



APPLICATION ON NOTIFICATION – ESSENTIAL INFRASTRUCTURE

Applicant:	ElectraNet Pty Ltd
Development Number:	921/V003/19
Nature of Development:	Construction of a new 275kV and 132kV overhead transmission line (and associated infrastructure) from Whyalla to Port Lincoln – the 'Eyre Peninsula Transmission Supply Project'.
Type of development:	Essential Infrastructure
Zone / Policy Area:	The transmission line alignment traverses the Remote Areas Zone of the Out of Council Area of the Planning and Development Code (under the new <i>Planning, Development and Infrastructure Act (PDI) 2016</i>); the Remote Areas Zone of the Whyalla Council Development Plan - Consolidated on 14 June 2017; the Primary Production Zone of the Franklin Harbour Council Development Plan - Consolidated on 11 February 2016; the Primary Production Zone of the Cleve Council Development Plan - Consolidated 23 April 2015; the Primary Production Zone and Water Protection Zone of the Tumby Bay (DC) Development Plan - Consolidated 6 March 2018; and the Primary Production Zone, Rural Living Zone and Water Protection Zone of the Lower Eyre Peninsula Council Development Plan - Consolidated 12 July 2018 (under the <i>Development Act 1993</i>).
Subject Land:	Various land parcels along a 270km long route alignment starting from the Cultana Substation (9km N of Whyalla) and heading SW to the Port Lincoln Substation. The majority of the route would follow an existing transmission line easement.
Contact Officer:	Lee Webb
Phone Number:	7109 7066
Start Date:	12 December 2019
Close Date:	Friday 24 January 2020
During the notification period, hard copies of the application documentation can be viewed at the Department of Planning, Transport and Infrastructure, Level 5, 50 Flinders Street, Adelaide during normal business hours. Application documentation may also be viewed during normal business hours at the Whyalla City Council (Civic Building, Darling Terrace, Whyalla), District Council of Franklin Harbour (6 Main Street, Cowell), District Council of Cleve (10 Main Street, Cleve), District Council of Tumby Bay (corner Mortlock Street and West Terrace, Tumby Bay) and the District Council of Lower Eyre Peninsula (32 Railway Terrace, Cummins).	

Written representations must be received by the close date (indicated above) and can either be posted, hand-delivered, faxed or emailed to the State Commission Assessment Panel (SCAP). A representation form is provided as part of this pdf document.

Any representations received after the close date will not be considered.

Postal Address: The Secretary State Commission Assessment Panel GPO Box 1815 ADELAIDE SA 5001	Street Address: Development Division Department of Planning, Transport and Infrastructure Level 5, 50 Flinders Street ADELAIDE
Email Address: scapreps@sa.gov.au	Fax Number: (08) 8303 0753

**PLANNING, DEVELOPMENT AND INFRASTRUCTURE ACT 2016, S.131 – ESSENTIAL INFRASTRUCTURE
REPRESENTATION ON APPLICATION**

Applicant:	ElectraNet Pty Ltd
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My name: _____

My phone number: _____

PRIMARY METHOD(S) OF CONTACT: Email address: _____

Postal address: _____

_____ Postcode _____

You may be contacted via your nominated PRIMARY METHOD(S) OF CONTACT if you indicate below that you wish to be heard in support of your submission.

- My interests are: owner of local property
 occupier of local property
 a representative of a company/other organisation affected by the proposal
 a private citizen

The address of the property affected isPostcode.....

The specific aspects of the application to which I make comment on are:

.....

.....

.....

- I wish to be heard in support of my submission
 do not wish to be heard in support of my submission
 (Please tick one)

- by appearing personally
 being represented by the following person :
 (Cross out whichever does not apply)

Date: Signature:

**Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 or
scapreps@sa.gov.au**



Government of South Australia

Department of Planning,
Transport and Infrastructure

PLANNING, DEVELOPMENT AND INFRASTRUCTURE ACT 2016

NOTICE OF APPLICATION FOR CONSENT TO DEVELOPMENT

SECTION 131 – ESSENTIAL INFRASTRUCTURE

Notice is hereby given that an application has been made by **ElectraNet Pty Ltd** for consent to construct a new 275kV and 132kV overhead transmission line (and associated infrastructure) from Whyalla to Port Lincoln – the 'Eyre Peninsula Transmission Supply Project'.

Development Number: 921/V003/19.

The proposed new line follows a 270 km long alignment adjacent to the existing 132kV transmission line corridor. The substations at Cultana, Yadnarie and Port Lincoln would be expanded or upgraded to incorporate new switchyards. Temporary workers camps and laydown areas (including compounds) would be required during construction.

The proposed development is located within land use planning zones established under two different pieces of legislation (namely the *Development Act 1993* and the *Planning, Development and Infrastructure Act 2016*), whereupon the *Planning, Development and Infrastructure (Transitional Provisions) Regulations 2017* applies to the further assessment of the proposal.

The transmission line alignment traverses the Remote Areas Zone of the Out of Council Area of the Planning and Development Code (under the new *Planning, Development and Infrastructure Act (PDI) 2016*); the Remote Areas Zone of the Whyalla Council Development Plan - Consolidated on 14 June 2017; the Primary Production Zone of the Franklin Harbour Council Development Plan - Consolidated on 11 February 2016; the Primary Production Zone of the Cleve Council Development Plan - Consolidated 23 April 2015; the Primary Production Zone and Water Protection Zone of the Tumby Bay (DC) Development Plan - Consolidated 6 March 2018; and the Primary Production Zone, Rural Living Zone and Water Protection Zone of the Lower Eyre Peninsula Council Development Plan - Consolidated 12 July 2018 (under the *Development Act 1993*).

The application may be examined during normal office hours at the office of the State Commission Assessment Panel (SCAP), Level 5, 50 Flinders Street, Adelaide and at the offices of the Whyalla City Council (Civic Building, Darling Terrace, Whyalla), the District Council of Franklin Harbour (6 Main Street, Cowell), the District Council of Cleve (10 Main Street, Cleve), the District Council of Tumby Bay (corner Mortlock Street and West Terrace, Tumby Bay) and the District Council of Lower Eyre Peninsula (32 Railway Terrace, Cummins). Application documentation may also be viewed on the SCAP website https://www.saplanningportal.sa.gov.au/public_notices.

Any person or body who desires to do so may make representations concerning the application by notice in writing delivered to the Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide SA 5001 **NOT LATER THAN Friday 24 January 2020**. Submissions may also be emailed to: scapreps@sa.gov.au.

Each person or body making a representation should state the reason for the representation and whether that person or body wishes to be given the opportunity to appear before the SCAP to further explain the representation.

Submissions may be made available for public inspection.

Should you wish to discuss the application and the public notification procedure please contact **Lee Webb** on **7109 7066** or lee.webb@sa.gov.au

Jessie Surinam

SECRETARY

STATE COMMISSION ASSESSMENT PANEL

PUBLISHED IN: Adelaide Advertiser & the Whyalla Times, Eyre Peninsula Tribune and Port Lincoln Times.

PUBLICATION DATE: Thursday 12 December 2019

SECTION 49 & 49A – CROWN DEVELOPMENT DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: SEE ATTACHED
 APPLICANT: ELECTRA NET
 ADDRESS: PO Box 7096 Hutt St PO
ADELAIDE SA 5000
 CROWN AGENCY: DEPT ENERGY + MINING

FOR OFFICE USE

DEVELOPMENT No: _____
 PREVIOUS DEVELOPMENT No: _____
 DATE RECEIVED: / /

CONTACT PERSON FOR FURTHER INFORMATION

Name: ALECIA WRIGHT
 Telephone: 0439758888 [work] _____ [Ah]
 Fax: _____ [work] _____ [Ah]
 Email: wright-alecia@electra.net.com.au

<input type="checkbox"/> Complying <input type="checkbox"/> Merit <input type="checkbox"/> Public Notification <input type="checkbox"/> Referrals	Decision: _____ Type: _____ Finalised: / /
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NOTE TO APPLICANTS:

(1) All sections of this form must be completed. The site of the development must be accurately identified and the nature of the proposal adequately described. If the expected development cost of this Section 49 or Section 49A application exceeds \$100,000 (excl. fit-out) or the development involves the division of land (with the creation of additional allotments) it will be subject to those fees as outlined in Item 1 of Schedule 6 of the *Development Regulations 2008*. Proposals over \$4 million (excl. fit-out) will be subject to public notification and advertising fees.
 (2) Three copies of the application should also be provided.

	Decision required	Fees	Receipt No	Date
Planning:	_____	_____	_____	_____
Land Division:	_____	_____	_____	_____
Additional:	_____	_____	_____	_____
Minister's Approval				

EXISTING USE: PRIMARY PRODUCTION, WATER PROTECTION, RURAL LIVING, REMOTE AREAS

DESCRIPTION OF PROPOSED DEVELOPMENT: CONSTRUCTION OF A 275 KV AND 132KV TRANSMISSION LINE AND ASSOCIATED SUBSTATION CONSTRUCTION AND UPGRADES

LOCATION OF PROPOSED DEVELOPMENT: SEE ATTACHED

House No: _____ Lot No: _____ Street: _____ Town/Suburb: _____
 Section No [full/part] _____ Hundred: _____ Volume: _____ Folio: _____
 Section No [full/part] _____ Hundred: _____ Volume: _____ Folio: _____

LAND DIVISION: N/A

Site Area [m²] _____ Reserve Area [m²] _____ No of existing allotments _____
 Number of additional allotments [excluding road and reserve]: _____ Lease: YES NO

DEVELOPMENT COST [do not include any fit-out costs]: \$ 300,000,000.00 (\$3m)

POWERLINE SETBACKS: Pursuant to Schedule 5 (2a)(1) of the *Development Regulations 2008*, if this application is for a building it will be forwarded to the Office of the Technical Regulator for comment unless the applicant provides a declaration to confirm that the building meets the required setback distances from existing powerlines. The declaration form and further information on electricity infrastructure and clearance distances can be downloaded from the DPLG website (www.dac.sa.gov.au).

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the *Development Act 1993*.

SIGNATURE: 

Dated: 8 / 11 / 2019

RECEIVED 27 JUN 2019



**Government
of South Australia**

Department for
Energy and Mining

Our Ref: D19051687

Mr Simon Appleby
Senior Manager, Regulation & Land Management
ElectraNet Pty Ltd
PO Box 7096
HUTT STREET OFFICE
ADELAIDE SA 5000

Dear Mr Appleby

EYRE PENINSULA REINFORCEMENT PROJECT CROWN SPONSORSHIP

I refer to your letter of 23 April 2019 regarding the request for support and specific endorsement pursuant to Section 49(2)(c) of the *Development Act 1993* (the Act) for the Eyre Peninsula Reinforcement Project.

As I understand, the previous sponsorship Crown sponsorship under Section 49 for the Project had lapsed as ElectraNet had not lodged a Development Application. I note that the Project has obtained regulatory approval from the Australian Energy Regulator (AER) on 11 April 2019 following completion of the Regulatory investment Test for Transmission Project Assessment Conclusions Report (PACR) in November 2018. I understand this has now provided ElectraNet with the certainty to proceed with seeking necessary development and environmental approvals.

The AER approval of the Project's preferred option from the PACR involves the construction of a new double-circuit 132 kV transmission line from Cultana to Port Lincoln, via Yadnarie, with the ability to upgrade the Cultana to Yadnarie section to 275 kV at a later date.

As the preferred option has the potential to deliver the greatest benefits to customers and ensures the Eyre Peninsula has a safe, reliable and secure electricity supply into the future I will support the Crown sponsorship of the Development Application as a development of public infrastructure as required by Section 49 of the Act. Further, I note the strategic benefits of the Project including over 200 jobs during construction supporting the maintenance and growth of the agriculture, aquaculture, tourism and mining industries as well as the growth of the renewable energy industry.

The Department for Energy and Mining makes no representations or gives no warranties in relation to the outcome of the development application or time that it takes to secure a planning outcome for the project.

Chief Executive

Address Level 12, 11 Waymouth Street, Adelaide 5000 | GPO Box 320 Adelaide SA 5001 | DX452

Tel (+61) 08 8429 3216 | Email DEM.OCE@sa.gov.au | www.energymining.sa.gov.au | ABN 83 768 683 934



It is ElectraNet's responsibility to obtain all other statutory approvals, licences and permits from relevant authorities, manage community expectations and to fund the project. The State Government makes no commitment to provide any funding towards the Project, assist in the augmentation of the electricity network or to purchase any product or service related to the Project.

A development application must be lodged by ElectraNet at its own cost with the Development Assessment Commission on or prior to 28 June 2020. If this is not achieved by that time, my support under Section 49(2)(c) of the Act for the Project will lapse.

Should you have any questions regarding preparation of the material to support this Section 49 Development Application, please contact the nominated Case Manager, Mr Peter Boulton on 8303 2342.

Yours sincerely,



Paul Heithersay
CHIEF EXECUTIVE

21/6/2019

Council	Email	Phone Number
District Council of Lower Eyre Peninsula	mail@dclep.sa.gov.au	Ph: (08) 8676 0400
District Council of Tumby Bay	dctumby@tumbybay.sa.gov.au	Tel: (08) 8688 2101
District Council of Cleve	council@cleve.sa.gov.au	T: 08 8628 2004
District Council of Franklin Harbour	council@franklinharbour.sa.gov.au	Phone: (08) 8629 2019
Corporation of the City of Whyalla	customer.service@whyalla.sa.gov.au	08 8640-3444
Pastoral Unincorporated Area (Outback Communities Authority)	oca@sa.gov.au	(08) 8648 5970

Project Site Name	Lot Plan	Substitute CT Reference
ElectraNet Pty Ltd	D93251AL66	CR 6140/94
Dept. Defence	D93251AL67	CL 6164/360
Minister for Sustainability, Environment & Conservation - Whyalla CP	H560300SE14	CR 5438/431
Minister for Sustainability, Environment & Conservation	D85850AL34	CR 6140/90
Dept. Defence	D85850QP30	CL 6164/360
OneSteel Manufacturing Pty Ltd	F252368QP60	CL 6189/768
OneSteel Manufacturing Pty Ltd	F252366AL62	CL 6189/775
OneSteel Manufacturing Pty Ltd	F252367AL61	CL 6189/768
Dept. Defence	D85850QP32	CL 6164/360
Ashby, IK, CA, ER & SB	H560500SE5	CL 6201/587
Ashby, IK, CA, ER & SB	H560500SE4	CL 6201/586
Ashby, IK, CA, ER & SB	D28423AL1	CL 6201/585
Ashby, IK, CA, ER & SB	H560100SE10	CL 6201/584
HEB Investments Pty Ltd	H560100SE15	CL 6210/726
HEB Investments Pty Ltd	H560100SE12	CL 6210/746
HEB Investments Pty Ltd	D23001QP28	CL 6210/68
HEB Investments Pty Ltd	D23001QP31	CL 6210/734
Minister for Sustainability, Environment & Conservation - Ironstone	D83666QP80	CR 6059/793
HEB Investments Pty Ltd	H560600SE12	CL 6205/138
Minister for Sustainability, Environment & Conservation - Ironstone	D83666AL82	CR 6059/795
OneSteel Manufacturing Pty Ltd	D23001QP19	CT 6128/515
Minister for Sustainability, Environment & Conservation - Ironstone	D83666AL81	CR 6059/794
Minister for Sustainability, Environment & Conservation - Ironstone	D83666AL84	CR 6059/797
Minister for Sustainability, Environment & Conservation - Ironstone	H560600SE10	CR 6072/724
Ecological Horizons Pty Ltd	H560700SE4	CL 6181/881
Ecological Horizons Pty Ltd	H560700SE3	CL 6181/881
Havendale Nominees Pty Ltd	H530900SE24	CL 6182/263
Havendale Nominees Pty Ltd	H530900SE27	CL 6182/263
Burton, FW & NE	H531400SE27	CT 6190/222
Minister for Sustainability, Environment & Conservation - Sheoak	D38006AL100	CR 5772/809
Deer, MP	H531400SE40	CT 5673/580
Deer, MP	H531400SE32	CT 5673/580
Minister for Sustainability, Environment & Conservation - Sheoak	H531400SE50	CR 5772/867
Wishford Nominees Pty Ltd	H531400SE33	CT 5979/39
Rogers, GW & HM	H531400SE12	CT 6185/838
Lowe, AJ	H531400SE13	CT 5971/65
L S Harris Nominees Pty Ltd	H531400SE10	CT 6182/681
L S Harris Nominees Pty Ltd	H531400SE9	CT 6182/681
L S Harris Nominees Pty Ltd	H531400SE5	CT 6182/681
L S Harris Nominees Pty Ltd	H531400SE46	CT 6182/681
L S Harris Nominees Pty Ltd	H531400SE6	CT 6182/681
Story, PJ & LK	H531200SE6	CT 6184/167
Story, PJ & LK	H531600SE30	CT 6184/167
Nield, JD & BL	H531600SE12	CT 6197/644
Nield, JD & BL	H531600SE11	CT 6197/643
Norris, PL & KA	H531600SE37	CT 6185/567
Hannemann, GK & ML	H531600SE17	CT 6186/571
Norris, PL & KA	F178594AL182	CT 6185/566
Story, PJ & LK	F147689AL4	CT 6184/166
Story, PJ & LK	H531600SE23	CT 6184/168
Hannemann, MR & AC	F178593AL181	CT 6189/229
Hannemann, MR & AC	H530500SE1	CT 6189/230
Dreckow, BW & LK	H533400SE414	CT 6197/361
Quinn, W & J	H533400SE104	CT 6173/414
Quinn, W & J	H533400SE103	CT 6173/412
Quinn, W & J	H533400SE95	CT 6173/413
Crosby, BE & KH	H533400SE96	CT 6197/261
Harris, BM & L	H533400SE88	CT 6197/823
Turner, PS	H533400SE74	CT 6185/901
Turner, PS	H533400SE75	CT 6185/901
Harris, BM & L	H533400SE64	CT 6197/822
Crosby, BE & KH	D95003AL5002	CT 6151/567
ElectraNet	D95003AL5001	CT 6151/566
ElectraNet	D52791AL501	CT 5782/656
Distribution Lessor Corp	D52791AL502	CT 5782/657
Crosby, BE & KH	D86447QP6	CT 6087/165
Siviour, GM & TM	H533400SE54	CT 6202/483

