in construction zone uncovered.



Pipeline Set out to be in conjunction with Asset location and Foliage removal minimization strategy, refer DPTI and/or DEW approvals.

Traffic Management: Detailed plan to be lodged and approved by DPTI and KIC. Strategy to isolate one lane with appropriate barricade for a distance of 100m. Remote controlled lights either end to share one- lane traffic. It is anticipated to have three construction crews therefore three sections along route to be affected. Construction will occur outside busy visitor periods where possible.

Deliveries: Roadside storage of pipe packs and fittings will be pegged and KIC and/or DPTI approval sought 7 days prior to deliveries.

Transport of Sand: Sand bedding is to be supplied from a local source on the island. D'Estree Bay Sand Pit to supply approximately 300 truck movements.

Watercourses – EIP Template: Each water course will be identified, and the appropriate methodology assigned to enable a Water Affecting Activity Permit to be obtained.

Methodology of crossing of waterways will vary depending on the depth and type of structure. Standard SAW drawings show preferred methods however all methods will be in accordance with approved CEMMP. Most waterway crossings will have scour valves (flush valves) as per drawings. These can be pegged, and location approved by KIC and/or DPTI if required.

DPTI: Approvals and conformity of standard specifications.

Trenching to be open cut at 600mm Wide 900mm depth as per SAW Trench detail "WSCM – Section -03- Excavation- Embedment- and- Trench- Fill Drawing number 4005-30003-01, attached as part of this submission. Excavators with offset boom to be used for foliage sensitive areas. Material to be stock piled on Roadside. Material to be removed including any rock- laden material not suitable for back fill will be directly loaded via skid steer loaders into Tip trucks for removal. Trucks to also carry sand bedding material. Compaction to be performed by mechanical excavator mounted and hand operated models. Each section of pipe to be backfilled and cleared up prior to moving to next section

Testing: Pressure testing of pipe is to be completed in 1000m intervals as per SAW and consulting engineers approved procedures. The test results will be available to KIC and/or DPTI engineers if required.

Inspections: Will be performed as a combination of Consulting Engineers, SAW Inspectors and internet-based video recorded system.

Defects will be handled by SAW procedures however KIC and/or DPTI can request additional post rectification works direct with IM at any time during defects liability period (to be confirmed at 12 months) from practical completion date.

As Constructed plans: A local surveyor will be employed to compile drawings to SAW, DPTI, KIC and other government bodies standards.

Yours sincerely



Mark McIntosh
Mobile: 0409 823 826
Irrigation Management Pty Ltd
Making Water Work



APPENDIX 2 NATIVE PLANT SPECIES RECORDED

Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	VVV	VV	UU	TT	SS3	SS2
<i>Acacia cupularis</i>														
<i>Acacia euthycarpa</i>			RA											
<i>Acacia leiophylla</i>														
<i>Acacia longifolia</i> ssp. <i>sophorae</i>														
<i>Acacia myrtifolia</i>														
<i>Acacia paradoxa</i>														
<i>Acacia pycnantha</i>														
<i>Acacia spinescens</i>														
<i>Acacia triquetra</i>														
<i>Acacia uncifolia</i>														
<i>Acaena novae-zelandiae</i>														
<i>Acrotriche affinis</i>														
<i>Acrotriche depressa</i>														
<i>Acrotriche patula</i>														
<i>Adenanthos macropodanus</i>														
<i>Adenanthos terminalis</i>														
<i>Adriana quadripartita</i>														
<i>Allocasuarina muelleriana</i> ssp. <i>notocolpica</i>														
<i>Allocasuarina striata</i>														
<i>Allocasuarina verticillata</i>														
<i>Alyxia buxifolia</i>														
<i>Angianthus preissianus</i>														
<i>Astroloma conostephioides</i>														
<i>Astroloma humifusum</i>														
<i>Austrostipa</i> sp.														
<i>Baeckea ericaea</i>														
<i>Banksia marginata</i>														
<i>Baumea juncea</i>														
<i>Bertya rotundifolia</i>														
<i>Beyeria lechenaultii</i>														
<i>Beyeria subsecta</i>	VU	E	EN											
<i>Billardiera cymosa</i> ssp. <i>cymosa</i>			RA											
<i>Billardiera uniflora</i>														
<i>Billardiera versicolor</i>														
<i>Boronia coerulescens</i> ssp. <i>coerulescens</i>			RA											
<i>Boronia filifolia</i>														
<i>Brachyloma ericoides</i> ssp. <i>bicolor</i>														
<i>Bulbine semibarbata</i>														
<i>Burchardia umbellata</i>														
<i>Caladenia</i> sp.														
<i>Callistemon rugulosus</i>														
<i>Callitris gracilis</i>														
<i>Callitris rhomboidea</i>														
<i>Calytrix glaberrima</i>														
<i>Calytrix tetragona</i>														
<i>Carpobrotus rossii</i>														
<i>Cassinia complanata</i>														
<i>Cassytha glabella</i> f. <i>dispar</i>														
<i>Cassytha melantha</i>														



Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Cassytha pubescens</i>														
<i>Choretrum glomeratum</i>														
<i>Chorizandra enodis</i>														
<i>Clematis microphylla</i>														
<i>Comesperma volubile</i>														
<i>Correa backhouseana</i> var. <i>orbicularis</i>		R												
<i>Correa reflexa</i> var. <i>insularis</i>														
<i>Correa reflexa</i> var. <i>reflexa</i>														
<i>Cotula vulgaris</i> var. <i>australasica</i>														
<i>Cyphanthera myosotidea</i>			RA											
<i>Dampiera lanceolata</i> var. <i>insularis</i>			RA											
<i>Daviesia asperula</i> ssp. <i>asperula</i>														
<i>Daviesia brevifolia</i>														
<i>Dianella brevicaulis</i>														
<i>Dianella revoluta</i> var. <i>revoluta</i>														
<i>Dichondra repens</i>														
<i>Dillwynia hispida</i>														
<i>Dillwynia sericea</i>														
<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>														
<i>Diuris orientis</i>														
<i>Dodonaea baueri</i>														
<i>Dodonaea hexandra</i>														
<i>Dodonaea humilis</i>														
<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>														
<i>Drosera macrantha</i> ssp. <i>planchonii</i>														
<i>Drosera</i> sp.														
<i>Einadia nutans</i> ssp. <i>nutans</i>														
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>														
<i>Epilobium billardierianum</i> ssp. <i>billardierianum</i>														
<i>Eremophila behriana</i>			VU											
<i>Eremophila glabra</i> ssp. <i>glabra</i>			VU											
<i>Eucalyptus albobupurea</i>														
<i>Eucalyptus cneorifolia</i>														
<i>Eucalyptus cosmophylla</i>														
<i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i>														
<i>Eucalyptus fasciculosa</i>		R												
<i>Eucalyptus leptophylla</i>			RA											
<i>Eucalyptus odorata</i>			RA											
<i>Eucalyptus phenax</i> ssp. <i>compressa</i>		R	RA											
<i>Eucalyptus rugosa</i>														
<i>Euphrasia collina</i> ssp. <i>tetragona</i>														
<i>Eutaxia diffusa</i>			RA											
<i>Eutaxia microphylla</i>														
<i>Ficinia nodosa</i>														
<i>Frankenia pauciflora</i> var. <i>gunnii</i>														
<i>Gahnia trifida</i>														
<i>Geranium potentilloides</i> var. <i>potentilloides</i>														
<i>Glischrocaryon behrii</i>														
<i>Gonocarpus meianus</i>														



Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Goodenia blackiana</i>														
<i>Goodenia varia</i>														
<i>Goodia medicaginea</i>														
<i>Grevillea halmaturina ssp. halmaturina</i>		R												
<i>Grevillea ilicifolia ssp. ilicifolia</i>														
<i>Grevillea muricata</i>		V	VU											
<i>Hakea mitchellii</i>														
<i>Hakea rostrata</i>														
<i>Hakea rugosa</i>														
<i>Hardenbergia violacea</i>			RA											
<i>Hibbertia devitata</i>														
<i>Hibbertia empetrifolia ssp. radians</i>														
<i>Hibbertia glebosa ssp. oblonga</i>		R												
<i>Hibbertia pallidiflora</i>														
<i>Hibbertia platyphylla ssp. halmaturina</i>														
<i>Hibbertia riparia</i>														
<i>Hibbertia virgata</i>														
<i>Hypolaena fastigiata</i>														
<i>Isopogon ceratophyllus</i>														
<i>Juncus bufonius</i>														
<i>Juncus pallidus</i>														
<i>Juncus subsecundus</i>			RA											
<i>Kunzea pomifera</i>														
<i>Lachnagrostis billardierei ssp. billardierei</i>														
<i>Lachnagrostis filiformis</i>														
<i>Lasiopetalum baueri</i>														
<i>Lasiopetalum discolor</i>														
<i>Lasiopetalum schulzenii</i>														
<i>Lawrenzia spicata</i>														
<i>Leonema equestre</i>	EN	E	EN											
<i>Lepidosperma canescens</i>														
<i>Lepidosperma viscidum</i>														
<i>Leptospermum continentale</i>														
<i>Leptospermum myrsinoides</i>														
<i>Leucopogon concurvus</i>														
<i>Leucopogon parviflorus</i>														
<i>Leucopogon rufus</i>														
<i>Leucopogon woodsii</i>														
<i>Logania linifolia</i>														
<i>Logania ovata</i>														
<i>Lomandra micrantha ssp. micrantha</i>														
<i>Lythrum hyssopifolia</i>														
<i>Maireana oppositifolia</i>														
<i>Melaleuca acuminata ssp. acuminata</i>														
<i>Melaleuca brevifolia</i>														
<i>Melaleuca gibbosa</i>														
<i>Melaleuca halmaturorum</i>														
<i>Melaleuca lanceolata</i>														
<i>Melaleuca uncinata</i>														



Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Micranthemum demissum</i>														
<i>Microtis arenaria</i>														
<i>Muehlenbeckia adpressa</i>														
<i>Muehlenbeckia gunnii</i>														
<i>Myoporum insulare</i>														
<i>Olearia axillaris</i>														
<i>Olearia microdisca</i>	EN	E	VU											
<i>Olearia ramulosa</i>														
<i>Olearia teretifolia</i>														
<i>Orthrosanthus multiflorus</i>														
<i>Petrophile multisecta</i>														
<i>Phyllanthus striaticaulis</i>														
<i>Phyllota pleurandroides</i>														
<i>Pimelea flava</i> ssp. <i>flava</i>														
<i>Pimelea glauca</i>														
<i>Pimelea octophylla</i>														
<i>Pimelea serpyllifolia</i> ssp. <i>serpyllifolia</i>														
<i>Pimelea stricta</i>														
<i>Platysace heterophylla</i> var. <i>tepperi</i>														
<i>Poa halmaturina</i>														
<i>Poa</i> sp.														
<i>Pomaderris obcordata</i>														
<i>Pomaderris paniculosa</i> ssp. <i>paralia</i>														
<i>Prostanthera aspalathoides</i>														
<i>Prostanthera chlorantha</i>		R												
<i>Pterostylis</i> sp.														
<i>Puccinellia perluxa</i>			RA											
<i>Pultenaea acerosa</i>														
<i>Pultenaea canaliculata</i>														
<i>Pultenaea penna</i>														
<i>Pultenaea tenuifolia</i>														
<i>Pultenaea teretifolia</i> var. <i>brachyphylla</i>			RA											
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>														
<i>Rytidosperma</i> sp.														
<i>Samolus repens</i>														
<i>Sarcocornia quinqueflora</i>														
<i>Scaevola linearis</i> ssp. <i>confertifolia</i>														
<i>Schoenus</i> sp.														
<i>Senecio odoratus</i>														
<i>Senecio quadridentatus</i>			RA											
<i>Senecio</i> sp.														
<i>Spergularia marina</i>														
<i>Sporobolus virginicus</i>														
<i>Spyridium eriocephalum</i> var. <i>glabrisepalum</i>	VU	E	EN											
<i>Spyridium halmaturinum</i>														
<i>Spyridium nitidum</i>														
<i>Spyridium spathulatum</i>			R											
<i>Stackhousia aspericocca</i> ssp. <i>Cylindrical inflorescence</i> (W.R.Barker 1418)														
<i>Stackhousia</i> sp.														



Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Styphelia exarrhena</i>				■						■				
<i>Suaeda australis</i>							■		■					■
<i>Tecticomia sp.</i>							■	■						■
<i>Templetonia retusa</i>											■	■		
<i>Tetragonia implexicoma</i>													■	■
<i>Thelymitra pauciflora</i>								■						
<i>Thomasia petalocalyx</i>					■		■	■	■	■	■			
<i>Threlkeldia diffusa</i>					■		■	■	■	■				■
<i>Thryptomene ericaea</i>				■	■		■	■	■	■	■			
<i>Thysanotus racemoides</i>												■		
<i>Triglochin striata</i>			RA							■				
<i>Vittadinia australasica var. australasica</i>									■	■				
<i>Vittadinia gracilis</i>										■		■	■	
<i>Westringia eremicola</i>			RA									■		
<i>Wilsonia rotundifolia</i>			RA		■	■								
<i>Xanthorrhoea semiplana ssp. tateana</i>		R		■	■			■	■	■	■	■		
<i>Zieria veronicea ssp. insularis</i>		R	RA							■				



APPENDIX 3 INTRODUCED PLANT SPECIES RECORDED

Name	Declared	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Acacia cyclops</i>												
<i>Acacia longifolia</i> ssp. <i>longifolia</i>												
<i>Aira</i> sp.												
<i>Anagallis arvensis</i>												
<i>Arctotheca calendula</i>												
<i>Argyranthemum frutescens</i> ssp. <i>frutescens</i>												
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	YES											
<i>Asparagus declinatus</i>	YES											
<i>Asphodelus fistulosus</i>												
<i>Atriplex prostrata</i>												
<i>Avena barbata</i>												
<i>Briza maxima</i>												
<i>Briza minor</i>												
<i>Bromus diandrus</i>												
<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>												
<i>Callitris</i> sp.												
<i>Carduus tenuiflorus</i>												
<i>Catapodium rigidum</i>												
<i>Cenchrus clandestinus</i>												
<i>Cerastium</i> sp.												
<i>Cotula coronopifolia</i>												
<i>Cynodon dactylon</i> var. <i>dactylon</i>												
<i>Cynosurus echinatus</i>												
<i>Dactylis glomerata</i>												
<i>Diplotaxis tenuifolia</i>	YES											
<i>Dipogon lignosus</i>												
<i>Echium plantagineum</i>												
<i>Ehrharta calycina</i>												
<i>Ehrharta longiflora</i>												
<i>Erodium moschatum</i>												
<i>Eucalyptus camaldulensis</i>												
<i>Eucalyptus</i> sp.												
<i>Euphorbia peplus</i>												
<i>Foeniculum vulgare</i>												
<i>Freesia cultivar</i>												
<i>Geranium molle</i> var. <i>molle</i>												
<i>Holcus</i> sp.												
<i>Hordeum vulgare</i>												
<i>Hypochaeris radicata</i>												
<i>Kickxia elatine</i> ssp. <i>elatine</i>												
<i>Lactuca</i> sp.												
<i>Lagurus ovatus</i>												
<i>Lavandula</i> sp.												
<i>Leontodon rhagadioloides</i>												
<i>Lolium</i> sp.												
<i>Lycium ferocissimum</i>	YES											
<i>Malva parviflora</i>												
<i>Marrubium vulgare</i>	YES											



Name	Declared	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
<i>Medicago sp.</i>												
<i>Oenothera stricta ssp. stricta</i>												
<i>Oxalis pes-caprae</i>	YES											
<i>Parapholis incurva</i>												
<i>Phalaris aquatica</i>												
<i>Phalaris sp.</i>												
<i>Picnomon acama</i>												
<i>Pinus sp.</i>												
<i>Piptatherum miliaceum</i>												
<i>Pittosporum undulatum</i>												
<i>Plantago coronopus ssp. commutata</i>												
<i>Plantago coronopus ssp. coronopus</i>												
<i>Plantago lanceolata var. lanceolata</i>												
<i>Plantago sp.</i>												
<i>Polygala myrtifolia</i>												
<i>Polypogon sp.</i>												
<i>Romulea rosea var. australis</i>												
<i>Rostraria cristata</i>												
<i>Rostraria sp.</i>												
<i>Rumex sp.</i>												
<i>Scabiosa atropurpurea</i>												
<i>Schinus molle</i>												
<i>Senecio pterophorus</i>												
<i>Solanum nigrum</i>												
<i>Sonchus asper ssp. asper</i>												
<i>Sonchus oleraceus</i>												
<i>Sporobolus africanus</i>												
<i>Thinopyrum elongatum</i>												
<i>Trifolium arvense var. arvense</i>												
<i>Trifolium glomeratum</i>												
<i>Urospermum picroides</i>												
<i>Vulpia sp.</i>												