RBQ Holdings Pty Ltd	H533400SE55	CT 5940/707
RBQ Holdings Pty Ltd	H533400SE46	CT 5940/707
RBQ Holdings Pty Ltd	H533400SE39	CT 6205/513
Quinn, RM & KJ	H533400SE28	CT 6214/633
Bammann, GW & SM	H533400SE22	CT 6200/907
Bammann, GW & SM	H533400SE1	CT 6200/907
Stephenson, J T & L J	H533400SE24	CT 6205/934
Stephenson, J T & L J	H532700SE33	CT 6205/934
Bammann, GW & SM	H532700SE73	CT 6203/248
Bammann, GW & SM	H532700SE55	CT 6203/248
Bates, KP & SL	H532700SE32	CT 6200/915
Smith, KJ & B	H532700SE29	CT 6217/523
Nield, K J and E A	H533100SE35	CT 6202/553
Minister for Transport	H533100SE55	CT 5665/342
Lovegrove, MB	H533100SE78	CT 6204/364
Lovegrove, MB	F35330QP1	CT 6216/414
Rosenzweig, TC	H533100SE42	CT 5889/7
Masters, GD & GH	H533100SE44	CT 6200/953
Rosenzweig, TC	H533100SE20	CT 5450/559
Jones, JM & JK	H533100SE46	CT 6216/199
Millard, D J	H533100SE13	CT 6210/303
Millard, D J	H533100SE14	CT 6210/303
Prime, DL	F199822QP91	CT 6214/532
Minister for Sustainability, Environment & Conservation - Wharminda	H533100SE48	CT 5957/792
Minister for Sustainability, Environment & Conservation - Wharminda	H533100SE94	CR 5772/879
Minister for Sustainability, Environment & Conservation - Wharminda	H533100SE77	CT 5880/963
Prime, DL	F199822QP92	CT 6214/532
Masters, PG & LM	H533100SE4	CT 6202/301
G K Prime Pty Ltd	D93642AL50	CT 6203/228
G K Prime Pty Ltd	F178754AL342	CT 5547/715
G K Prime Pty Ltd	F178753AL341	CT 5547/716
Minister for Transport, Infrastructure & Local Government	F217080QP27	CT 5680/304
Cameron, MA & AL	F178751AL339	CT 6198/268
Cameron, MA & AL	F178752AL340	CT 5699/866
Prime, PG, AJ & CG	F199449QP93	CT 6197/363
Pedler & Swaffer, DT & AM	H530400SE32	CT 6198/265
Malcolm, SW & VB	F178747AL335	CT 6197/522
Charlton, CI	H530400SE31	CT 6205/236
Charlton, CI	D56914AL71	CT 6209/702
Houston, JA & EE	H530400SE34	CT 5951/411
Houston, JA & EE	H530400SE67	CT 5605/481
R M Cane Nominees Pty Ltd	H530400SE45	CT 6203/597
Houston, JA & EE	H530400SE37	CT 5605/479
Houston, JA & EE	F215905QP92	CT 5605/478
Garra Land Pty Ltd	H530400SE1	CT 5949/857
Lawrie, JN, SA & CJT	D80728AL14	CT 6124/37
Lawrie, JN, SA & CJT	H511600SE365	CT 5991/809
Lawrie, JN, SA & CJT	H511600SE433	CT 5991/809
Telfer, LC, SJ & IN	D58399AL50	CT 6215/330
Jillandra Farming Pty Ltd	D32252AL3	CT 6204/279
Jillandra Farming Pty Ltd	D32252AL4	CT 6204/280
Jillandra Farming Pty Ltd	D32252AL5	CT 6204/281
Liddicoat, TC & DK	H511600SE400	CT 6055/314
Liddicoat, TC & DK	H511000SE99	CT 6055/313
Telfer, JK & MK	H511000BL10C	CT 6200/807
Fausser, D & S	F178914AL502	CT 6201/387
Roediger, KJ & TJ	F6395AL1	CT 6199/714
RoeCo Pty Ltd	F6395AL2	CT 6199/572
Roediger, KJ & TJ	D66450AL50	CT 6205/807
Roediger, KJ & TJ	D66450QP51	CT 6199/713
Telfer, GK & DH	D69546AL102	CT 6199/569
Bawden, RL & GM	F178907AL495	CT 5547/325
Richardson, JG & SG	F199791QP96	CT 5397/117
Richardson, AG	F42968QP9	CT 5934/51
Richardson, AG	F42968AL7	CT 5934/51
Richardson, AG	H510300SE129	CT 5549/527
Richardson, AG & SJ	H510300SE130	CT 5465/916
Butler, DJ	F42968AL6	CT 6208/233
Butler, DJ	H510300SE125	CT 5194/335

Cabot, AJ & KA	F216882AL91	CT 6202/932
Borthwick, EL	F216604AL357	CT 6204/53
Borthwick, EL	F216604QP361	CT 6204/53
Borthwick, EL	F216604QP363	CT 6204/53
Borthwick, EL	F216604AL355	CT 6204/53
Borthwick, EL	F216604AL354	CT 6204/53
Borthwick, CED	F216409AL128	CT 6200/924
Borthwick, CED	F216409AL127	CT 6200/924
Cullen, RW & LA	H510400SE130	CT 6202/972
Cullen, RW & LA	H510400SE134	CT 6202/972
Calderwood, CJ & IC	H510400SE136	CT 6199/818
Calderwood, RJ	H510400SE36	CT 6200/312
Calderwood, RJ	H510400SE35	CT 6200/311
Barns & Shapalova, NS & N	H510400SE38	CT 6204/9
Calderwood, RJ	H510400SE37	CT 6200/311
Calderwood, RJ	H510400SE67	CT 6200/313
Docking, PAJ & EL	H510400SE68	CT 6215/945
Docking, PAJ & EL	H510400SE16	CT 6215/944
Docking, PAJ & EL	F1597AL2	CT 6215/943
Bascombe, DJ & PM	F130554AL1	CT 5253/903
K D and W G MacDonald Pty Ltd	F214542AL151	CT 6206/496
K D and W G MacDonald Pty Ltd	F214542AL153	CT 6206/496
Smits, GM	F130554AL2	CT 6122/308
Smits, GM	F130554AL3	CT 6122/309
Bascombe, DJ & PM	F130554AL5	CT 5253/903
Docking, PAJ & EL	H510700SE145	CT 6106/418
Docking, PAJ & EL	H510700SE144	CT 6106/417
Tucknott, SI	H510700SE204	CT 5546/775
Tucknott, SI	H510700SE220	CT 5815/529
Carter, W&S	H510700SE223	CT 5446/676
Bilney, J & C	F208389AL91	CT 5549/22
White Flat Hall	F209442AL256	
Low, LL & YA	F214991AL93	CT 5792/848
Low, LL & YA	F199758QP95	CT 5955/875
Stoneleigh Nominees Pty Ltd	F199757QP92	CT 5388/607
Low, LL & YA	D51226AL32	CT 6214/530
Proude, RD	D52679AL34	CT 5733/812
Proude, RD	D52679AL33	CT 6201/453
Syzpowski, PY	D52679AL35	CT 5733/813
Murray, ME	F213007QP92	CT 6211/232
Dorward, CA	H510700SE333	CT 6210/465
Dorward, CA	H510700SE334	CT 6210/463
Murray, L&M	H510700SE165	CT 5489/756
Cook, JS & MT	H510700SE329	CT 6201/590
Cook, JS & MT	H510700SE163	CT 6201/589
Cook, JS & MT	H510700SE376	CT 6201/591
Cook, JS & MT	H510700SE343	CT 6138/342
Low Holdings Pty Ltd	H510700SE373	CT 6209/961
Low Holdings Pty Ltd	H510700SE374	CT 6209/961
Whillas, LG & KL	H510700SE363	CT 6209/2
Henderson, S & D	H510700SE362	CT 6209/831
Turvey General Supplies Pty Ltd	H510700SE364	CT 6218/147
Murray, L&M	H510700SE365	CT 5939/525
Whillas, LG & KL	F216503AL91	CT 6209/1
Whillas, LG & KL	F216503AL92	CT 6209/1
Whillas, LG & KL	F216503AL94	CT 6209/1
Whillas, LG & KL	F216503AL93	CT 6209/1
Whillas, JP	F17131AL33	CT 6202/929
Whillas, JP	F147915AL7	CT 6202/930
Seaford Holdings Pty Ltd	F156084AL1	CT 6202/485
Sheehan, P	D115114AL53	CT 6205/801
ElectraNet	F148263AL23	CT 5274/145
Whillas, CA	F6326AL5	CT 5411/949
Whillas, CA	F6326AL4	CT 5411/951
Finch, RD	F6326AL3	CT 5115/141
Carrison, DK & KJ	D93428AL41	CT 6138/62
Nottle, G & K	F6326AL1	CT 5534/119
Trenowden, JW	D115746AL31	CT 6195/933
Mallard, RT	D72489AL78	CT 5977/860

Skinner & Burke, GW & SK	D72489AL77	CT 5977/859
Trenowden, JW	D115746AL30	CT 6195/932
Grosser, RG	D72489AL76	CT 5977/858
Wohling, NJ & S	D72489AL61	CT 5977/845
Ryan, IM	D72489AL62	CT 5977/846
Cutler, T & T	D72489AL59	CT 5977/843
Carpenter, SW & KL	D72489AL58	CT 5977/842
Aqua-Protein Pty Ltd	D115620AL5	CT 6191/487
Ambrose, BR & HK	D80972AL502	CT 6037/76
Hall, LJ	D112207AL18	CT 6171/454
Clements, JM & LH	D112207AL17	CT 6171/453
Montgomerie, PJ & LM	D80972AL503	CT 6037/77
Miller, B & K	D72492AL5	CT 5977/874
King, DC	D72492AL6	CT 5977/875
Forster, TR & AT	D84960AL178	CT 6067/389
Schlink, DT	D110446AL16	CT 6162/435
Cox, MJ, AM & JM	D110446AL15	CT 6162/434
Reed, SP & CJ	D84960AL177	CT 6067/388
Rimland, HP	D110446AL19	CT 6162/436
Neighbour & Brooks, C & S	D110446AL14	CT 6162/433
Kranz, MC	D84960AL107	CT 6067/319
Kurtin, AM	D110446AL12	CT 6162/431
Lower Eyre, District Council of	D84960AE179	CT 6067/390
Gibson, RA	D72491AL2	CT 5977/866
Lower Eyre, District Council of	D72491AE202	CT 5977/895
Pt Lincoln Golf Club	F179979AL757	CT 5553/594
Zerk & Zollo, H & B	D80257AL5052	CT 6043/686
ElectraNet	D80257AL5051	CT 6043/685



REPORT

Eyre Peninsula Transmission Supply Project

Development Application

Submitted to:

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4 November 2019



Distribution List

Executive Summary

ElectraNet (the proponent) proposes to construct a new 275/132 kilovolt (kV) transmission line to replace the existing 132kV transmission line currently servicing the Eyre Peninsula in South Australia. The new transmission line will extend approximately 270 kilometres (km) from the Cultana substation near Whyalla in the north to the Port Lincoln terminal substation in the south. The Eyre Peninsula Transmission Supply Project aims to secure a reliable and ongoing supply of electricity that meets the increased demand for power that has arisen from continued growth in residential, agricultural, industrial and commercial activities across the Eyre Peninsula in the past 50 years.

Construction of the new transmission line will occur adjacent to the existing transmission line corridor in order to minimise the environmental impacts associated with the development. Two substations (or switchyards) at Yadnarie and Port Lincoln will also be developed as part of the project, providing the necessary infrastructure to support the augmentation of the transmission line. In addition, the project will require the establishment of access tracks, workers' camps and laydown areas for storage of construction equipment.

Several detailed assessment studies and management plans have been undertaken to support this development application, including:

- Ecology and native vegetation;
- Cultural heritage;
- Non-Aboriginal heritage;
- Bushfire management;
- Community and stakeholder engagement; and
- Weed and pest management.

As a result of the ecological assessments, a referral to the Commonwealth Government under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* will be made to determine the likely impacts of the project on Matters of National Environmental Significance (NES). An application to the South Australian Native Vegetation Council for approval to clear native vegetation will also be lodged with negotiations to determine an appropriate offset via the establishment of a Significant Environmental Benefit (SEB) to occur as part of the approval process.

All other impacts associated with the construction of the proposed development will be avoided, managed and mitigated to acceptable levels through application of the Construction Environmental Management Plan (CEMP) developed to support the project (see section 9 and APPENDIX C).

The proposed augmentation of critical electricity infrastructure serving the Eyre Peninsula is a much-needed development that will facilitate ongoing economic growth across the region while enabling the future development of its considerable renewable energy and mineral resources, consistent with the South Australian Government's regional economic objectives. The assessment of the proposal against the relevant planning policy provisions in section 5 of this report demonstrates its overall compliance with the land use activities and forms of development envisaged for the project area. Accordingly, when considered on its merits, the proposed transmission line and substation development warrants the granting of development consent.

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1.0 INTRODUCTION

ElectraNet Pty Ltd (ElectraNet) proposes to construct a new high-voltage 275/132 kilovolt (kV) transmission line (alongside the existing 132kV line) from the Cultana substation near Whyalla in the north to the Port Lincoln terminal substation in the south, and two supporting substation developments at Yadnarie and Port Lincoln. The project is known as the Eyre Peninsula Transmission Supply Project.

The Transmission Supply Project aims to upgrade the existing transmission network to secure a reliable and ongoing supply of electricity to the Eyre Peninsula. Since the existing 132 kV transmission line was energised in 1967, the demand for power across the Peninsula has increased significantly as a result of growth in residential, agricultural, industrial and commercial activities. This demand is likely to increase further in the near future as a result of anticipated growth in the mining and renewable energy sectors.

The potential increase in electricity demand is beyond the capacity of the existing electricity transmission network, which is fast approaching the end of its operational life. The projected demand increases also mean that the relevant Electricity Transmission Code (ETC) standards at the Port Lincoln connection point will not be met. To ensure that future ETC standards are upheld, action is required by ElectraNet to reinforce and augment the existing network by 2021/22 to meet the forecast demand and ensure an ongoing reliable supply of electricity to the Eyre Peninsula region.

This development application report (prepared for ElectraNet by Golder Associates Pty Ltd) details the components of the proposed transmission line, as well as two substation developments, temporary laydown areas and workers' camps, to support its augmentation. It then provides an assessment of the proposed development against the relevant planning provisions and discusses how the likely environmental, social and economic impacts arising from the project will be managed.

1.1 The proponent

ElectraNet is the principal electricity Transmission Network Service Provider (TNSP) and has operated in South Australia since 2000 as part of the National Electricity Market under National Electricity Rules. The company's revenue is set by the Australian Energy Regulator (AER).

ElectraNet owns and manages the high-voltage transmission lines and substations that connect South Australia's electricity generation system to multiple customer connection points, including ETSA Utilities' lower-voltage distribution network.

ElectraNet's transmission network is one of the most extensive and reliable regional transmission systems in Australia, extending across some 200,000 square kilometres of the State. This network consists of transmission lines operating at 132kV and 275kV (supported by both lattice structures and large stobie poles) and substations.

Table 1: Applicant details

	Description
Applicant	ElectraNet Pty Ltd
Project contact	Alecia Wright e. wright.alecia@electranet.com.au m. 0439 758 888
Registered ABN and ACN	ABN: 41 094 482 416 ACN: 094 482 416
Registered address	52-55 East Terrace Adelaide SA 5000

1.2 Project overview

For the purposes of this development application, the nature of the proposed development comprises the following components (described in detail in section 4 below):

- Construction of a new double-circuit electricity transmission line from Cultana to Yadnarie that is initially energised at 132kV, but which may be energised at 275kV if required in the future.
- Construction of a new 132kV double-circuit transmission line from Yadnarie to Port Lincoln.
- Construction of a new 275kV/132kV substation immediately north of the existing Yadnarie substation.
- Extension of the existing Port Lincoln Terminal substation to accommodate additional electricity infrastructure required to support the new transmission line.

The proposed development requires the acquisition of approximately 270 lineal km (1500-3000 hectares) of land easement and installation of around 540 lattice structures with associated cabling, ancillary structures, access tracks, laydown areas and workers' camps. The proposed substations require an additional two (2) hectares of land and installation of equipment, associated cabling and security fencing while the workers' camps and laydown areas (which will be rehabilitated on completion of the project) will occupy a combined area of approximately five (5) hectares.

1.3 Approval pathway

Given the significance of the proposed development in augmenting critical public electricity infrastructure in the State, ElectraNet has secured the support of the South Australian Department for Energy and Mining (DEM) to sponsor the proposed development, enabling its assessment under the provisions of Section 49 of the *Development Act 1993* by the State Commission Assessment Panel (SCAP).

The proposed transmission line passes through five (5) local government areas with a 50km section extending through land not within a Council area. Development on land not within a Council area is now subject to assessment under the new *Planning and Design Code as applying to Land Not Within a Council Area* (Outback Code)¹. Advice received from the Department of Planning, Transport and Infrastructure (DPTI) confirms that the proposed development *in its entirety* will be assessed against the relevant provisions of the Outback Code. A secondary assessment against the provisions of the local Development Plan for those elements of the proposed development that pass through the relevant council area will also be conducted. In addition, the development will be assessed for consistency with the new State Planning Policies (SPPs).

1.4 Project timing

Development of the proposed transmission lines and substations will take up to three years with early works anticipated to begin in May 2020.

The development application has been lodged at this time to enable the commencement of early works, which include development of access tracks to areas along the transmission line alignment that are currently inaccessible and preliminary pegging of structure locations.

1.5 Structure and content of this report

This report includes a discussion of the strategic policy context of relevance to the proposed development followed by an account of the environment in which the project is located. Section 4 provides a detailed description of the transmission line development and associated project components while section 5 presents

¹ The Outback Code is an instrument of the *Planning, Development and Infrastructure Act 2016* (PDI Act) which will soon supersede the Development Act.

an assessment of the development against the provisions of the Outback Code and relevant Development Plans.

The ensuing sections discuss the assessment of environmental, cultural heritage and social impacts associated with the project alongside an account of the mitigation measures employed to address these impacts. As discussed in more detail below, several impact assessments and management plans are currently being finalised and will be submitted to SCAP in coming weeks. These include:

- Native vegetation assessment;
- Ecological (flora and fauna) assessment;
- Initial Cultural Heritage Management Plan;
- Initial Construction Environmental Management Plan (CEMP) which is to incorporate:
 - Bushfire Management Plan
 - Non-Aboriginal Heritage Management Plan
 - Weed Management Plan.

A Traffic Management Plan will be prepared by the construction contractor in conjunction with DPTI (Transport) Eyre and Western Region and submitted to SCAP prior to construction if requested.

The Initial CEMP is to be presented in two parts. The CEMP attached to this report is partially completed as the detailed design of the project is not yet finalised. On completion of the detailed design phase, the CEMP and the management plans it incorporates will be completed in full by the construction contractor and submitted to SCAP and other relevant authorities prior to construction if requested.

The Initial Cultural Heritage Management Plan will be developed further with the Barngarla Determination Aboriginal Corporation and the construction contractor.

2.0 STRATEGIC CONTEXT

The following sections discuss the strategic context for the proposed augmentation of the Eyre Peninsula transmission line drawing on State Government priorities and relevant State and Federal legislation.

2.1 South Australian Government context

Several State Government strategic policy documents are of relevance in providing context and justification for the proposed development. These are summarised below.

2.1.1 Budget priorities

The South Australian Government sets the strategic direction for the State through a range of initiatives detailed in its annual Budget Papers. Of relevance to the proposed development is additional funding targeted towards boosting economic and infrastructure development in the regions, summarised in the following table.

Table 2: South Australian Budget Priorities

Budget Initiative	Funding (where specified)	Relevance to Project
General Regional Initiatives		
Mining	\$10 million over 3 years	Aims to facilitate new mining development in the regions which will increase energy demand
Remote Housing	\$75 million over 5 years	Encourages population and housing growth in the Eyre Peninsula region that will increase demand for energy
Remote Area Energy Supply Scheme	\$5.6 million over 5 years	Provides for future sustainability of electricity service arrangements in remote areas
Regional Road and Transport Infrastructure Upgrades	\$1.1 billion over 8 years	Provides for enhancements to regional transport networks which will increase demand for energy
Road Safety Package	\$834 million over 4 years	Includes a number of projects aimed at improving the safety and efficiency of the Eyre Peninsula road transport network
Eyre Peninsula Initiatives		
Eyre Peninsula Roads	\$125 million over 8 years	Upgrades to roads on the Peninsula, including the Eyre Highway, will foster economic growth and demand for energy
Whyalla Steelworks	\$1 million in 2019-20	Supports transformation of the Steelworks which will require an ongoing reliable supply of energy

In seeking to foster economic growth across the region, these Government funding priorities will increase the demand for power across the Eyre Peninsula. The proposed augmentation of the Eyre Peninsula transmission line is clearly consistent with the Government's objectives and indeed necessary to their achievement.

2.1.2 Our Energy Plan

The South Australian Government released *Our Energy Plan Policy* in 2017 to provide the State with greater control of energy security by generating capacity, enhancing competition, increasing renewable energy capacity with battery storage and facilitating more job opportunities in the sector.

Of relevance to the proposed development is the new energy security target in the Plan, which seeks to stimulate investment in locally generated, cleaner and more secure energy across South Australia in order to put downward pressure on power prices while providing for greater energy system reliability.

The proposed transmission line and substations will facilitate the development of renewable energy sources across the Eyre Peninsula that are amongst the best in the world (University College London *et al.*, 2015). To date, these renewable energy sources have not been developed because the existing transmission network on the Peninsula is limited in capacity. Accordingly, the proposed augmentation of the transmission line not only complements the Government's energy objectives, it will also provide essential infrastructure required to facilitate economic growth across the Eyre Peninsula region.

2.1.2.1 Provision of power system security

The Eyre Peninsula supports a range of agriculture, aquaculture, tourism and mining industries that are all reliant on a secure supply of electricity. While the region's population is forecast to remain relatively stable over the next 25 years - from 58,415 in 2016 to 58,448 in 2041² – the region is expected to experience electricity load growth in the order of 3.3% – 4.9% per annum. This is attributable in part to anticipated growth in the farming and mining sectors as well as growth arising from the infrastructure improvements noted above. In relation to mining, the South Australian Chamber of Mines and Energy (SACOME) has actively lobbied the State Government for ongoing infrastructure investment in the Eyre Peninsula in order to optimise the potential economic benefits from mining. This includes augmentation of the existing transmission line, as well as investment in associated infrastructure such as new ports and processing facilities.

In short, there is a critical need to secure a safe and reliable electrical energy supply to support and facilitate regional economic growth in the Eyre Peninsula. The proposed development aims to provide this capacity and so contribute to meeting the State Government's regional economic objectives.

2.1.3 Eyre and Western Region Plan

The Eyre and Western Region Plan (2012) is a volume of the South Australian Planning Strategy and provides strategic guidance for land use and development, provision of services and infrastructure, and management of population and climate change.

Key issues identified as critical to the region's future development include the following:

- Environment and sustainability
 - Recognise, protect and restore the region's environmental assets
 - Protect people, property and the environment from exposure to hazards
 - Increase the capacity of the region to adapt and become resilient to the impacts of climate change
- Economic development
 - Protect and build on the region's strategic infrastructure
 - Protect and strengthen the economic potential of the region's primary production land

² Source: Location SA Map Viewer, accessed 21 August 2019

- Strengthen the economic potential of the region’s mineral and energy resources
- Infrastructure and service development
 - Maximise the use and adaptability of infrastructure through consolidation, clustering and economies of scale
 - Providing adequate infrastructure (e.g. transport facilities, communications, energy, water security) to support development of mining, agriculture, aquaculture and tourism

The proposed transmission line builds on the Eyre Peninsula’s strategic infrastructure which will support and strengthen the region’s industries and allow for the development of new industry sectors (such as renewable energy) that will increase the capacity of the region to adapt to climate change.

It should be noted that the Eyre and Western Region Plan is currently under review as part of the transition to a new planning system in South Australia. However, the Plan’s strategic directions, as applicable to the proposed transmission line and substations and the land on which this infrastructure will be developed, are unlikely to change.

2.1.4 State Infrastructure Strategy Discussion Paper

In the course of developing the 20-year State Infrastructure Strategy, Infrastructure SA released a discussion paper in June 2019 that discusses a range of infrastructure additions required to meet the State Government’s economic growth target of 3% per annum. Statements made in this paper that support the proposed development include:

- Infrastructure investment in the regions is critical to provide efficient access to markets, especially for mining, food and agribusiness products.
- The Eyre Peninsula region is highly productive but current infrastructure shortfalls are a constraint to its economic development.
- The Regional Development Australia (Whyalla and Eyre Peninsula) Board has consistently prioritised energy transmission and generation as a key infrastructure initiative to facilitate economic growth across the region.

2.2 Legislative context

This development application has taken into consideration the following legislative requirements.

Table 3: Relevant Legislation

Legislation	Project response to requirements
South Australian Legislation	
Native Vegetation Act 1991	Under this Act, any clearance of native vegetation requires consent from the Native Vegetation Council (NVC). All native vegetation clearance associated with the project has been assessed in accordance with this Act with a Significant Environmental Benefit (SEB) offset to be established in accordance with NVC requirements.
Environment Protection Act 1993	Given the nature of activities associated with erecting the structures and transmission line, the proponent has, and will continue to engage with the Environment Protection Authority (EPA) on any requirements for its contractors to hold relevant licences and approvals for earthworks and drainage.

Legislation	Project response to requirements
Natural Resources Management Act 2004	The proponent has considered and will comply with all requirements in relation to the management and protection of land, plants, animals and watercourses. This includes appropriate management of pest plant and animal species during construction and rehabilitation of construction sites as part of the CEMP. If required, Water Affecting Activity permits will be obtained by the construction contractor prior to works being undertaken near a watercourse.
National Parks and Wildlife Act 1972	The proponent has taken into consideration potential impacts (i.e. siting, design and construction) on all relevant conservation and recreation reserves through which the proposed transmission line traverses. Measures to minimise potential impacts to listed flora and fauna species during construction will be established and put in place as part of the CEMP.
Aboriginal Heritage Act 1988	The proponent engaged AECOM Australia Pty Ltd (AECOM) to undertake an Aboriginal cultural heritage survey of the proposed transmission line corridor. The survey involved Barngarla representatives in accord with a Cultural Heritage Agreement established between ElectraNet and the Barngarla Native Title Claimants. Several culturally significant items were identified during the survey and it was determined that further survey followed by a Cultural Heritage Management Plan detailing appropriate protocols for protecting these items during the construction of the transmission line and substations would be prepared and implemented.
Native Title (South Australia) Act 1994	The proponent is currently in discussions with the Barngarla Determination Aboriginal Corporation and Crown Lands SA with regard to Native Title matters for the project and aims to comply with all requirements related to Aboriginal cultural heritage and Native Title under both State and Commonwealth legislation.
Heritage Places Act 1993	The proponent has undertaken due diligence with respect to the protection of areas of significance and has designed the transmission line alignment to generally avoid such areas. However the line passes close to two local heritage places with both Councils (District Council of Tumby Bay and District Council of Lower Eyre Peninsula) confirming that the proposed development will not impact on the heritage value of these places.
Road Traffic Act 1961	The transport of heavy construction materials associated with the proposed development has the potential to impact on the Eyre Highway and local road networks. These impacts will be managed via a Traffic Management Plan to meet the requirements of DPTI and relevant Councils being the bodies responsible for safe and efficient operation and maintenance of the road system.
Local Government Act 1999	Pursuant to the provisions of Section 221 (Alteration of road) of this Act, an authorisation is not required for an alteration to a road if ' <i>...the person who proposes to make the alteration has some other statutory authorisation to make the alteration</i> ' (e.g. development approval secured under the Development Act). A Traffic Management Plan will be prepared to support the project.
Electricity Act 1996	The proponent has undertaken due diligence and secured all required licences related to providing a safe and reliable supply of energy to the Eyre Peninsula. The proposed development has been designed to meet

Legislation	Project response to requirements
	the legal requirements for vegetation clearance around high voltage transmission lines.
Climate Change and Greenhouse Emissions Act 2007	The proposed transmission line will facilitate the development and commercialisation of renewable energy and technologies across the Eyre Peninsula in accordance with the objects of this Act.
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation (EPBC) Act 1999	The proponent has undertaken ecological surveys and assessments to determine the likelihood of the project impacting on Matters of National Environmental Significance (NES) under the EPBC Act. The ecological assessments completed to date confirm that flora such as the Grassy Woodland of South Australia and Eyre Peninsula Blue Gum, and fauna such as the Sandhill Dunnart, Malleefowl, Southern Emu-wren and Western Grass Wren and their respective habitats, in the vicinity of both the existing and proposed easement have been identified as being affected as a result of the proposed development. Desktop and field investigations along the proposed route alignment have indicated that while it is considered that impacts to EPBC species and habitat is not significant, a formal referral to the Commonwealth will be submitted.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The proponent engaged AECOM Australia Pty Ltd (AECOM) to undertake an Aboriginal cultural heritage survey of the proposed transmission line corridor. The survey involved Barngarla representatives in accord with a Cultural Heritage Agreement established between ElectraNet and the Barngarla Native Title Claimants. Several culturally significant items were identified during the survey and it was determined that additional survey followed by a Cultural Heritage Management Plan detailing appropriate protocols for protecting these items during the construction of the transmission line and substations would be prepared and implemented.

3.0 EXISTING ENVIRONMENT

The Eyre Peninsula region is over 230,000 square kilometres (km²) extending from the City of Whyalla and the Upper Spencer Gulf in the east and stretching across the southern boundaries of the Gawler Ranges, west to Ceduna and south to Port Lincoln. The region has a population of approximately 58,500 people or 3.4% of the State’s population (Government of South Australia 2019).

Two major population and service centres – Whyalla and Port Lincoln – are located in the Upper Eyre Peninsula and Lower Eyre Peninsula respectively. Both centres accommodate a range of commercial, industrial, educational and retail facilities and services with Port Lincoln also being a popular tourist destination, as reflected in its airport being South Australia’s busiest regional airport in terms of annual passenger numbers and aircraft flights.

3.1 Project area

The project area is to be contained within a (generally) 100 metre (m) wide easement located immediately to the west of the existing transmission line easement. This area extends through both the Myall Plains and Eyre and Yorke Block IBRA Subregions, with the latter accommodating approximately 80% of the proposed alignment.

Figure 1 shows the corridor through which the proposed transmission line passes in the context of the important conservation areas in the Eyre Peninsula.

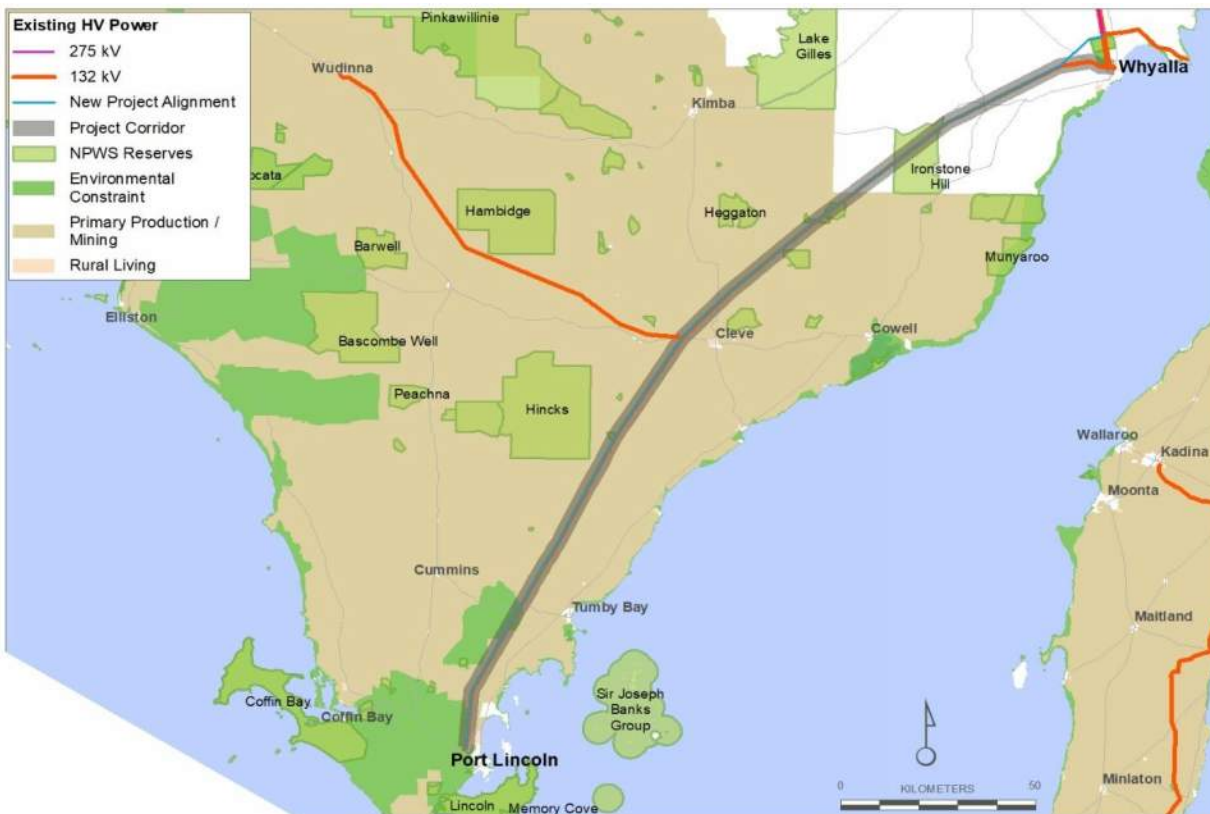


Figure 1: Project area

The northern, drier portion of the project area contains largely native vegetation (including some native grasslands) with grazing activities being the predominant land use. Towards the wetter, southern portion of the project area, cropland dominates alongside grazing activities with low density stands of trees scattered

across the landscape. Land uses surrounding the easement are predominantly agricultural and/or contain native vegetation.

The size of properties on the Eyre Peninsula varies depending on their location with larger properties occupying the inland areas and then decreasing in size as properties get closer to the coast and regional centres. In the northern section there are several pastoral leases with large rural landholdings radiating out from Whyalla to the north, north-west, west and south-west. The existing 132kV transmission line traverses through three of these lease areas. In the southern section the landholdings consist of smaller, privately-owned farming properties known for some of the best cropping conditions in South Australia.

A more detailed account of the geographical characteristics of the project area is contained in the EBS Ecology report in APPENDIX D.

3.1.1 Land use

The predominant land use in and around the project area is primary production with a significant portion of this land consisting of native vegetation. Land use zones accommodating the proposed development (including the substations) include:

- Primary Production;
- Water Protection;
- Rural Living; and
- Remote Areas.

Although the development does not traverse through areas of residential land, there are several dwellings associated with agricultural activities that are located in relatively close proximity to the proposed transmission line. Given the presence of the existing 132kV line in these locations, the proposed development is not expected to adversely affect occupiers of these dwellings, as evidenced by the results of the community engagement undertaken by ElectraNet (see section 8 below).

3.2 Regional economy

The economy of the Eyre Peninsula is based largely on primary production, with aquaculture and grain production particularly prevalent. As previously noted, the region also contains significant mineral and renewable energy resources that have yet to be fully realised.

The following sections discuss the key economic prospects in the region that together provide a strong economic rationale for the Transmission Supply Project.

3.2.1 Agriculture and aquaculture

A significant proportion of South Australia's grain crops and seafood harvest comes from the Eyre Peninsula with around 45% of the State's wheat, 20% of its barley and 45% of its seafood harvest all produced in the region. Some \$2.63 billion in exports comprising predominantly agricultural, mining and manufacturing products were sourced from the Eyre Peninsula in 2015-16 (Infrastructure SA, 2019). These industry sectors are forecast to experience growth in coming years and there is considerable potential for the region to benefit from value-adding in these sectors. An ongoing reliable source of energy would facilitate the realisation of this potential and provide enhanced employment and economic opportunities across the region.

3.2.2 Mining

The Eyre Peninsula has significant mineral resources located in the mineral regions known as the Gawler Craton and the Eucla Basin. The region is widely recognised as an important frontier for mineral exploration and development in Australia and there are a number of mining developments at pre-feasibility, feasibility or

construction stages, including Wilcherry Hill (Ironclad), Wilgerup (Centrex Metals), Warramboe (Iron Road) and Tripitaka (Iluka). To date, ElectraNet has received five formal connection enquiries from mining customers on Eyre Peninsula for a combined load of around 480 megawatts (MW).

The Transmission Supply Project responds directly to the potential of these initiatives at a time when market prospects for growth of the mineral sector in South Australia are encouraging. It also responds to a key recommendation of the Resources and Energy Sector Infrastructure Council (RESIC) mining study in 2011 to accelerate the augmentation of the Eyre Peninsula transmission line from 132kV to 275kV.

3.2.3 Renewable energy

The Eyre Peninsula is well suited to renewable energy development and the region is expected to experience significant growth in renewable energy infrastructure in coming years due to its abundant wind and solar energy resources.

In 2010, a feasibility assessment was commissioned by Macquarie Capital Advisors to report on the possible development of a 500kV 'Green Grid' on the Eyre Peninsula to take advantage of the potential generation of up to 2,000 MW of renewable energy from the region. At the time, four wind farm developers indicated an interest in developing infrastructure on the Peninsula as part of the Green Grid proposal. The study also indicated that ElectraNet's existing 132kV transmission line was near to or at full capacity and that construction of the proposed Green Grid would require augmentation of the transmission line in order to open up areas with potential for renewable energy development.

According to Renewables SA, the Eyre Peninsula has the potential to support over 10,000 MW of wind generation which would make the Peninsula the largest renewable energy region in South Australia. More recently, there have been several renewable energy initiatives in the region that have either obtained approval or are in the process of being developed. These include:

- Cathedral Rocks Wind Farm at Sleaford (66 MW)
- Mt Millar Wind Farm at Cowell (70 MW)
- Cultana Solar Farm (280 MW)
- Whyalla Solar Farm (150 MW).

The Transmission Supply Project will facilitate the ongoing development of renewable energy resources across the Eyre Peninsula which will foster both regional and State-wide economic growth while contributing to South Australia's renewable energy targets.

3.2.4 Transport infrastructure

Regional Development Australia (Whyalla and Eyre Peninsula) have consistently argued that the limited capacity, condition and age of the region's infrastructure is effectively constraining economic development across the Peninsula. The recent closure of the freight rail system adds weight to this argument as extra pressure will be placed on the region's road network to efficiently service growth in the primary production and mining sectors.

Nonetheless, recent proposals for deep sea port facilities to service mineral development together with the recent upgrade to the Port Lincoln Airport attest to increasing investment into transport infrastructure across the region.

3.3 Existing power supply

Electricity supply for the Eyre Peninsula is sourced via a single 275kV transmission line north of Cultana. The Whyalla to Yadnarie and Yadnarie to Port Lincoln 132kV transmission lines were built in 1967 to connect the Eyre Peninsula to the State's main transmission network.

Figure 2 shows the key elements of the Eyre Peninsula's transmission network and location of key infrastructure. The existing transmission line begins at the Cultana substation near Whyalla, then extends south-west towards the township of Cleve via the Middleback substation. The line then runs south to the Yadnarie substation and subsequently to the terminal substation located approximately 5km north-west of Port Lincoln.

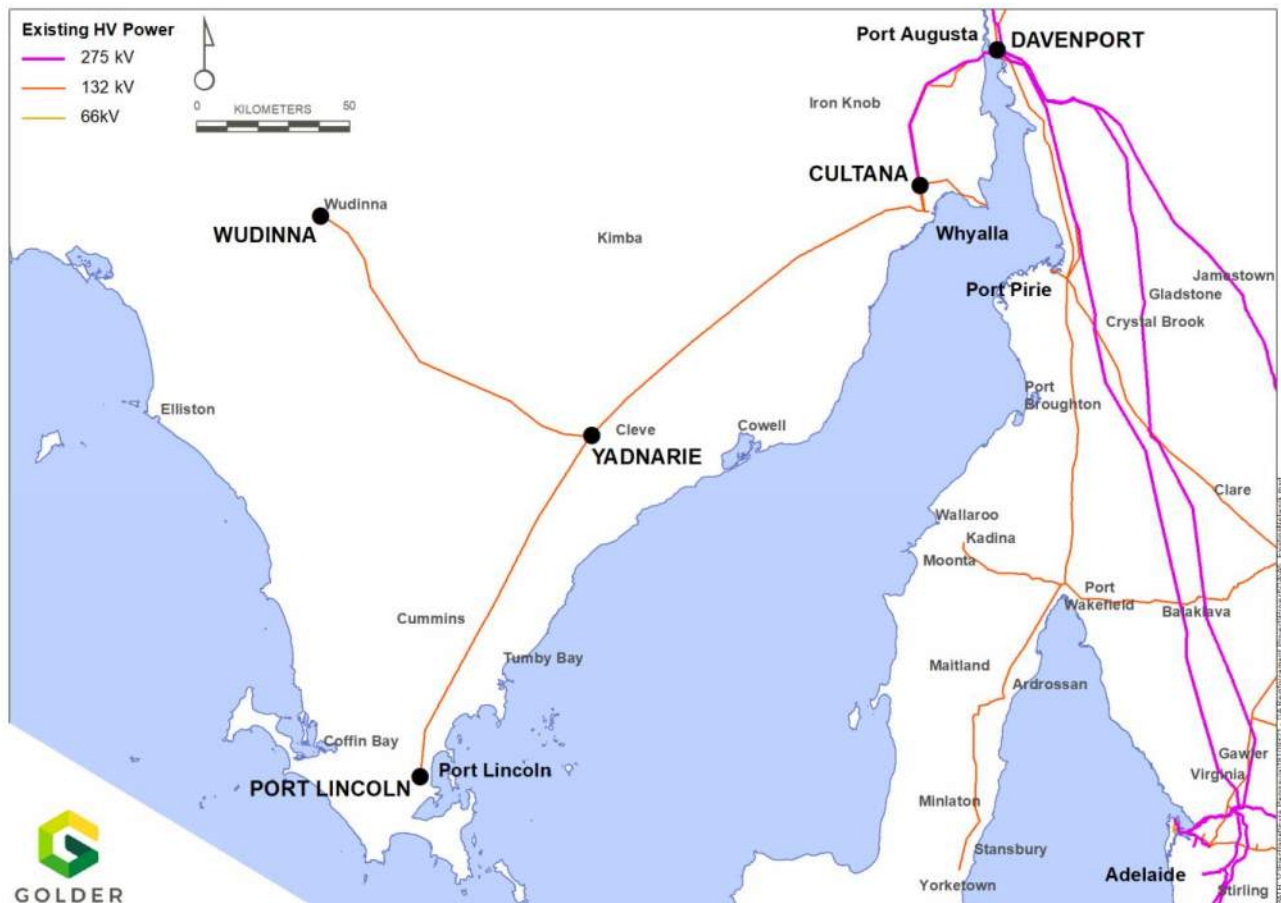


Figure 2: Existing Eyre Peninsula Transmission Network

The Upper Eyre Peninsula is also serviced by a single 132kV transmission line that runs from Yadnarie to the Wudinna substation. However, the western Eyre Peninsula is supported by a lower voltage transmission line of 66kV that continues from the Wudinna substation to Ceduna and then to Penong on the Far West Coast.