APPENDIX 4 SIGNIFICANT WILDLIFE SPECIES

Scientific Name	Common Name	AU	SA	KI	GG1	GG2	GJC	XX2	XX1	WW	VV	UU	TT	SS3	SS2
BIRDS															
<i>Accipiter fasciatus</i>	Brown Goshawk			RA											
<i>Actitis hypoleucos</i>	Common Sandpiper	R	CR												
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		VU												
<i>Anas rhynchotis</i>	Australian Shoveler	R	RA												
<i>Anthochaera chrysoptera</i>	Little Wattlebird (KI)		RA												
<i>Apus pacificus</i>	Fork-tailed Swift		RA												
<i>Ardea alba</i>	Great Egret		RA												
<i>Ardea ibis</i>	Cattle Egret	R	RA												
<i>Arenaria interpres</i>	Ruddy Turnstone	R	EN												
<i>Biziura lobata</i>	Musk Duck	R	RA												
<i>Botaurus poiciloptilus</i>	Australian Bittern	EN	V												
<i>Burhinus grallarius</i>	Bush Stonecurlew	R													
<i>Calamanthus (Hylacola) cautus</i>	Shy Heathwren	R	RA												
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		VU												
<i>Calidris alba</i>	Sanderling	R	RA												
<i>Calidris canutus</i>	Red Knot	EN	EN												
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	EN												
<i>Calidris ruficollis</i>	Red-necked Stint		RA												
<i>Calidris tenuirostris</i>	Great Knot	CR	R	EN											
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo		V	RA											
<i>Calyptorhynchus lathami halmaturinus</i>	Glossy Black Cockatoo	EN	E	EN											
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	R	RA												
<i>Charadrius bicinctus</i>	Double-banded Plover		EN												
<i>Circus approximans</i>	Swamp Harrier		VU												
<i>Circus assimilis</i>	Spotted Harrier		RA												
<i>Cladorhynchus leucocephalus</i>	Banded Stilt		V												
<i>Egretta garzetta</i>	Little Egret	R	RA												
<i>Egretta sacra</i>	Eastern Reef Egret	R	RA												
<i>Eiaseyornis melanops</i>	Black-fronted Dotterel		RA												
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel		RA												
<i>Falco longipennis</i>	Australian Hobby		RA												
<i>Falco peregrinus</i>	Peregrine Falcon	R	VU												
<i>Gallinago hardwickii</i>	Latham's Snipe	R	CR												
<i>Gallirallus philippensis</i>	Buff-banded Rail		RA												
<i>Gallinago hardwickii</i>	Latham's Snipe	R	CR												
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	R	RA												
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher	R	RA												
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	E	CR												
<i>Hydroprogne caspia</i>	Caspian Tern		EN												
<i>Larus pacificus</i>	Pacific Gull		VU												
<i>Lewinia pectoralis</i>	Lewin's Rail	V	VU												
<i>Limosa lapponica</i>	Bar-tailed Godwit	R	CR												
<i>Melithreptus lunatus</i>	White-naped Honeyeater		RA												
<i>Mirafra javanica</i>	Horsfield's Bush Lark		RA												
<i>Myiagra inquieta</i>	Restless Flycatcher	R	VU												
<i>Neophema petrophila</i>	Rock Parrot	R	RA												
<i>Numenius madagascariensis</i>	Far Eastern Curlew	CR	V	CR											
<i>Numenius phaeopus</i>	Whimbrel	R	CR												
<i>Nycticorax caledonicus</i>	Nankeen Night Heron		VU												
<i>Pandion haliaetus</i>	Osprey	E	CR												
<i>Pelecanus conspicillatus</i>	Australian Pelican		VU												
<i>Phalacrocorax carbo</i>	Great Cormorant		RA												
<i>Platalea flavipes</i>	Yellow-billed Spoonbill		RA												
<i>Platalea regia</i>	Royal Spoonbill		RA												
<i>Pluvialis fulva</i>	Pacific Golden Plover	R	CR												
<i>Pluvialis squatarola</i>	Grey Plover		EN												
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet		RA												
<i>Stagonopleura bella</i>	Beautiful Fretail	R													
<i>Sterna hirundo</i>	Common Tern	R													
<i>Sterna nereis</i>	Fairy Tern	VU	E	CR											
<i>Stictonetta naevosa</i>	Freckled Duck		V	RA											
<i>Stipiturus malachurus halmaturinus</i>	Southern Emu Wren (KI ssp)	R	RA												
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		RA												
<i>Todiramphus sanctus</i>	Sacred Kingfisher		RA												
<i>Tringa brevipes</i>	Grey-tailed Tattler	R	CR												
<i>Tringa glareola</i>	Wood Sandpiper	R	CR												
<i>Tringa nebularia</i>	Common Greenshank		EN												
<i>Tumix varus</i>	Painted Buttonquail	R	EN												
<i>Vanellus tricolor</i>	Banded Lapwing		RA												
MAMMALS															
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (SA mainland and KI)	EN	V												
<i>Tachyglossus aculeatus multiaculeatus</i>	Short-beaked Echidna	EN													
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	R													
REPTILES															
<i>Liopholis multiscutata</i>	Bull Skink		RA												
<i>Menetia greyii</i>	Dwarf Skink		RA												
<i>Varanus rosenbergi</i>	Heath Goanna	V													