The remainder of the radial network across the region is provided by SA Power Networks and includes all 66kV, 33kV and 11kV distribution systems. These distribution networks are extensive and service the majority of the communities and farming enterprises in the region.

Electricity supply to Port Lincoln is backed up by three 25 MW diesel-fuelled gas turbines to reinforce the reliability of supply. The system is operated by Synergen and provides the region with back-up electricity if the transmission network fails.

There are currently four existing ElectraNet substations servicing the 132kV transmission line between Whyalla and Port Lincoln as follows:

- Whyalla terminal substation - located approximately 2.5km north of Whyalla within an industrial precinct. The upgrade works at Cultana will reconfigure the transmission network with some of the existing substation functionality from the Whyalla substation to be moved to the Cultana substation.

- Cultana substation - located 2.3km west of the Lincoln Highway, approximately 10km north-west of Whyalla. Surrounded by sparse native vegetation, the recent augmentation of this substation will increase the security and reliability of the transmission system.
- Middleback substation – dedicated to the provision of electricity to the Iron Duke mine, this substation borders the Ironstone Hill Conservation Park, approximately halfway between Whyalla and Yadnarie, and is surrounded by native vegetation.
- Yadnarie substation – located approximately 9km west of Cleve at Pine Corner (corner of the Birdseye Highway and Syvertsen Road), on a site constrained from further expansion by the highway intersection to the west and south and by native vegetation to the east and north-east. The proposed new substation required as part of the Transmission Supply Project is to be located on a separate parcel of land recently purchased by ElectraNet immediately to the north of the existing substation.
- Port Lincoln terminal substation – located approximately 5km north-west of Port Lincoln, west of the Flinders Highway and immediately south of the Port Lincoln Golf Club on Pound Lane, this site is surrounded by low density cropping land. The proposed substation upgrade is to be constructed immediately to the west of the existing substation on a 1.4 hectare site.

There is also a substation servicing the 70 MW Mount Millar wind farm (west of Cowell) which connects to the Yadnarie substation.

4.0 DESCRIPTION OF THE DEVELOPMENT

The Transmission Supply Project is made up of the following infrastructure components:

- Construction of a new double-circuit transmission line from Cultana to Yadnarie that is initially energised at 132kV, but which is capable of being energised at 275kV if required in the future;
- Construction of a new 132kV double-circuit transmission line from Yadnarie to Port Lincoln;
- Construction of a new 275/132kV substation immediately north of the existing Yadnarie substation;
- Extension of the existing Port Lincoln terminal substation to accommodate additional infrastructure required to support the new transmission line.
- A minor upgrade to the Cultana substation to accommodate additional infrastructure required to support the new transmission line.

The project will also require:

- Erection of approximately 540 new lattice structures or poles to support the new transmission lines;
- Installation of new electricity infrastructure, small buildings (accommodating control systems and staff facilities), cabling and security fencing at the substation sites;
- Construction of new access tracks facilitating access to the transmission line in areas where there are no existing access tracks, and upgrade of some existing access tracks to safely accommodate heavy vehicles/equipment needed for construction;
- Development of three (3) main laydown areas for temporary storage of heavy vehicles and equipment with associated site offices and amenities (within ATCO huts), security fencing and self-bunded diesel fuel storages; and
- Development of two (2) temporary workers' camps with associated accommodation, amenities and kitchen (dry mess) facilities catering for approximately 70 workers. These camps will also have local power generation facilities and self-bunded diesel fuel storages.

Figure 3 (below) shows the location of the key project components and indicative locations of the laydown areas and workers' camps. A detailed description of each of these project components is provided in sections 4.2 – 4.7 below with plans and information provided in APPENDIX A.

It should be noted that the detailed design phase of the project has yet to be completed. The information presented in the following sections is based on the preliminary design being at 90% with no changes expected to the transmission line alignment and only minor changes to key project elements. Further, the construction contractor will be responsible for the detailed siting of the proposed workers' camps and laydown areas and, once appointed, will be required to obtain all necessary licences and approvals to operate these facilities.

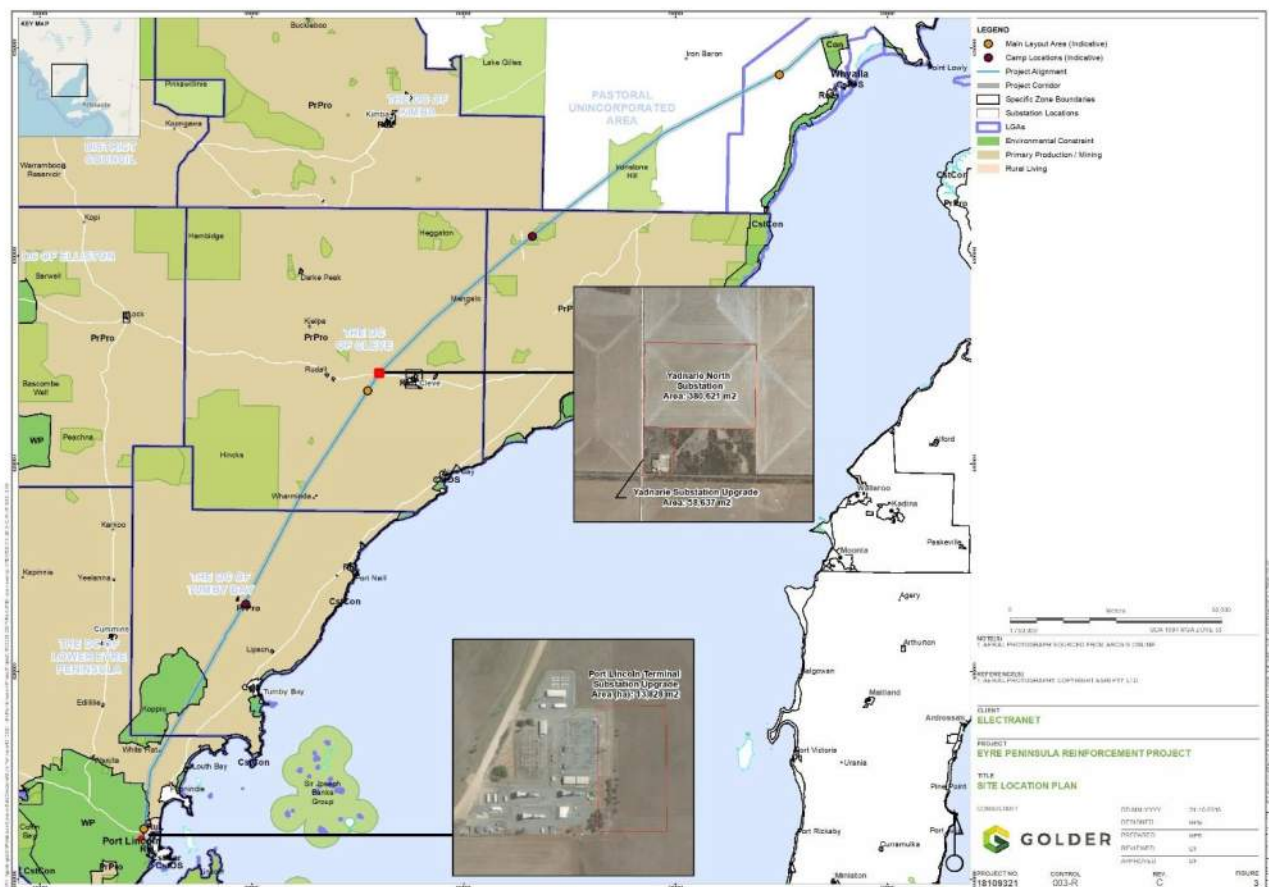


Figure 3: Project site plan

4.1 Project rationale

As previously described, the existing Eyre Peninsula 132kV radial transmission line is almost 50 years old and reaching a point where its limited capacity, age and condition means it is fast approaching the end of its operational life. Since its inception, demand on the Eyre Peninsula's electricity transmission system:

- Has continued to grow steadily due to the ongoing expansion of primary production, residential, industrial and commercial activities.
- Is likely to be further accentuated by:
 - growth in mining and associated infrastructure such as new ports and processing facilities, evidenced by five formal connection enquires made to ElectraNet by mining companies covering six separate spot load developments, reflecting various resource tenements under multiple ownerships; and
 - growth in renewable energy developments.

The potential increase in electricity demand is well beyond the capacity of the existing transmission network. Further, in order to optimise the social, economic and environmental benefits arising from expansion of primary production, mining and renewable energy activities, an augmented transmission network is required.

These current and future demand increases also mean that the relevant Electricity Transmission Code (ETC) standards at the Port Lincoln connection point will not be met. To ensure that future ETC standards are upheld, action is required by ElectraNet to reinforce and augment the existing network by 2021/22 to meet the forecast demand and ensure an ongoing reliable supply of electricity to the Eyre Peninsula.

4.2 Transmission line

ElectraNet is in the process of securing a 100m-wide easement adjacent to and on the western side of the existing 40m-wide 132kV transmission line easement in which to build the proposed transmission line. The transmission line will comprise:

- six (6) separate lines (conductors) mounted on 60m high lattice structures or monopoles on that part of the alignment between Cultana and Yadnarie; and
- three (3) separate conductors mounted on 50m high lattice structures or monopoles on that part of the alignment between Yadnarie and Port Lincoln.

There will be an average span of 400 – 500m between each structure with the transmission line corridor to extend a total distance of 270km, from the Cultana substation in the north to the Port Lincoln terminal substation in the south.

There are 207 separate land ownership parcels along the proposed transmission line alignment. The 140km of land easement between the Cultana substation and Yadnarie comprises predominantly large pastoral land holdings with a total of 62 properties being held by 28 different landowners, including the Crown as owner of conservation parks and reserves through which the alignment traverses. The remaining 126km of easement between Yadnarie and the Port Lincoln terminal substation consists of smaller landholdings, with a total of 145 properties being held by 79 landowners, including the Crown.

ElectraNet is in the process of reaching agreements with all landholders for access rights within the new easement.

For the most part, the proposed transmission line will be built approximately 30m in from the western edge of the new easement, leaving a buffer of at least 70m from the existing 132kV transmission line. ElectraNet has purposely designed the alignment in this way to allow for future augmentation of the transmission network (with the functional life of high voltage transmission lines being around 50 years).

A typical program of works to erect the transmission line will involve the following:

- Geotechnical investigations.
- Development of access tracks where required (see section 4.4 below).
- Installation of gates for security reasons where required.
- Marking out the precise position of structures to be erected.
- Clearing and levelling the area where the structures are to be positioned to ensure a stable and safe surface for construction (see section 4.3 below for a description of the structure pads). Structure pads will be rolled where possible to minimise vegetation impacts. Where required, this will take the form of 'scraping' the vegetation and associated soil materials with a bulldozer, stockpiling these materials until construction is complete, and returning the materials as close as possible to their original state to facilitate self-seeding of the vegetation (i.e. rehabilitation).
- Erection of the structures (see section 4.3 below).
- Stringing of the conductor cabling, usually undertaken in sections of 5-10km at a time. ElectraNet is currently working with potential construction contractors to determine how stringing will occur in order to minimise on-ground impacts. In most cases stringing will be undertaken within a stringing track using equipment such as winches and purpose-built stringing machines (see Figure 4).



Figure 4: Typical line stringing equipment

Figure 5, Figure 6 and Figure 7 depict typical stringing methods to be used on the Project.

The 'strain to strain' method involves the use of 'pullers' and 'tensioners' set up on level pads (see Figure 5) to pull the conductor wire under tension from one strain structure (tensioner) to another strain structure (puller). On completion of stringing, the conductor wire is then anchored with rigging gear to the strain cross-arm at one end, with the conductor measured, cut, terminated and connected to the strain insulator assembly. At the other end, the conductor wire is pulled to final required tension, measured, cut, terminated and connected to the strain insulator assembly. This process is repeated for all six (6) conductor wires and two (2) earthwires before installation of insulator/clamp assemblies.

This method is generally used for earthwire stringing.

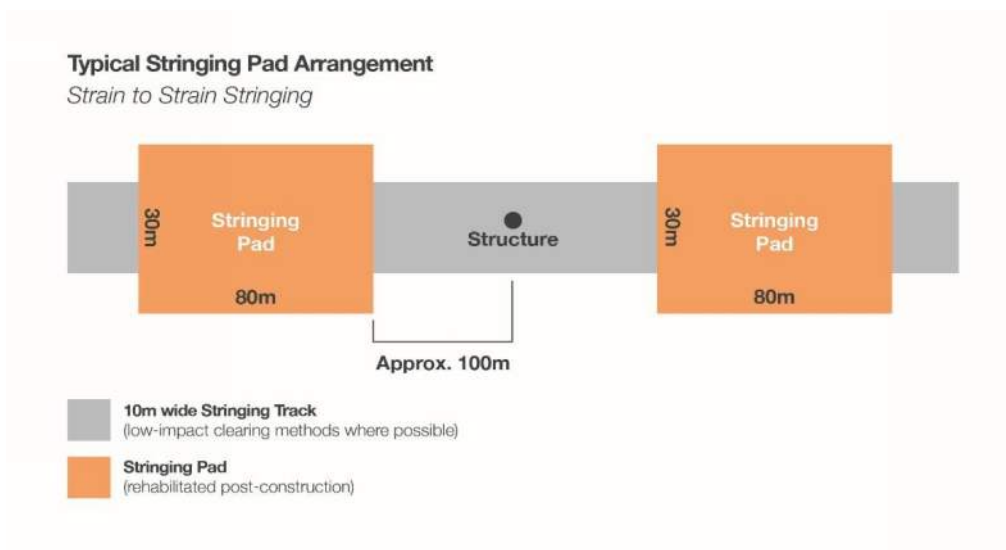


Figure 5: Typical stringing-strain to strain arrangement

The OPGW (or optical ground wire) method involves stringing a thinner wire used for both communications and grounding to the top of the structure. As this wire cannot be jointed without bringing it to ground level, additional pads are required along the alignment during the stringing process (see Figure 6).

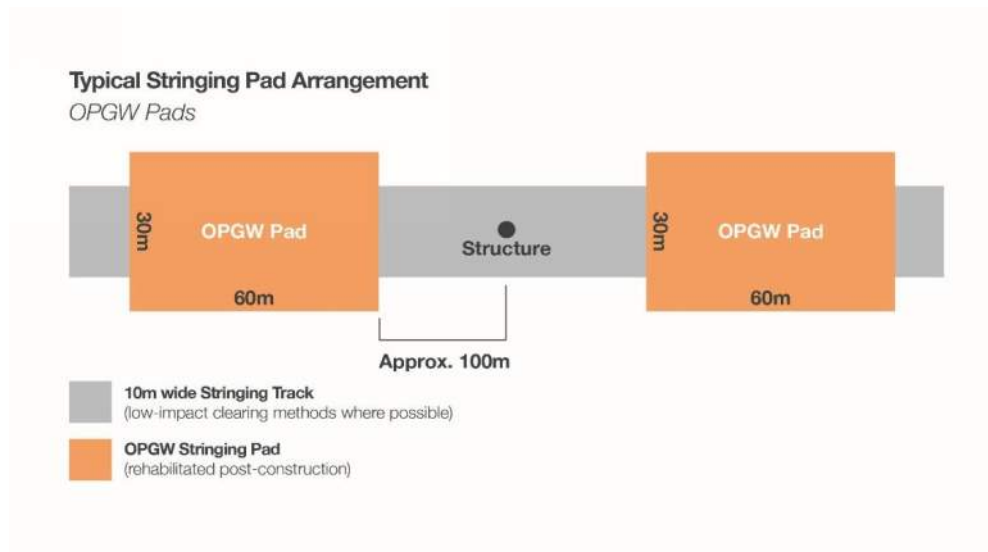


Figure 6: Typical stringing-OPGE arrangement

The ‘floating’ method involves using pullers and tensioners to pull the conductor wire under tension from the middle of a span (see Figure 7). On completion of stringing, the conductor wire is then anchored with rigging gear to a ground anchor. The conductor tails are jointed using a mid-span joint with the conductor wire then pulled sideways until tension is taken up by a sideways pulled winch. The conductor is then allowed to float until all tension is off the anchors and they can be disconnected. By pulling the other end back the conductor can be taken to final tension, measured, cut, terminated and connected to the strain assembly, or jointed to a previously installed section. This process is repeated for all six (6) conductor wires before installation of insulator/clamp assemblies.

This method is generally used for conductor wire stringing.

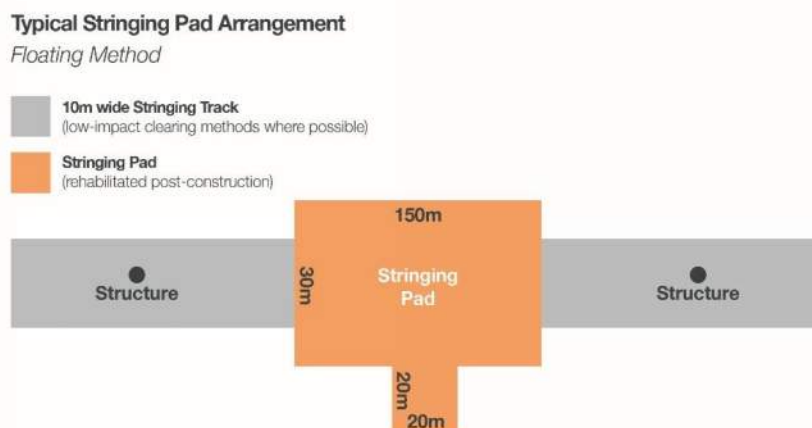


Figure 7: Typical stringing-floating arrangement

Where required, a separate stringing track will be established to accommodate the stringing process using a bulldozer with blades raised to remove larger trees while keeping shrubs, grasses and top soil largely intact. The vehicle used to carry the conductor wires into position will be rubber-wheeled (where possible) to minimise damage to remaining vegetation. On completion of stringing, the site will be rehabilitated. Measures will be implemented to prevent stringing tracks becoming access tracks where possible.

There is a possibility that aerial stringing will be used in some locations. This will be confirmed in the final version of the CEMP.

It is estimated that the project will require around 1800km of conductor cabling to be delivered to various sites along the alignment in drums capable of carrying 5 tonnes.

- Installation of security devices and measures, including ground earthing and anti-climbing devices.
- Inspections and commissioning tests prior to the transmission line being energised and put in service.

Construction of the transmission line will typically proceed in a linear fashion along the easement, concurrently at several different sites to be determined by the construction contractor.

4.2.1 Transmission line diversions

The new transmission line will run parallel to the existing line for most of the alignment. However, there are exceptions to this where constraints posed by the proximity of dwellings, difficult terrain and/or environmentally and culturally sensitive areas have led ElectraNet to divert the transmission line in order to avoid these areas and minimise impacts.

The following diversions are of note:

- Cultana substation to Structure 30 – a change in the alignment has been made to minimise the length of the transmission line on Defence land where access restrictions are in place, and to avoid identified cultural heritage sites, EPBC-listed fauna, the Whyalla Conservation Park and Wild Dog Hill. This section of the easement will be located east of the existing 132kV line and will require the construction of a new 5m wide in-easement access track (see section 4.4 below).
- Line deviation approximately 50-60m to the west at “Dingo Hill” to avoid siting a structure on a ridge with significant cultural heritage.
- Line deviation approximately 60m to the west at “The Pines” to avoid an area of significant cultural heritage.
- Line deviation approximately 150m to the west at “Nylow Hill” to avoid an area of significant cultural heritage.
- Line deviation at Whites Flat to avoid several residences (details to be confirmed during detailed design).
- The proposed transmission line passes over two dams north-east of the Middleback area and while no deviation is envisaged, further siting work is required to ensure there are no ongoing operational issues.
- The new line will not pass over the “Claypan” – a cultural heritage site to the west of the Middleback substation. An access restriction will be put in place to avoid disturbance of this area.
- The line passes through Wharminda Conservation Park with spur tracks to be established from existing tracks on the eastern side of the park.
- Existing sheds near Ungarra and Gawler Ponds Road will be relocated (with agreement of owners) to avoid line deviations.
- A structure is required in an area of significant vegetation near Pillaworta Hill. While the line is unlikely to be deviated, the structure will be sited to minimise clearance using a single spur access track and local clearance only.
- The line passes above a large tree in a valley on the north side of McAvany Lane with structures to be carefully sited to ensure the tree is not impacted.
- Line deviation at Boston to avoid several residences (details to be confirmed during detailed design).

The plans and information contained in APPENDIX A show where line diversions have been made to minimise potential impacts.

4.2.2 Visual amenity

ElectraNet acknowledges that high voltage transmission lines and structures can have a significant impact on the amenity of the landscapes through which they pass. In this case, the enlarged height of the proposed development means that it will have a greater visual impact than the existing transmission line, although this impact is generally understood and accepted by stakeholder and community groups consulted about the project (see section 8 below). There is strong support for the proposed location of the transmission line adjacent to the existing line (in preference to creating a new corridor) from landowners and community members owing to their familiarity with the existing transmission line, their recognition of the need for its augmentation and the fact that most residences are a significant distance from the alignment.

A further consideration relates to the requirement for the existing 132kV line to remain in situ until construction of the new transmission line is complete and the Australian Energy Regulator (AER) authorises the decommissioning and removal of the existing line. All landowners and community engagement participants have been informed of this requirement.

4.3 Structures

The proposed transmission line is to be supported by large lattice structures or monopoles of up to 60m in height. On average, it is proposed to erect one structure for every 400 - 500m span of transmission line, requiring a total of around 540 structures along the entire alignment, distributed as follows:

- Approximately 300 structures measuring 60m in height in the northern section of the easement from Cultana to Yadnarie. Structures in this section of the alignment are higher in order to clear native vegetation with minimal disturbance; and
- Approximately 240 structures measuring 50m in height in the southern section of the easement between Yadnarie and Port Lincoln where cropping activities are predominant.

Figure 8 below shows the typical transmission structures used by ElectraNet.

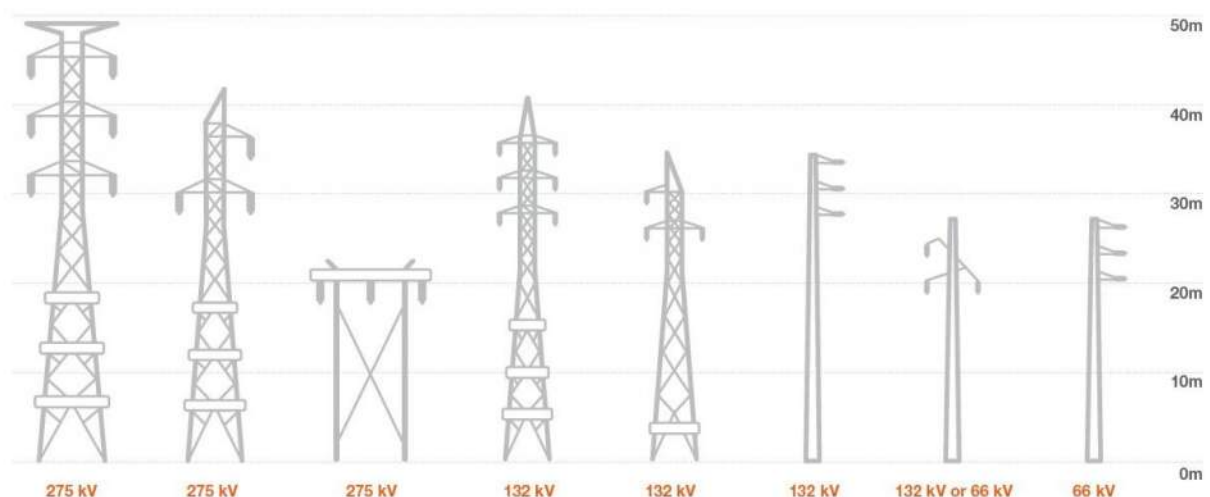


Figure 8: Typical transmission structures

The structures will be mounted on concrete structure pads measuring approximately 10m x 10m, enclosed within a maximum construction area of 50m x 50m to allow space for positioning large equipment (cranes,

piling rigs and winches) required to erect the structures and string the transmission line. The construction footprint will be minimised wherever possible, with structure pads of 30m x 30m achievable in some locations.

It should be noted that the *Electricity (General) Regulations 2012* require minimum clearance or setback distances from structures and vegetation that could present a risk to either the electricity infrastructure itself or the surrounding environment through bushfire. ElectraNet will apply these statutory clearances when erecting the structures and transmission line which will necessarily lead to some clearance of native vegetation. In all cases, ElectraNet has sought to minimise the extent of native vegetation clearance when determining the precise location of each structure and will erect higher structures if required to ensure it meets the regulatory standards.

Figure 9 and Figure 10 below depict typical structure pad arrangements in agricultural areas and conservation areas respectively.

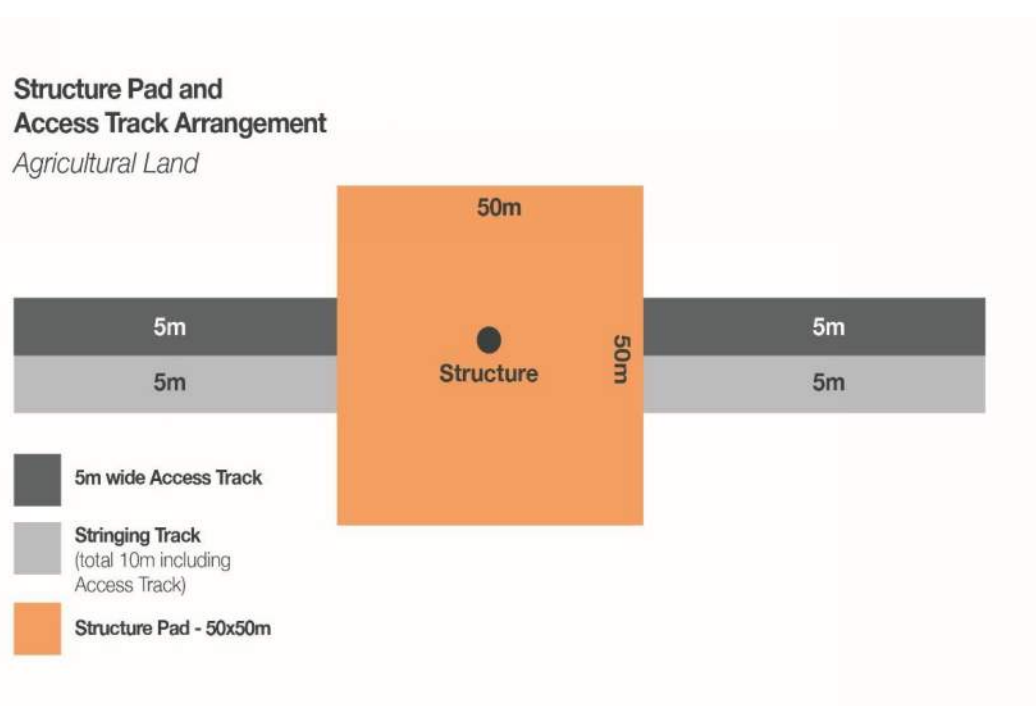


Figure 9: Typical structure pad arrangement-agricultural areas

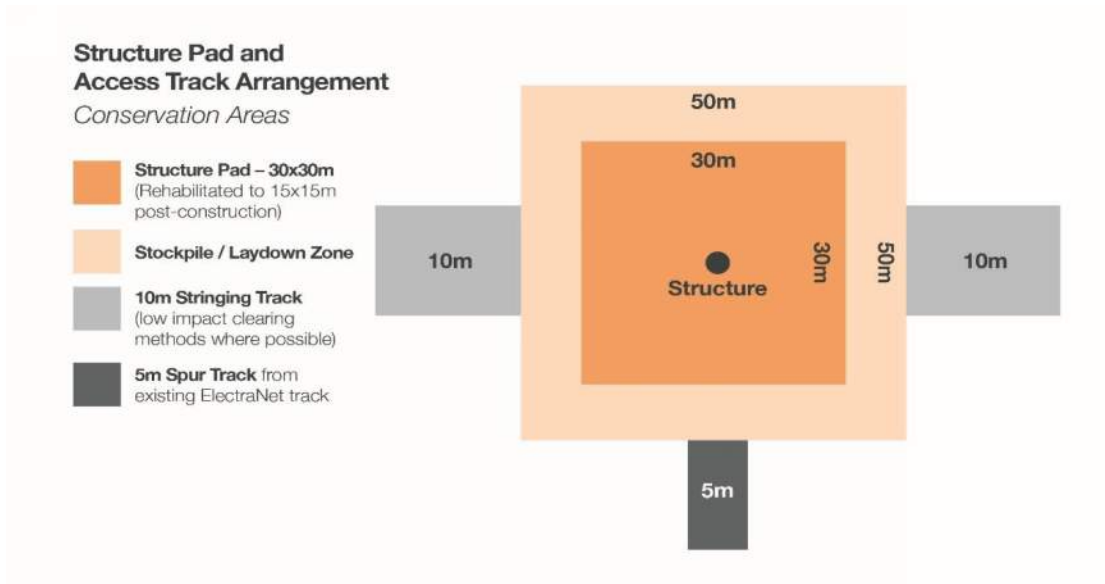


Figure 10: Typical structure pad arrangement-conservation areas

The sequence of construction for the structures involves the following:

- Installing foundations – drilling and excavation of soil and rock material to a depth of between 10-15m before driving piles and/or filling with concrete. Excavated fill will be spread across the site if agreed to by the landowner. If not, it will be removed and either used off-site (for capping or donated to local landowners) or transported to an appropriate disposal facility.
- Assembling structure – structure sections will be delivered to the site and then erected in sections using a large mobile crane and winch.

In areas of significant slope, the site will first be levelled and made safe for the subsequent erection of structures.

4.3.1 Concrete batching plants

Concrete batching plants are likely to be used to provide the foundation material for the structures and structure pads. The type, number and location of these plants are not yet known but will be confirmed on engagement of the construction contractor who will liaise with the EPA to obtain the necessary licences for the use of these plants.

4.4 Access tracks

There are a host of existing access tracks used to maintain the 132kV line and ElectraNet intends to use these as much as possible to access the proposed transmission line alignment. Where new access tracks are needed, bulldozers and graders will be used to clear vegetation (where required) to provide a trafficable surface. The tracks will nonetheless be designed to take the shortest route (with the potential to use short spur tracks off existing access tracks) and with as little impact as possible on existing cropping/grazing activities, native vegetation and sensitive areas. Some of the existing tracks will need to be upgraded to safely accommodate the type of vehicles and equipment required for the development, with upgrades similarly designed to minimise impacts.

Work on all access and spur tracks will be undertaken in accordance with ElectraNet's standards. During the development of these tracks, ElectraNet will maintain contact with affected landowners to ensure minimal disturbance.

Figure 11 (below) shows a typical access track arrangement.



Figure 11: Typical access track arrangement

4.5 Substations

The three substation developments proposed as part of the Transmission Supply Project will accommodate additional electricity infrastructure required to support the high voltage transmission line. Effectively these are switchyard developments (as transformers do not need to be installed) which will involve the following:

- Construction of a new switchyard immediately north of the existing substation at Yadnarie, located approximately 10km west of the township of Cleve. ElectraNet has purchased a separate land parcel measuring approximately 37.9 hectares on which to develop this switchyard.
- Extension of the existing Port Lincoln terminal substation by approximately 15m to the east, increasing the size of the substation footprint to a total area of approximately 3.2 hectares.
- A minor upgrade of the Cultana substation which will be accommodated within the existing substation footprint.

The proposed substations/switchyards will see the installation of small buildings to accommodate staff facilities, and technical control and protection systems that will allow the site to be remotely monitored and operated. Security fencing and other measures typical of substation developments will be installed to ensure public safety and protection of the infrastructure.

Indicative plans showing the typical layout of the proposed switchyards are contained in APPENDIX A.

4.6 Temporary workers' camps

Two (2) temporary workers' camps, each approximately one (1) hectare in size, will be developed as part of the project owing to the paucity of available accommodation facilities along the proposed alignment. One of these camps will be located at Ungarra (approximately 80km north of Port Lincoln) while the other will be located on the periphery of the Sheoak Hill Conservation Park (approximately 35km north-west of Cowell). While the precise siting of these camps is to be determined by the construction contractor as part of the detailed design phase, ElectraNet requires that they be sited in areas already disturbed by development of access tracks or maintenance activities, or in areas with limited native vegetation using the following criteria:

- Site is located close to alignment, is relatively flat, stable and capable of being secured and screened;
- Access for B-double trucks is available;
- Site has been previously cleared requiring no (or minimal) native vegetation clearance;

- No listed flora and fauna species are present;
- Items or sites of cultural heritage significance are not affected; and
- Site is located away from residences and other sensitive receptors.

Each camp will provide accommodation, amenities and kitchen (dry mess) facilities for around 70-80 workers and incorporate local power generation facilities (requiring integrated self-bunded diesel fuel storage tanks), wastewater treatment and stormwater management regimes. As noted, the construction contractor will obtain all licences and approvals for establishing and operating the camps from the relevant authorities.

Being of a temporary nature, the workers' camp sites will be rehabilitated immediately after use.

4.7 Temporary laydown areas

The project requires the development of three (3) main all-weather laydown areas, each approximately one - two hectares in size, within the easement at locations close to Whyalla, Cleve (Yadnarie) and Port Lincoln north. These areas will be used to store heavy vehicles, equipment and bulk materials (including large drums of conductor and earthwire cabling) needed to construct the transmission line with associated site offices and amenities housed within ATCO huts. Final siting of the proposed laydown areas will be determined by the construction contractor as part of the detailed design phase with site selection criteria as follows:

- Site is located close to alignment, relatively flat, stable, and capable of being secured and screened;
- Access for B-double trucks is available;
- No (or minimal) clearance of native vegetation is required;
- No listed flora and fauna species are present;
- Items or sites of cultural heritage significance are not affected; and
- Site is located away from residences and other sensitive receptors.

These laydown areas will incorporate security fencing, gates and areas for storage of diesel fuel within integrated self-bunded tanks. As with the workers' camps, the construction contractor will obtain all necessary licences and approvals to establish and operate the laydown areas.

Contractors undertaking the works will access the main laydown areas to collect equipment and materials which will then be transported to specific construction sites along the alignment. Smaller temporary laydown areas will be set up on existing access tracks along the alignment (where possible) to erect the structures and conductors with contractors required to meet ElectraNet's siting criteria when establishing these areas.

All laydown sites will be rehabilitated immediately after use.

Indicative plans showing the typical layout of the proposed laydown areas are shown in APPENDIX A.

4.8 Construction approach

Given the variability of terrain along the proposed alignment, the approach to constructing the transmission line will vary according to existing ground and access conditions. ElectraNet will continue to work with the construction contractor to ensure that the construction process meets its standards in relation to minimising environmental harm, protecting areas of cultural heritage significance, adhering to agreements made with landowners and ensuring that all relevant approvals/licences have been obtained.

While much of the proposed transmission line passes through primary production land on which agricultural activities can continue (so long as safe clearances are maintained), there will be instances where cropping areas may need to be cleared (or rolled if suitable) to develop access tracks, temporary workers' camps,

temporary laydown areas and structure pads. In such cases, the work will only occur with agreement from and in consultation with landowners.

However, a substantial proportion of the alignment traverses through relatively pristine areas of natural vegetation. The following sections summarise management measures to be employed during construction of the proposed development to minimise impacts with a detailed account of these measures included in the CEMP (see APPENDIX C).

4.8.1 Vegetation management

As previously noted, all efforts will be taken to minimise the extent of native vegetation clearance and the potential disturbance of fauna habitat arising from the construction of the proposed transmission line. ElectraNet is also keen to put in place a suitable SEB offset that goes beyond a simple dollar payment and will be negotiating the substance of this offset with the Native Vegetation Council.

The proposed alignment also passes over a number of native vegetation heritage agreement areas with ElectraNet to negotiate the amendment of these agreements with landowners and the Native Vegetation Council for the period of construction.

A referral to the Commonwealth Department of the Environment and Energy under the EPBC Act will be made to determine the extent to which the project may affect matters of NES. The ecological assessments completed to date confirm that the proposed transmission line is likely to impact some listed ecological flora and fauna communities.

During construction of the transmission line, a raft of measures will be employed to prevent or minimise the potential for weed invasion with a Weed Management Plan is to be developed as part of the CEMP.

In relation to the condition of land and vegetation post-construction, ElectraNet will undertake rehabilitation of the affected environment (including access tracks, laydown areas and workers' camps) with the aim being to return the land to its pre-construction state as much as possible. ElectraNet will continue to engage with landowners during the rehabilitation process and has secured agreement from some landowners to leave access and spur tracks in place to facilitate ongoing maintenance and inspections of the transmission line infrastructure.

4.8.2 Soil management

Temporary stockpiling of topsoils and subsoils may be required during the construction phase of the project for the establishment of structure pads and temporary laydown areas along the alignment. Assuming the worst case of an average depth of clearance being approximately 100mm, each structure would require a temporary stockpile of around 250 cubic metres (m³) with stockpiles to be limited to a height of 2m and area of 225m² (depending on the dimensions of the available cleared area).

Clearance will be minimised wherever possible and stockpiles will be located away from watercourses and sensitive areas and may be temporarily covered with cleared vegetation to reduce the potential for wind erosion.

On completion of construction activities, the stockpiled topsoil, subsoil and cleared vegetation will be re-spread over the cleared area with the sites left to naturally revegetate. If the soil is unsuitable for restoration, it will be disposed of in accordance with EPA Waste Fill requirements.

4.8.3 Watercourse management

The Tod River system is the only permanent flowing watercourse on the Eyre Peninsula, rising north of Yallunda Flat before flowing in a southerly direction to Louth Bay on the Spencer Gulf. The proposed transmission line traverses through Water Protection Zones administered by the District Councils of Tumby

Bay and Lower Eyre Peninsula (see section 5 below) which seek to protect the river system from pollution and contamination.

The line also crosses over a number of ephemeral streams along the corridor. All efforts will be taken to avoid or minimise impacts on these watercourses. The construction contractor will be instructed to ensure that no structures are placed in waterways during construction and where access tracks are required to cross a waterway, the contractor will liaise with Natural Resources Eyre Peninsula to obtain the necessary Water Affecting Activity permits to minimise impacts on surface water hydrology.

4.8.4 Water supply during construction

Potable water will be needed for use in concrete manufacture, workers' camps and staff amenities, with lower quality water to be used for compaction of the foundations at structure sites and for dust suppression of cleared areas along the alignment. The water is likely to be obtained from a number of sources, including existing and new groundwater wells and the State's potable water network. Water may be stored in large, temporary above-ground storages (water tanks or turkeys nests) which will be removed after use or donated to relevant landowner(s).