APPENDIX 5 SEGMENT PHOTOGRAPHS



Segment GG1



Segment GG2



Segment GJC



Segment XX2



Segment XX1



Segment WW





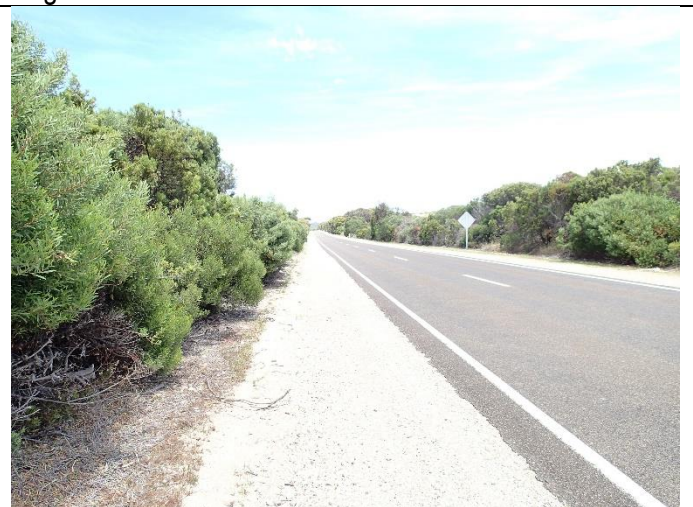
Segment VV



Segment UU



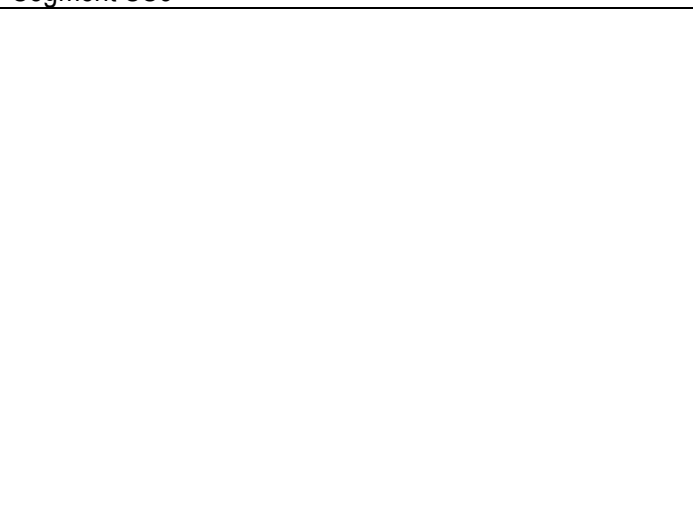
Segment TT



Segment SS3



Segment SS2



APPENDIX 6 BUSHLAND ASSESSMENT SUMMARIES

- There are 45 Bushland Assessment Spreadsheets
- This report summarises the outcomes of each Bushland Assessment
- The score page has been saved as .pdf of each spreadsheet including a photograph of each site with grid references
- The populations of significant plant species (Nationally Threatened, State Listed and Regionally Significant) have been provided to BDBSA for uploading- 815 records
- Bushland Assessment Spreadsheets have been provided electronically



APPENDIX 7 ROADSIDE SURVEY SUMMARIES

- There were 45 sites established over 11 segments
- The pipeline is only proposed on the north side of the road and all Bushland Assessments relate to the north side only
- The flora assessment was expanded to a Roadside Survey whereby the data from the south side was added to the north side data.
- The Roadside Survey Summaries are provided to provide a comprehensive understanding of the flora.