Detailed information on the supply and storage of water, as well as management of dewatering that may be encountered in some areas during construction, will be confirmed as part of the detailed design phase.

4.8.5 Bushfire management

The proposed development passes through areas of significant bushfire risk. For this reason, ElectraNet intends to develop and implement a Bushfire Management Plan as part of the CEMP. This plan will formalise the following measures:

- On days of **catastrophic** fire danger, no work will be undertaken.
- On days of **extreme** fire danger, a risk assessment will be undertaken at every construction site of the work scheduled for that day and whether this work would constitute a serious risk in the conditions. If it is considered that the risk could be adequately mitigated and the landowner agrees with that assessment, work may proceed, although no 'hot work' (angle grinding, welding and the like) will be undertaken. If the risk cannot be adequately mitigated, work will cease. On extreme fire danger days, it is more likely that no work will occur.
- On days of **severe** fire danger, the same risk procedure as that for days of extreme fire danger will be implemented with no 'hot work' to be undertaken and no work at all if risks cannot be adequately mitigated. On these days, it is more likely that work will occur with the proviso that the risk will be monitored throughout the day.

Contractors will be required to keep fire-fighting equipment on each construction site, including fire pumps mounted on 400 litre water tanks and high-pressure hoses. Mobile work teams will also be required to carry fire-fighting equipment in the form of (smaller) water tanks and hoses. Contractors will also be required to comply with Country Fire Service (CFS) permits in relation to undertaking 'hot work'.

It is worth noting that the statutory requirements for electricity infrastructure to be setback well away from vegetation will be met during construction of the proposed development to minimise the risk of bushfire along the transmission line and on the substation sites.

4.8.6 Heritage management

There are two local heritage listed properties along the proposed alignment. These include a cottage and outbuilding located at 689 White Flat Road in the District Council of Lower Eyre Peninsula and a dwelling located at Section 126, Hundred of Koppio, Yallunda Flat in the District Council of Tumby Bay. In the case of the dwelling and outbuilding at 689 White Flat Road, the place displays historical, economic and social themes

of importance and represents customs or ways of life characteristic of the local area. In the case of the dwelling at Yallunda Flat, there are no details available on the reasons for its listing.

Both Councils have been informed about the proximity of the proposed development to these heritage places and both have confirmed that they have no concerns that the heritage values of these places will be impacted (see **Appendix E**).

A Non-Aboriginal Heritage Management Plan is to be developed as part of the CEMP to ensure that the heritage values of these items are protected during construction of the proposed development.

4.8.7 Traffic management

ElectraNet has met with relevant local councils to discuss the traffic management issues associated with the proposed development. The maximum size of vehicles transporting equipment and infrastructure will be B-doubles, which can be accommodated on all roads forming the route to construction sites and laydown areas. A Traffic Management Plan confirming the type and size of vehicles and routes taken to deliver infrastructure components and the areas of the road network that will need to be reinforced (in consultation with the DPTI and local councils) will be submitted by the construction contractor during the detailed design phase.

5.0 PLANNING ASSESSMENT

The proposed transmission line and substations are located in the following local government areas/zones.

Table 4: Zones accommodating the project

Local Government Area	Relevant Zones
City of Whyalla	Remote Area Zone
District Council of Franklin Harbour	Primary Production Zone
District Council of Cleve	Primary Production Zone (includes Yadnarie substation)
District Council of Tumby Bay	Primary Production Zone; Water Protection Zone
District Council of Lower Eyre Peninsula	Primary Production Zone, Rural Living Zone, Water Protection Zone (includes Port Lincoln terminal substation)
Out of Council Area	Remote Areas Zone

Given that the transmission line is to extend approximately 50km through land that is not within a Council area, it requires assessment against the provisions of the new *Planning and Design Code as applying to Land Not Within a Council Area* (Outback Code). The Outback Code is an instrument of the PDI Act which will soon supersede the Development Act.

Pursuant to Regulation 11(5) of the *Planning, Development and Infrastructure (Transitional Provisions) Regulations 2017*, and subsequently confirmed by written advice received from DPTI, the proposed development *in its entirety* (including the transmission line and substations) is to be assessed against the relevant provisions of the Outback Code. A secondary assessment against the provisions of the local Development Plan for those elements of the proposed development that pass through the relevant council area is also required. In addition, the development is to be assessed for consistency with the new State Planning Policies (SPPs).

5.1 State Planning Policies

The SPPs are the highest order policies in South Australia's planning system and bring together the State Government's key priorities for land use and development. While the SPPs are not used specifically for assessing development proposals, it is a requirement of the new planning system that development is consistent with the SPPs. Given the significance of the proposed transmission line and substations in enhancing the capacity and reliability of South Australia's energy system, it is important that the effects of the proposed development are compatible with the SPPs and achieve the policy objectives expressed within them.

An assessment of the SPPs considered relevant to the proposed development is provided in the following table.

Table 5: Relevant State Planning Policies

State Planning Policy (SPP)	Consistency of Proposed Development
SPP 1 - Integrated Planning	Upgrade of the existing transmission line is a necessary infrastructure development supporting industry development and enhancing socio-economic growth and sustainability of the Eyre Peninsula region.
SPP 3 - Adaptive Reuse	Upgrade of the existing transmission line uses an extension of the existing line easement and so minimises impacts on environmentally sensitive areas, natural resources, agricultural activities and local communities.
SPP 4 - Biodiversity	Extension of the existing line easement helps minimise impacts on the region's biodiversity in line with the requirements of the EPBC Act while supporting the economy. Loss of native vegetation as a result of the proposed development will be offset through an appropriate SEB to be approved by the Native Vegetation Council.
SPP 5 - Climate Change	Upgrade of the existing transmission line will allow for the development of further renewable energy sources across the Eyre Peninsula, contributing to South Australia's renewable energy targets, reduced emissions and regional economic growth.
SPP 7 - Cultural Heritage	A cultural heritage survey involving Barngarla men and women from the Native Title Claimants was undertaken for the transmission line corridor with several culturally significant items identified. A Cultural Heritage Management Plan is being prepared in consultation with the Barngarla representatives and will detail agreed protocols for protecting these items during the construction of the transmission line.
SPP 8 - Primary Industry	The proposed development will support primary industry value chains and the economic activity these generate across the region. All efforts will be made to minimise disruption of agricultural activities during construction of the transmission line. On completion of construction, these agricultural activities will remain largely unaffected by the development.
SPP 10 – Mineral and Energy Resources	Upgrade of the existing transmission line will increase the long-term capacity and reliability of electricity supply in the region and allow for growth of the mining and renewable energy sectors that support the South Australian and regional economies while fostering community development.
SPP 12 - Energy	Upgrade of the existing transmission line will increase the long-term capacity and reliability of electricity supply on which industries and households depend, providing a range of social, economic and environmental benefits to the region and the State.
SPP 15 - Natural Hazards	The proposed development will be constructed in a manner designed to mitigate the risks posed by natural hazards in accordance with the CEMP.

5.2 Relevant assessment provisions

The following sections provide a planning analysis of the Transmission Supply Project against the relevant provisions of the Outback Code (July 2019), the Whyalla Council Development Plan (consolidated 14 June 2017), Franklin Harbour Council Development plan (consolidated 11 February 2016), Cleve Council Development Plan (consolidated 23 April 2015), Tumbly Bay (DC) Development Plan (consolidated 6 March 2018) and the Lower Eyre Peninsula Council Development Plan (consolidated 12 July 2018).

The sections are presented as follows:

- Assessment of the proposed development (in full) against the Planning and Design Code as applying to land not within a Council area (section 5.2.1).
- Assessment of the relevant components of the proposed development that are located within particular zones of each Council area (section 5.2.2).
- Assessment of the proposed development against the general provisions of all five Council areas (section 5.2.3).

5.2.1 Planning and Design Code

Approximately 50km of the transmission line alignment, supported by 106 structures passes through land not within a Council area (at an average frequency of 1 structure every 472m).

The alignment passes exclusively through the Remote Areas Zone of the Outback Code. There are no Subzones that are applicable. The following table provides an assessment of the proposal against the relevant provisions of the Code.

Table 6: Relevant provisions - Outback Code

Outback Code	
Remote Areas Zone provisions	
Desired Outcome	<i>A diverse range of activities from pastoral, grazing and farming activities, agricultural processing and transportation, mining and petroleum (and associated settlement activities), the generation and storage of energy, pipelines or infrastructure, aerospace and defence related activities (and associated settlement activities), tourism, remote settlements, Aboriginal lands and related rural land activities.</i>
PO 1.1	<i>Development sited and designed to protect natural features and the conservation value of the area.</i>
While the transmission of energy is not a land use specified as desired in the zone, the proposed development is a necessary adjunct to the generation and storage of energy and provides the essential infrastructure required to support the ongoing viability and growth of all activities desired in the zone. The proposed transmission line, substations, access tracks, laydown areas and workers' camps have been carefully designed and sited to minimise impacts on the natural environment and maintain the conservation value of areas within the zone.	
Overlay provisions	
Hazards (Bushfire – Outback) Overlay	
Desired Outcome	<i>Development is located to minimise the threat and impact of bushfires on life and property.</i>
PO 2.1	<i>Roads are designed and constructed to facilitate safe and effective:</i>

	<ul style="list-style-type: none"> a) <i>use, operation and evacuation of fire-fighting and emergency personnel; and</i> b) <i>evacuation of residents.</i>
<p>The proposed transmission line is to be built on an extension of the existing transmission line easement in order to minimise the overall impact of the development, including its susceptibility to bushfire risk.</p> <p>Access tracks used to access the transmission line easement and proposed substations and laydown areas will be designed to safely accommodate heavy vehicles, construction equipment and emergency service vehicles while providing for unimpeded access to and egress from construction sites.</p> <p>The CEMP for the project includes a bushfire management plan that details procedures to be followed to mitigate the risk of bushfire during construction of the transmission line and substations.</p>	
<p>Significant Landscape Protection Overlay</p>	
Desired Outcome	<i>Conserve the natural and rural character and scenic and cultural qualities of significant landscapes.</i>
PO 1.1	<p><i>Development carefully sited and designed to:</i></p> <ul style="list-style-type: none"> a) <i>minimise disruption to natural landforms;</i> b) <i>avoid clearance of native vegetation;</i> c) <i>minimise impacts on wildlife habitat;</i> d) <i>be visually unobtrusive by blending in with the surrounding area.</i>
PO 1.2	<p><i>Buildings and structures limited to those that:</i></p> <ul style="list-style-type: none"> a) <i>are ancillary, adjacent to and of the same or lesser scale as existing buildings.</i>
PO 2.1	<i>Development retains existing native vegetation and supports revegetation with plant species indigenous to the locality.</i>
<p>Designed and sited to minimise impacts on natural, rural and cultural landscapes, the proposed transmission line replicates and extends the existing transmission line alignment while the proposed substations modestly extend the footprint of existing substations. Construction of the development will require the clearance of native vegetation with all efforts taken to minimise the extent of clearance, including changing the alignment to ensure the conservation of valued areas of native vegetation and wildlife habitat.</p> <p>As noted, an application for native vegetation clearance will be submitted to the Native Vegetation Council with an appropriate SEB to be provided.</p>	
<p>State Heritage Place Overlay</p>	
Desired Outcome	<i>Recognition of the major contribution that South Australia's State Heritage Places make to South Australia's identity and economy through ongoing use, conservation and adaptive reuse opportunities.</i>
PO 1.1	<p><i>Development maintaining the heritage value of a State Heritage Place through respecting the context, by managing the following elements:</i></p> <ul style="list-style-type: none"> a) <i>massing and scale;</i> b) <i>boundary setbacks and setting;</i> c) <i>proportion and composition of design elements such as rooflines, windows and doors and façade width and modulation; and</i> d) <i>type, colour and texture of external materials.</i>

PO 1.2	<i>New buildings are not placed or erected between the front street boundary and the façade of a State Heritage Place.</i>
<p>The proposed transmission line passes over two State Heritage Places - the Poonindie Mission and the site of the former CW Schuermann's Lutheran Mission – which have significant links with past interactions between Aboriginal people and colonial settlers and as places where rations were distributed, fringe camps established and ceremonial activities undertaken. A Heritage Management Plan has been developed as part of the CEMP to ensure that the heritage values of these items are protected during construction of the transmission line which will not materially affect the value of these places.</p>	
Water Protection Area Overlay	
Desired Outcome 1	<i>Safeguard South Australia's public water supplies by protecting regionally and locally significant surface and underground water resources from pollution.</i>
Desired Outcome 2	<i>Protect surface and underground water resources in ecologically significant Water Protection Areas.</i>
PO 1.1	<p><i>Groundwater resources are protected from pollution by ensuring development does not:</i></p> <ul style="list-style-type: none"> <i>a) generate and dispose waste in a manner that would pollute water resources;</i> <i>b) involve the storage or disposal of chemicals or hazardous substances in a manner that would pose an unsatisfactory risk to water supplies.</i>
PO 1.2	<p><i>Groundwater catchment and recharge characteristics are safeguarded by ensuring development:</i></p> <ul style="list-style-type: none"> <i>a) retains and protects existing areas of native vegetation; and</i> <i>b) does not inhibit the potential of an aquifer to recharge.</i>
<p>The construction of the proposed transmission line will be undertaken in a manner that avoids pollution or contamination of all surface and underground water resources, including those in ecologically significant Water Protection Areas. While the development will require the clearance of native vegetation, this will be undertaken in a manner that will not inhibit aquifer recharge.</p>	
General provisions	
Design and Siting	
Desired Outcome	<p><i>Development that achieves high design quality by being:</i></p> <ul style="list-style-type: none"> <i>a) contextual – by considering, recognising and carefully responding to its surroundings and positively contributing to the character of the immediate area;</i> <i>b) durable – fit for purpose, adaptable and long lasting.</i>
PO 1.1	<i>Development, including land division, is integrated with the natural and cultural landscape through preservation of environmental and cultural features and values of the site and locality.</i>
PO 10.1	<i>Development incorporates appropriate facilities for on-site storage and collection of refuse (including facilities to enable the separation of recyclable materials).</i>
PO 12.1	<i>Development, including any associated driveways or tracks, minimises the need for earthworks to limit disturbance to natural topography.</i>

<p>The design of the proposed development responds sensitively and positively to the contextual environment and provides essential infrastructure that is durable and of significant benefit to the region. Waste generated during the construction process will be appropriately treated and/or stored before removal off-site while existing and new access tracks and laydown areas have been designed to minimise disturbance to the natural environment.</p> <p>Sites of cultural significance to the Barngarla people have been surveyed and identified and will be protected through implementation of the Cultural Heritage Management Plan to be developed as part of the project.</p>	
<p>Infrastructure and Renewable Energy Facilities</p>	
Desired Outcome	<p><i>The efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and that suitably manages adverse visual impacts on natural and rural landscapes and residential amenity.</i></p>
PO 1.1	<p><i>Development located and designed to minimise hazard or nuisance to adjacent development and land uses.</i></p>
PO 2.1	<p><i>The visual impact of above ground infrastructure networks and services, renewable energy facilities, energy storage facilities and ancillary development from townships, scenic routes and public roads is minimised and managed by:</i></p> <ul style="list-style-type: none"> <i>a) utilising features of the natural landscape to obscure views where practicable;</i> <i>b) siting development below ridgelines where practicable;</i> <i>c) avoiding visually sensitive and significant landscapes;</i> <i>d) using materials and finishes with low reflectivity and colours that complement the surroundings;</i> <i>e) using existing vegetation to screen buildings; and</i> <i>f) incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments used for residential or other sensitive land uses.</i>
PO 2.2	<p><i>Substations, pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetated buffers around the perimeter to reduce adverse visual impacts when viewed from adjacent land.</i></p>
PO 2.3	<p><i>The visual impact of excavation and earthworks for the installation of storage facilities, pipework, penstock, substations or the like is minimised through the reinstatement of exposed surfaces, revegetation and rehabilitation.</i></p>
PO 3.1	<p><i>The progressive or future rehabilitation of disturbed areas ahead of, or upon, decommissioning of areas used for (or have been used for) renewable energy facilities and transmission corridors.</i></p>
PO 4.2	<p><i>Facilities for energy generating, power storage and transmission separated from dwellings, tourist accommodation and frequently visited public places (such as viewing platforms/lookouts) to reduce risks to public safety from fire or equipment malfunction.</i></p>
PO 5.1	<p><i>Electricity infrastructure located to minimise visual impacts through techniques including:</i></p> <ul style="list-style-type: none"> <i>a) siting utilities and services: <ul style="list-style-type: none"> <i>i. on areas already cleared of native vegetation; or</i> <i>ii. where there is minimal interference or disturbance to existing native vegetation or biodiversity; and</i> </i>

	<i>iii. grouping utility buildings and structures with non-residential development, where practicable.</i>
<p>By extending the existing alignment and footprint of existing substations, the proposed development responds sensitively and positively to the contextual environment and provides essential infrastructure that is durable and of significant benefit to the region. While the visual impacts associated with the proposed transmission line will be greater than those of the existing 132kV line by virtue of its greater height, these impacts are largely unavoidable and have been discussed with local landowners/residents and minimised where possible. Siting of the proposed laydown areas and workers' camps has also avoided areas of environmental, cultural and heritage significance.</p>	
Interface Between Land Uses	
Desired Outcome	<i>Development located and designed to mitigate adverse effects on neighbouring and proximate land uses to reduce potential for conflict.</i>
PO 1.2	<i>Development adjacent to a site containing a sensitive land use or zone primarily intended to accommodate sensitive land uses designed to minimise adverse impacts.</i>
PO 4.1	<i>Development that emits noise (other than music noise) does not unreasonably impact acoustic amenity at the nearest existing sensitive land use.</i>
PO 4.2	<p><i>Areas for the on-site manoeuvring of service and delivery vehicles, plant and equipment, outdoor work spaces (and the like) are designed and sited to not unreasonably impact the amenity of adjacent sensitive land uses and zones primarily intended to accommodate sensitive land uses due to noise and vibration by adopting techniques including:</i></p> <ul style="list-style-type: none"> <i>a) locating openings of buildings and associated services away from the interface with the adjacent sensitive land uses and zones primarily intended to accommodate sensitive land uses;</i> <i>b) when sited outdoors, locating such areas as far as practicable from adjacent sensitive land uses and zones primarily intended sensitive land uses;</i> <i>c) housing plant and equipment within an enclosed structure or acoustic enclosure; and</i> <i>d) providing a suitable acoustic barrier between the plant and/or equipment and the adjacent sensitive land use boundary or zone.</i>
<p>Given that the existing transmission line and substations have operated for many years without disturbing adjacent and nearby activities, it is considered that the proposed development is unlikely to create adverse impacts on neighbouring and proximate land uses. During construction of the development, areas will be set aside to safely accommodate the manoeuvring of vehicles delivering plant and equipment, including the lattice structures to be erected to support the proposed transmission line. These areas have been sited to minimise impacts on native vegetation, places of cultural and heritage significance and sensitive receptors.</p>	
Transport, Access and Parking	
PO 1.1	<i>Development integrated with the existing transport system and designed to minimise its potential impact on the functional performance of the transport system.</i>
PO 1.4	<i>Development sited and designed so that loading, unloading and turning of all traffic likely to be generated avoids interrupting the operation of and queuing on public roads and pedestrian paths.</i>

PO 3.1	<i>Safe and convenient access that ensures vehicles can enter and exit a site safely, and minimises impact on or interruption to the operation of public roads.</i>
PO 3.2	<i>Access points designed to accommodate the type and volume of traffic likely to be generated by the development or land use.</i>
PO 3.3	<i>Access points sited and designed to minimise any adverse impacts on neighbouring properties.</i>
PO 3.8	<i>Driveways, access points, access tracks and parking areas are designed and constructed to allow adequate movement and manoeuvrability having regard to the types of vehicles that are reasonably anticipated.</i>
<p>The traffic to be generated by the proposed development will involve heavy vehicles (transporting structure sections, conductors, cabling and other electricity infrastructure) as well as vehicles used by workers accessing the site. The latter is unlikely to affect the functional performance of the transport network. A Traffic Management Plan will be developed to ensure that the transport of construction materials by heavy vehicles will not disrupt the efficient functioning of the transport system in those localities requiring access. Access tracks to construction sites will be designed to accommodate the anticipated heavy vehicle traffic safely and in accord with all relevant requirements.</p>	
Workers Accommodation and Settlements	
Desired Outcome	<i>Appropriately designed and located accommodation for seasonal and short-term workers in rural areas that minimises environmental and social impacts.</i>
PO 1.1	<i>Workers settlements and accommodation sited and designed to minimise impacts on views from scenic routes, tourist destinations and areas of conservation significance.</i>
PO 1.2	<i>Workers settlements and accommodation sited and designed to minimise nuisance impacts on the amenity of adjacent users of land.</i>
PO 1.4	<i>Workers settlements and accommodation designed with materials and colours that blend with the landscape.</i>
PO 1.5	<i>Workers settlements and accommodation supplied with service infrastructure such as power, water and effluent disposal sufficient to satisfy the living requirements of workers.</i>
<p>For the most part, the temporary workers' camps will be sited either on cropping land or in areas already disturbed by maintenance activities associated with the existing transmission line in order to minimise impacts on the surrounding environment, including areas of conservation significance. Camps will, in most cases, be located some distance away from residences and other sensitive receivers and will incorporate the range of amenities normally associated with living environments, including toilet and showering, kitchen, dining and sleeping facilities in ATCO huts. Waste produced through camp activities will either be treated on site or stored securely prior to removal in accordance with all regulatory requirements.</p>	

5.2.2 Council zone provisions

5.2.2.1 Whyalla Council

Approximately 26.5km of the transmission line alignment, supported by 54 structures passes through the Remote Area Zone of the City of Whyalla (at an average frequency of 1 structure every 490m).

The following table provides an assessment of the proposal against the relevant Zone provisions of the Whyalla Council Development Plan (consolidated 14 June 2017).

Table 7: Relevant Zone provisions - City of Whyalla

Objectives and Principles of Development Control (PDCs)	
Remote Area Zone	
Objective 1	<i>A zone accommodating a remote area to the west and south-west of Whyalla suited to pastoral, conservation and mining activities.</i>
Objective 2	<i>A zone recognising the associated Aboriginal and non-Aboriginal cultural significance of the region, including places of heritage significance and established pastoral, grazing and farming activities.</i>
Objective 5	<i>Infrastructure provided in an economical and environmentally sensitive manner.</i>
Objective 7	<i>Development that contributes to the desired character of the zone.</i>
PDC 6	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>
PDC 7	<i>Development should not mar the natural features and scenic beauty of landscapes within the zone.</i>
PDC 8	<i>Utilities and services, including access roads and tracks, should be sited on areas already cleared of native vegetation. If this is not possible, their siting should cause minimal interference or disturbance to existing native vegetation and biodiversity.</i>
PDC 9	<i>Development should not be undertaken unless infrastructure to meet the needs of the development is in place or forms part of the development.</i>
PDC 10	<i>Development should only be undertaken in a manner that protects fragile ecosystems and the natural environment, and avoids hazards and impacts of inundation in those parts of the zone that are subject to occasional flooding.</i>
<p>While the desired character seeks the retention of an open, semi-arid rural landscape, it also envisages the presence of power lines, including those connecting to the National Electricity Grid. For this reason, it is considered that the proposed transmission line is consistent with the desired character for the zone. The proposed development also provides essential infrastructure in an economical and environmentally sensitive manner through its siting on an extension of the existing transmission line easement which has helped to minimise impacts on fragile ecosystems, natural features and the scenic beauty of landscapes within the zone. Access roads associated with the development are either existing or have been carefully sited to minimise the need to clear native vegetation or disturb biodiversity. The development has also avoided areas of Aboriginal cultural significance in consultation with Barngarla people.</p>	

5.2.2.2 Franklin Harbour Council

Approximately 24.5km of the transmission line alignment, supported by 48 structures passes through the Primary Production Zone of the District Council of Franklin Harbour (at an average frequency of 1 structure every 510m).

The following table provides an assessment of the proposal against the relevant Zone provisions of the Franklin Harbour Council Development Plan (consolidated 11 February 2016).

Table 8: Relevant Zone provisions - District Council of Franklin Harbour

Objectives and Principles of Development Control (PDCs)	
Primary Production Zone	
Objective 3	<i>Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.</i>
Objective 4	<i>Development that contributes to the desired character of the zone.</i>
PDC 10	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>
PDC 11	<i>Development should not occur within 500 metres of a National Park, Conservation Park, Wilderness Protection Area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants.</i>
<p>The desired character for this zone explicitly envisages electricity infrastructure in the form of power lines, substations, maintenance sheds and access roads as constituting a necessary component of the zone's character. The proposed development will maintain that character whilst allowing for the ongoing protection of primary production land. It is acknowledged that the visual impact of the transmission line and structures will be greater than that of the existing line, but as an entrenched land use within the zone, the development is unlikely to compromise the existing scenic qualities of open rural landscapes. Although the existing and proposed alignment extends unavoidably through conservation parks and stands of native vegetation, it has been designed to minimise impacts and conserve particularly sensitive flora and fauna. The CEMP also includes strategies to prevent the spread of pest plants during construction and maintenance.</p>	

5.2.2.3 Cleve Council

Approximately 73.5km of the transmission line alignment, supported by 150 structures passes through the Primary Production Zone of the District Council of Cleve (at an average frequency of 1 structure every 490m). The proposed Yadnarie substation is also located in this zone.

The following table provides an assessment of the proposal against the relevant Zone provisions of the Cleve Council Development Plan (consolidated 23 April 2015).

Table 9: Relevant Zone provisions - District Council of Cleve

Objectives and Principles of Development Control (PDCs)	
Primary Production Zone	
Objective 3	<i>Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes and significant stands of native vegetation.</i>
Objective 6	<i>Development that contributes to the desired character of the zone.</i>
PDC 9	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>

PDC 10	<i>Development should not occur within 500 metres of a National Park, Conservation Park, Wilderness Protection Area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants.</i>
<p>The desired character for this zone explicitly envisages electricity infrastructure in the form of power lines, substations, maintenance sheds and access roads as constituting a necessary component of the zone's character. The proposed development will maintain that character whilst allowing for the ongoing protection of primary production land. It is acknowledged that the visual impact of the transmission line, structures and new Yadnarie switchyard will be greater than that of the existing infrastructure, but as an entrenched land use within the zone, the development is unlikely to compromise the existing scenic qualities of open rural landscapes. Although the existing and proposed alignment extends unavoidably through conservation parks and stands of native vegetation, it has been designed to minimise impacts and conserve particularly sensitive flora and fauna. The CEMP also includes strategies to prevent the spread of pest plants during construction and maintenance.</p>	

5.2.2.4 Tumby Bay Council

Approximately 61.5km of the transmission line alignment, supported by 122 structures, passes through the Primary Production and Water Protection Zones of the District Council of Tumby Bay (at an average frequency of 1 structure every 504m).

The following table provides an assessment of the proposal against the relevant Zone provisions of the Tumby Bay Council Development Plan (consolidated 6 March 2018).

Table 10: Relevant Zone provisions - District Council of Tumby Bay

Objectives and Principles of Development Control (PDCs)	
Primary Production Zone	
Objective 3	<i>Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.</i>
Objective 5	<i>Development that contributes to the desired character of the zone.</i>
PDC 9	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>
PDC 10	<i>Development should not occur within 500 metres of a National Park, Conservation Park, Wilderness Protection Area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants.</i>
<p>The desired character for this zone explicitly envisages electricity infrastructure in the form of power lines, substations, maintenance sheds and access roads as constituting a necessary component of the zone's character. The proposed development will maintain that character whilst allowing for the ongoing protection of primary production land. It is acknowledged that the visual impact of the transmission line and structures will be greater than that of the existing line, but as an entrenched land use within the zone, the development is unlikely to compromise the existing scenic qualities of open rural landscapes. Although the existing and proposed alignment extends unavoidably through conservation parks and stands of native vegetation, it has been designed to minimise impacts and conserve particularly sensitive flora and fauna. Measures to prevent the spread of pest plants during construction and maintenance are included in the CEMP.</p>	

Water Protection Zone	
Objective 1	<i>Protection of surface and underground water resources from pollution, contamination or unsustainable use.</i>
Objective 2	<i>Development excluded from the zone where it is liable to contribute to the contamination or pollution of surface and underground water resources or the reduction of aquifer recharge.</i>
Objective 6	<i>Development that contributes to the desired character of the zone.</i>
PDC 3	<i>Development should not:</i> <ul style="list-style-type: none"> a) <i>prejudice the protection of the water catchment</i> b) <i>affect the quality and quantity of the catchment's water resources</i> c) <i>inhibit the potential of the aquifer to recharge</i> d) <i>involve the storage or disposal of hazardous substances.</i>
PDC 8	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>
PDC 10	<i>Buildings and structures should be setback a minimum of 50 metres from all roads.</i>
<p>The construction of the proposed transmission line will be undertaken in a manner that prevents pollution or contamination of all surface and underground water resources. Structures associated with the development will generally be setback in excess of 50m from roads, although some structures may need to be placed closer to roads in order to minimise impacts on agricultural activities.</p>	

5.2.2.5 Lower Eyre Peninsula Council

Approximately 26.5km of the transmission line alignment, supported by 60 structures passes through the Primary Production, Rural Living and Water Protection Zones of the District Council of the Lower Eyre Peninsula (at an average frequency of 1 structure every 442m). The proposed augmentation of the Port Lincoln terminal substation is to be located in the Water Protection Zone.

The following table provides an assessment of the proposal against the relevant Zone provisions of the Lower Eyre Peninsula Council Development Plan (consolidated 12 July 2018).

Table 11: Relevant Zone provisions - District Council of the Lower Eyre Peninsula

Objectives and Principles of Development Control (PDCs)	
Primary Production Zone	
Objective 4	<i>Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.</i>
Objective 6	<i>Development that contributes to the desired character of the zone.</i>
PDC 8	<i>Development should not occur within 500 metres of a National Park, Conservation Park, Wilderness Protection Area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants.</i>

PDC 9	<i>Development should provide an access way of at least 3 metres wide that provides access for emergency vehicles to the rear of the allotment.</i>
PDC 11	<i>Buildings and structures should be setback a minimum of 50 metres from all roads.</i>
<p>The desired character for this zone explicitly envisages electricity infrastructure in the form of power lines, substations, maintenance sheds and access roads as constituting a necessary component of the zone's character. The proposed development will maintain that character whilst allowing for the ongoing protection of primary production land. It is acknowledged that the visual impact of the transmission line, structures and extension of the Port Lincoln terminal substation will be greater than that of the existing infrastructure, but as an entrenched land use within the zone, the development is unlikely to compromise the existing scenic qualities of open rural landscapes. Although the existing and proposed alignment extends unavoidably through conservation parks and stands of native vegetation, it has been designed to minimise impacts and conserve particularly sensitive flora and fauna. The CEMP includes strategies to prevent the spread of pest plants during construction and maintenance.</p> <p>Access to both the proposed transmission line and substation extension will be available to emergency vehicles and while structures associated with the substation are setback less than 50m from roads, this non-conformance is considered acceptable given that the extension to the existing substation footprint minimises impacts on existing cropping activities.</p>	
Rural Living Zone	
Objective 1	<i>A zone consisting of large allotments, detached dwellings and rural activities that do not adversely impact the amenity of the locality.</i>
PDC 11	<i>Cutting and filling of land should be kept to a minimum and be limited to a maximum depth or height of no greater than 2 metres so as to preserve the natural form of the land and the native vegetation.</i>
<p>While the proposed transmission line is not an envisaged use in the zone, the presence of the existing 132kV line means that electricity infrastructure of the sort proposed is a well-established land use within the zone. Construction of the structures supporting the transmission line may involve some cutting and filling of land, but this will be undertaken in a way to minimise vegetation clearance and preserve the natural form of the land.</p>	
Water Protection Zone	
Objective 1	<i>Protection of surface and underground water resources from pollution, contamination or unsustainable use.</i>
Objective 2	<i>Development excluded from the zone where it is liable to contribute to the contamination or pollution of surface and underground water resources or the reduction of aquifer recharge.</i>
Objective 6	<i>Development that contributes to the desired character of the zone.</i>
PDC 3	<p><i>Development should not:</i></p> <ul style="list-style-type: none"> <i>a) prejudice the protection of the water catchment</i> <i>b) affect the quality and quantity of the catchment's water resources</i> <i>c) inhibit the potential of the aquifer to recharge</i> <i>d) involve the storage or disposal of hazardous substances.</i>
PDC 8	<i>Development should not be undertaken unless it is consistent with the desired character for the zone.</i>

PDC 10	<i>Buildings and structures should be setback a minimum of 50 metres from all roads.</i>
<p>The construction of the proposed transmission line will be undertaken in a manner that prevents pollution or contamination of all surface and underground water resources. Structures associated with the transmission line will generally be setback in excess of 50m from roads. Although structures associated with the Port Lincoln terminal substation extension will be setback less than 50m from roads, this non-conformance is considered acceptable given that the extension to the existing substation footprint minimises its impacts on adjacent uses.</p>	

5.2.3 Council general provisions

Given that there is a great deal of commonality in the general provisions of each Council Development Plan, they have been listed in the table below without reference to the specific number allocated to each Objective and Principle of Development Control (PDC) in each Development Plan. Provisions specific to a Council area are listed as such.

The following table provides an assessment of the proposal against all relevant general provisions.

Table 12: General provisions common to all Development Plans

Objectives and Principles of Development Control (PDCs)	
Hazards	
Relevant Objectives	<i>Maintenance of the natural environment and systems by limiting development in areas susceptible to natural hazard risk.</i>
	<i>Development located away from areas that are vulnerable to, and cannot be adequately and effectively protected from, the risk of natural hazards.</i>
	<i>Development located to minimise the threat and impact of bushfires on life and property.</i>
	<i>Expansion of existing non-rural uses directed away from areas of high bushfire risk.</i>
	<i>Critical community facilities such as hospitals, emergency control centres, major service infrastructure facilities, and emergency service facilities located where they are not exposed to natural hazard risks.</i>
	<i>Minimisation of harm to life, property and the environment through appropriate location of development and appropriate storage, containment and handling of hazardous materials.</i>
Relevant PDCs	<p><i>Development should:</i></p> <ul style="list-style-type: none"> <i>a) be excluded from areas that are vulnerable to, and cannot be adequately and effectively protected from, the risk of natural hazards</i> <i>b) be sited, designed and undertaken with appropriate precautions being taken against fire, flood, coastal flooding, storm surge, landslip, earthquake, toxic emissions or other hazards such as vermin</i> <i>c) not occur on land where the risk of flooding is likely to be harmful to safety or damage property.</i>
	<i>The location of critical community facilities or key infrastructure in areas of high natural hazard risk should be avoided.</i>

	<p><i>Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of one or more of the following:</i></p> <ul style="list-style-type: none"> <i>a) vegetation cover comprising trees and/or shrubs</i> <i>b) poor access</i> <i>c) rugged terrain</i> <i>d) inability to provide an adequate building protection zone</i> <i>e) inability to provide an adequate supply of water for fire-fighting purposes.</i>
Lower Eyre Peninsula PDC 3	<i>There should not be any significant interference with natural processes in order to reduce the exposure of development to the risk of natural hazards.</i>
Lower Eyre Peninsula PDC 7 & Tumby Bay PDC 6	<i>The following bushfire protection principles of development control apply to development of land identified as General, Medium and High bushfire risk areas as shown on the <u>Bushfire Protection Area BPA Maps LEP/1 to 39 – Bushfire Risk</u>.</i>
Lower Eyre Peninsula PDC 8 & Tumby Bay PDC 7	<i>Development in a Bushfire Protection Area should be in accordance with those provisions of the <u>Minister's Code: Undertaking development in Bushfire Protection Areas</u> that are designated as mandatory for Development Plan Consent purposes.</i>
<p>The proposed transmission line is to be built on an extension of the existing transmission line easement in order to minimise the overall impact of the development and limit its susceptibility to hazards, including bushfire. While the development traverses areas of rugged terrain and high vegetation cover, appropriate clearances will be established to minimise bushfire risk.</p> <p>The CEMP for the project includes a bushfire management plan that details procedures to be followed to mitigate the risk of bushfire during construction of the transmission line and substations. This includes the provision of an adequate supply of water (and associated pumping facilities) for fire-fighting purposes in accordance with the Minister's Code.</p>	
Infrastructure	
Relevant Objectives	<i>Infrastructure provided in an economical and environmentally sensitive manner.</i>
	<i>Infrastructure, including social infrastructure, provided in advance of need.</i>
	<i>Suitable land for infrastructure identified and set aside in advance of need.</i>
	<i>The visual impact of infrastructure facilities minimised.</i>
Relevant PDCs	<i>Development should only occur where it provides, or has access to, relevant easements for the supply of infrastructure.</i>
	<i>Electricity infrastructure should be designed and located to minimise its visual and environmental impacts.</i>
	<i>Utilities and services, including access roads and tracks, should be sited on areas already cleared of native vegetation. If this is not possible, their siting should cause minimal interference or disturbance to existing native vegetation and biodiversity.</i>
Lower Eyre Peninsula PDC 17	<i>Provision should be made for new transmission and distribution substations and overhead major electricity line corridors (having a capacity greater than or equal to 33kV) in areas which have the required buffer distance to protect people and allow for adequate access.</i>

<p>By extending the existing alignment and footprint of existing substations, the proposed development responds sensitively and positively to the contextual environment and provides essential infrastructure on an established easement in advance of need. While the visual impacts associated with the proposed transmission line will be greater than those of the existing 132kV line by virtue of its greater height, these impacts are largely unavoidable and have been discussed with local landowners/residents and minimised where possible.</p> <p>Siting of the proposed laydown areas and workers' camps has also avoided areas of environmental, cultural and heritage significance. Appropriate buffer distances have been incorporated into the development of the proposed substations.</p>	
Natural Resources	
Relevant Objectives	<i>Retention, protection and restoration of the natural resources and environment.</i>
	<i>Development sited and designed to:</i> a) <i>minimise the loss and disturbance of native vegetation.</i>
	<i>Native flora, fauna and ecosystems protected, retained, conserved and restored.</i>
	<i>Minimal disturbance and modification of the natural landform.</i>
	<i>Protection of the scenic qualities of natural and rural landscapes.</i>
Whyalla Objective 12	<i>Protection of areas prone to erosion or other land degradation processes from inappropriate development.</i>
Lower Eyre Peninsula & Whyalla Objective 6	<i>Development sited and designed to:</i> a) <i>protect natural ecological systems</i> d) <i>reduce runoff and peak flows and prevent the risk of downstream flooding.</i>
Relevant PDCs	<i>Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.</i>
	<i>Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.</i>
	<i>Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.</i>
	<i>Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.</i>
	<i>Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, including marine animals and plants, and their breeding grounds and habitats.</i>
	<i>The provision of services, including power, water, effluent and waste disposal, access roads and tracks should be sited on areas already cleared of native vegetation.</i>
	<i>Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following:</i> a) <i>provides an important habitat for wildlife or shade and shelter for livestock</i> b) <i>has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities</i>

	<p>c) <i>provides an important seed bank for indigenous vegetation</i></p> <p>d) <i>has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views</i></p> <p>e) <i>has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture</i></p> <p>f) <i>is growing in, or is characteristically associated with a wetland environment.</i></p> <p><i>Development that proposes the clearance of native vegetation should address or consider the implications that removing native vegetation will have on the following:</i></p> <p>a) <i>provision for linkages and wildlife corridors between significant areas of native vegetation</i></p> <p>b) <i>erosion along watercourses and the filtering of suspended solids and nutrients from run-off</i></p> <p>c) <i>the amenity of the locality</i></p> <p>d) <i>bushfire safety</i></p> <p>e) <i>the net loss of native vegetation and other biodiversity.</i></p> <p><i>Where native vegetation is to be removed, it should be replaced in a suitable location on the site with vegetation indigenous to the local area to ensure that there is not a net loss of native vegetation and biodiversity.</i></p> <p><i>Development should be located and occur in a manner which:</i></p> <p>a) <i>does not increase the potential for, or result in, the spread of pest plants, or the spread of any non-indigenous plants into areas of native vegetation or a conservation zone</i></p> <p>b) <i>avoids the degradation of remnant native vegetation by any other means including as a result of spray drift, compaction of soil, modification of surface water flows, pollution to groundwater or surface water or change to groundwater levels</i></p> <p>c) <i>incorporates a separation distance and/or buffer area to protect wildlife habitats and other features of nature conservation significance.</i></p> <p><i>Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristic of soil resources.</i></p>
<p>Designed and sited to minimise impacts on natural, rural and cultural landscapes, the proposed development will nonetheless require the clearance of native vegetation and disturbance to areas of biodiversity. These impacts have been minimised as much as possible with many small diversions from the original alignment made in order to avoid areas of natural resources significance, including watercourses. As noted, an application for native vegetation clearance will be submitted to the Native Vegetation Council with an appropriate SEB to be provided. A referral to the Commonwealth under the EPBC Act has also been made in relation to Matters of NES.</p> <p>The development utilises existing access tracks as much as possible to limit the need for vegetation clearance and where new access tracks are formed or existing tracks upgraded, they have been sited so as to minimise impacts on flora, fauna, ecosystems and areas of scenic quality.</p>	
<p>Short-Term Workers Accommodation</p>	
<p>Relevant Objective</p>	<p><i>A range of appropriately located accommodation types supplied to meet the housing needs of seasonal and short-term workers.</i></p>
<p>Relevant PDCs</p>	<p><i>Buildings used for short-term workers accommodation should:</i></p>

	<p>c) <i>where located outside of townships, not jeopardise the continuation of primary production on adjoining land or elsewhere in the zone</i></p> <p>d) <i>be supplied with service infrastructure such as power, water, and effluent disposal sufficient to satisfy the living requirements of workers.</i></p>
	<i>Short-term workers accommodation should not be adapted or used for permanent occupancy.</i>
<p>The temporary workers' camps will be sited in areas already disturbed by maintenance activities associated with the existing transmission line and will, as a result, minimise impacts on the surrounding environment, including areas of conservation significance and productive farming land. These camps will be located some distance away from residences and other sensitive receivers and will incorporate the range of amenities normally associated with living environments, including toilet and showering, kitchen, dining and sleeping facilities in ATCO huts. Waste produced through the camp activities will be treated and/or stored securely on site prior to removal in accordance with all regulatory requirements.</p>	
Siting and Visibility	
Relevant Objective	<i>Protection of scenically attractive areas, particularly natural, rural and coastal landscapes.</i>
Relevant PDCs	<p><i>Development should be sited and designed to minimise its visual impact on:</i></p> <ul style="list-style-type: none"> <i>a) the natural, rural or heritage character of the area</i> <i>b) areas of high visual or scenic value, particularly rural and coastal areas</i> <i>c) views from the coast, near-shore waters, public reserves, tourist routes and walking trails.</i>
	<p><i>Buildings and structures should be designed to minimise their visual impact in the landscape, in particular:</i></p> <ul style="list-style-type: none"> <i>a) the profile of buildings should be low and the rooflines should complement the natural form of the land.</i>
	<i>The nature of external surface materials of buildings should not detract from the visual character and amenity of the landscape.</i>
	<i>The number of buildings and structures on land outside of urban areas should be limited to that necessary for the efficient management of the land.</i>
	<p><i>Development should be screened through the establishment of landscaping using locally indigenous plant species:</i></p> <ul style="list-style-type: none"> <i>a) around buildings and earthworks to provide a visual screen as well as shade in summer, and protection from prevailing winds</i> <i>b) along allotment boundaries to provide permanent screening of buildings and structures when viewed from adjoining properties and public roads</i> <i>c) along the verges of new roads and access tracks to provide screening and minimise erosion.</i>
<p>By extending the existing alignment and footprint of existing substations, the proposed development responds sensitively and positively to the contextual environment in order to minimise impacts on the visual character and scenic amenity of landscapes. While all efforts have been made to visually screen buildings and structures associated with the transmission line, the very nature of the development means that it will continue to form part of the visual landscape in a similar manner to that of the existing 132kV line.</p>	

Sloping Land	
Relevant Objective	<i>Development on sloping land designed to minimise environmental and visual impacts and protect soil stability and water quality.</i>
Relevant PDCs	<p><i>Development and associated driveways and access tracks, including related earthworks, should be sited, designed and undertaken in a manner that:</i></p> <ul style="list-style-type: none"> <i>a) minimises their visual impact</i> <i>b) reduces the bulk of buildings and structures</i> <i>c) minimises the extent of excavation and fill</i> <i>d) minimises the need for, and the height of, retaining walls</i> <i>e) does not cause or contribute to instability of any embankment or cutting</i> <i>f) avoids the silting of watercourses</i> <i>g) protects development and its surrounds from erosion caused by water run-off.</i> <p><i>Driveways and access tracks across sloping land should be accessible and have a safe, all-weather trafficable surface.</i></p> <p><i>Development sites should not be at risk of landslide.</i></p> <p><i>The excavation and/or filling of land outside townships and urban areas should:</i></p> <ul style="list-style-type: none"> <i>a) be kept to a minimum and be limited to a maximum depth or height no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation</i> <i>b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment</i> <i>c) only be undertaken if the resultant slope can be stabilised to prevent erosion.</i>
<p>In areas of sloping land, measures will be deployed during construction to ensure site safety while minimising landscape impacts. Cranes and heavy equipment used to erect the transmission line will be placed on stable surfaces which may require the removal of vegetation and addition of fill material, but in all cases the site will be returned to its natural state as much as possible. All sites will be rehabilitated in consultation with landowners.</p> <p>While stockpiles of soil and vegetation are likely to reach heights of around 2m maximum, these will be temporary with the land to be returned as close as possible to its natural form.</p>	
Transportation and Access	
Relevant Objective	<p><i>Development that:</i></p> <ul style="list-style-type: none"> <i>a) provides safe and efficient movement for all motorised and non-motorised transport modes</i> <i>b) ensures access for vehicles including emergency services, public infrastructure maintenance and commercial vehicles</i> <i>c) provides off street parking</i> <i>d) is appropriately located so that it supports and makes best use of existing transport facilities and networks.</i>
Relevant PDCs	<i>Development should be integrated with existing transport networks, particularly major rail and road corridors as shown on <u>Location Maps and Overlay Map(s) – Transport</u>, and designed to minimise its potential impact on the functional performance of the transport networks.</i>

	<p><i>Development should make sufficient provision on site for the loading, unloading and turning of all traffic likely to be generated.</i></p>
	<p><i>Development should be provided with safe and convenient access which:</i></p> <ul style="list-style-type: none"> <i>a) avoids unreasonable interference with the flow of traffic on adjoining roads</i> <i>b) accommodates the type and volume of traffic likely to be generated by the development or land use and minimises induced traffic through over-provision</i> <i>c) is sited and designed to minimise any adverse impacts on the occupants of and visitors to neighbouring properties.</i>
	<p><i>Development should not restrict access to publicly owned land.</i></p>
	<p><i>Driveways, access tracks and parking areas should be designed and constructed to:</i></p> <ul style="list-style-type: none"> <i>a) follow the natural contours of the land</i> <i>b) minimise excavation and/or fill</i> <i>c) minimise the potential for erosion from run-off</i> <i>d) avoid the removal of native vegetation.</i>
Lower Eyre Peninsula PDC 8	<p><i>Development should provide safe and convenient access for all anticipated modes of transport.</i></p>
<p>The traffic to be generated by the proposed development will involve heavy vehicles (transporting structures, conductors, cabling and other electricity infrastructure) as well as vehicles used by workers accessing the site. The latter is unlikely to affect the functional performance of the transport network. A Traffic Management Plan will be developed to ensure that the transport of construction materials by heavy vehicles will not disrupt the efficient functioning of the transport system in those localities requiring access. Access tracks to construction sites will be designed to safely accommodate the anticipated heavy vehicle traffic in accord with all relevant requirements.</p>	
<p>Waste</p>	
Relevant Objectives	<p><i>Development that, in order of priority, avoids the production of waste, minimises the production of waste, reuses waste, recycles waste for reuse, treats waste and disposes of waste in an environmentally sound manner.</i></p>
	<p><i>Development that includes the treatment and management of solid and liquid waste to prevent undesired impacts on the environment, including soil, plant and animal biodiversity, human health and the amenity of the locality.</i></p>
Relevant PDCs	<p><i>Development should be sited and designed to prevent or minimise the generation of waste (including wastewater) by applying the following waste management hierarchy in the order of priority shown below:</i></p> <ul style="list-style-type: none"> <i>a) avoiding the production of waste</i> <i>b) minimising waste production</i> <i>c) reusing waste</i> <i>d) recycling waste</i> <i>e) recovering part of the waste for re-use</i> <i>f) treating waste to reduce the potentially degrading impacts</i> <i>g) disposing of waste in an environmentally sound manner</i>

	<i>The storage, treatment and disposal of waste materials from any development should be achieved without risk to health or impairment of the environment.</i>
	<i>Development should avoid or minimise as far as practical, the discharge or deposit of waste (including waste water) onto land or into any waters (including processes such as seepage, infiltration or carriage by wind, rain, sea spray, stormwater or by the rising of the water table).</i>
	<i>Development should include appropriately sized area to facilitate the storage of receptacles that will enable the efficient recycling of waste.</i>
	<i>Development that produces any effluent should be connected to an approved waste treatment system which may include sewage, community wastewater management systems, or on-site wastewater treatment and disposal methods.</i>
	<i>The methods for, and siting of, effluent and waste storage, treatment and disposal systems should minimise the potential for environmental harm and adverse impacts on:</i> <ul style="list-style-type: none"> <i>a) the quality of surface and groundwater resources</i> <i>b) public health</i> <i>c) the amenity of a locality</i> <i>d) sensitive land uses</i>
Lower Eyre Peninsula PDC 10	<i>Development that produces any sewage or effluent should be connected to a waste treatment system that complies with (or can comply with) the relevant public and environmental health legislation applying to that type of system.</i>
<p>All efforts will be made to minimise the amount of waste produced by the proposed development, and waste that is produced will be recovered for re-use as much as possible or treated and securely stored on site prior to removal in accordance with regulatory requirements. Waste produced at the proposed worker's camps will be stored, treated and disposed to avoid any harm to environmental resources and the amenity of the locality.</p>	

6.0 MANAGING ENVIRONMENTAL IMPACTS

The following sections discuss and summarise the environmental assessments conducted to support the Project.

6.1 Ecological assessment

EBS Ecology (EBS) was commissioned by ElectraNet to complete an ecological assessment of the Transmission Supply Project with an initial assessment conducted in 2012. An updated ecological assessment of the proposed transmission line easement is currently being prepared and will be submitted to the SCAP as an attachment to this development application on completion.

Both assessments have focused on terrestrial flora and fauna, with the key objective being to identify potential ecological constraints for the project, including likely impacts on Matters of NES and native vegetation clearance requirements for the proposed infrastructure. The assessment involved both desktop research of existing databases as well as extensive field surveys to identify:

- vegetation type and condition;
- flora and fauna species present;
- value of habitats present;
- threatened species occurring or expected to occur; and
- identification of knowledge gaps where further survey may be required.

The following sections summarise key findings of the assessment undertaken in 2012.

6.1.1 Existing environment

The proposed transmission line easement (project area) extends for approximately 290km and covers an area of approximately 15,742 hectares. The project area traverses several protected areas including:

- Six (6) reserves dedicated under the *National Parks and Wildlife Act 1972*, including the Whyalla Conservation Park, Ironstone Hill Conservation Park, Sheoak Hill Conservation Park, Sheoak Hill Conservation Reserve, Wharminda Conservation Park and Hincks Wilderness Area.
- Eighteen (18) Heritage Agreement areas.
- Two (2) SEB offset areas.
- Two known Threatened Habitat Areas at Cleve Hills and Koppio Hills. These are areas of highly fragmented and isolated vegetation blocks with large numbers of threatened species and ecosystems.

In addition, the Tod River and Tumby Bay Wetlands are both relatively close to the proposed alignment, both of which are recognised as being of ecological significance to the area.

6.1.2 Flora

Approximately 45% of the project area consists of remnant native vegetation in the form of long continuous tracts of mallee and Western Myall / chenopod low woodlands, rail and roadside reserves and scattered trees. The remainder of the area has been cleared for predominantly agricultural purposes and, as a result, does not contain significant flora and fauna associations.

Seventy-five vegetation communities of varying condition were found across the project area with:

- 32.7% vegetation communities in good to very good condition (mostly in the northern portion);
- 32% vegetation communities in moderate condition; and
- 34.4% vegetation communities in poor to very poor condition (mostly in the southern portion).

One (1) threatened ecological community (TEC) was highlighted in the EPBC Protected Matters Search and found in the project area; Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia. Although areas were mapped as *Eucalyptus odorata* Woodland, the EPBC listing advice excludes occurrences of Peppermint Box that are a part of 'mallee' Eucalyptus woodlands with a shrubby understorey. There are several remnants mapped as *Eucalyptus petiolaris* Woodland along the transmission line alignment, however most are in moderate to poor condition.

Six (6) State listed TEC were recorded in the project area as follows:

- *Allocasuarina verticillata* Low Woodland - State Vulnerable;
- *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia* - State Vulnerable;
- *Eucalyptus peninsularis*, *E. dumosa* complex Woodland – State Endangered;
- *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland – State Endangered;
- *Gahnia trifida* (Cutting Grass) Sedgeland – State Endangered; and
- *Austrodanthonia* spp. / *Austrostipa* ssp. +/- *Themeda triandra* Tussock Grassland – State Endangered.

There were 22 nationally threatened flora species identified during the EPBC Protected Matters Search with nine of these endemic to Eyre Peninsula and 16 considered either possible or likely to occur in the project area.

There were 97 State threatened flora species identified by the desktop search and advice from local experts; 65 of which were considered possible or likely to occur in the project area.

These species were targeted during 2013 spring surveys to help determine presence / absence and area of occupancy. Based on existing records, all patches of intact vegetation with good quality understorey and limited weed invasion were considered potential threatened habitat.

Detailed lists of the flora species mentioned above can be found in the EBS Ecology report in APPENDIX D.

6.1.3 Fauna

A total of seven nationally listed fauna species were highlighted in the EPBC Protected Matters Search; four of which were considered 'likely' to occur within the project area. These species, except for the Fairy Tern, were recorded in the Biological Database of South Australia (BDBSA) search:

- Sandhill Dunnart (*Sminthopsis psammophila*), EPBC Endangered, State Vulnerable;
- Malleefowl (*Leipoa ocellata*), EPBC Vulnerable, State Vulnerable;
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*), EPBC Vulnerable, State Endangered; and
- Fairy Tern (Australian) (*Sternula nereis nereis*), EPBC Vulnerable, State Endangered.

6.1.3.1 Sandhill Dunnart

A large tract of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park is considered to contain the majority of Sandhill Dunnart habitat within the proposed transmission line corridor and there are numerous records of the species from within this area. Accordingly, there are several potential impacts on the Sandhill Dunnart arising from the proposed development including direct removal of habitat, degradation or further fragmentation of the habitat, direct removal of individuals and increased vulnerability to predation by cats and foxes.

6.1.3.2 *Malleefowl*

Critical habitat for the Malleefowl was found along approximately 35km of the alignment within the northern section between Iron Duchess to the southern end of Sheoak Conservation Park. Clearing and fragmentation of habitat is a significant threat to the Malleefowl together with increased predation from feral cats and foxes. The data also suggests that proximity to the transmission line may negatively affect nest site selection amongst Malleefowl and possibly their nesting success as Malleefowl mound densities along the transmission line were found to be 28% lower than densities elsewhere.

6.1.3.3 *Southern Emu-wren (Eyre Peninsula)*

The Southern Emu-wren (Eyre Peninsula) is limited to the extreme south of the Eyre Peninsula in numerous small disjointed populations. While suitable habitat for the Southern Emu-wren occurs within the transmission line alignment, none were observed during the survey (although the species can be very shy and unpredictable). A known population within the Koppio Hills was decimated during the 2005 'Black Tuesday' fires and the historical population within Charlton Gully has not been observed since 2005. While suitable habitat has recovered and could sustain the Southern Emu-wren, it is not known whether the species will re-habituate in these areas given the highly fragmented habitat between the areas and the species' poor long-distance movement. It is considered that potential impacts to the species can be minimised by sensitive micro-siting of the infrastructure.

6.1.3.4 *Fairy Tern*

The Fairy Tern population has dramatically declined in recent years, and if it were to occur within the proposed alignment, it would most likely to do so as a fly-over species. Any impact arising from the proposed development is unlikely, albeit difficult to predict.

6.1.3.5 *Other species*

There were 323 native fauna species derived from the search of the BDBSA, of which 5 were nationally listed, 10 migratory and 44 State listed. The nationally listed species include 2 bird species considered unlikely to occur within the project area and 3 species listed previously in the EPBC search.

Ten (10) nationally listed migratory species were identified in the EPBC Protected Matters Search as potentially occurring or having habitat potentially occurring within the vicinity of the project area. Eight (8) of these are considered as possible or likely visitors to the project area:

- Fork-tailed Swift (*Apus pacificus*);
- Great Egret (*Ardea alba*);
- Cattle Egret (*Ardea ibis*);
- Red-necked Stint (*Calidris ruficollis*);
- Latham's Snipe (*Gallinago hardwickii*);
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*);
- Malleefowl (*Leipoa ocellata*); and
- Rainbow Bee-eater (*Merops ornatus*).

A total of 85 individual point count surveys was undertaken for avian species along the easement at 2km intervals in large tracts of remnant vegetation or, where largely cleared, in any substantial vegetation patches. This resulted in 94 bird species being identified, including 1 nationally listed, 10 state listed and 3 introduced species.

6.1.4 Biodiversity hotspots

Six (6) biodiversity ‘hotspots’ were observed along the proposed transmission line corridor reflecting high concentrations of nationally and State threatened species records, TECs, protected areas, remnant native vegetation or recognised threatened habitat areas such as Koppio Hills and Cleve Hills.

These hotspots present constraints for the precise siting of infrastructure components associated with the project. The following table summarises the potential project constraints arising from these hotspots.

Table 13: Biodiversity hotspots

Hotspot	Location	Description	Constraints	Rating
Hotspot area 1	From Cultana substation to Middleback Ranges	Open chenopod shrubland with <i>Acacia papyrocarpa</i> ; Mallee in red & white sand with large dunes; Vegetation in excellent condition with low weed invasion & grazing impact.	<i>Santalum spicatum</i> (Sandalwood) Slender-billed Thornbill (western) Western Grasswren <i>Alectryon oleifolius</i> ssp (low woodland) Whyalla Conservation Park	State Vulnerable State Rare State Rare State Vulnerable Protected area
Hotspot area 2	From southern end of Middleback Ranges to Plug Range Conservation Park	Large continuous tracts of mallee / spinifex communities; Large dune complexes providing refuge areas for fauna & flora species.	<i>Acacia cretacea</i> (Chalky Wattle) <i>Swainsona pyrophila</i> (Yellow Swainson-pea) <i>Pterostylis xerophila</i> (Desert Greenhood) Malleefowl Sandhill Dunnart <i>Acacia rhigiophylla</i> (Dagger-leaf Wattle) Striated Grasswren Gilberts Whistler Ironstone Hill Conservation Park Sheoak Hill Conservation Park Sheoak Hill Conservation Reserve Plug Range Conservation Park 9 Heritage Agreements 1 SEB area Cleve Hills Threatened Habitat Area	Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened State Rare State Listed State Listed Protected Protected Protected Protected Protected Protected
Hotspot area 3	From Plug Range Conservation Park to just north-west of Cleve	Mallee/broombrush communities; Native Pine open woodlands providing valuable habitat.	<i>Allocasuarina verticillata</i> (Low Woodland) <i>Acacia cretacea</i> (Chalky Wattle) <i>Acacia praemorsa</i> (Senna Wattle) <i>Olearia pannosa</i> (Silver Daisy Bush) <i>Acacia rhotinocarpa</i> (Neat Wattle) <i>Acacia pinguiifolia</i> (Fat-leaved Wattle) <i>Acacia hexaneura</i> (Six-nerve Spine-bush) <i>Goodenia benthamiana</i> (Bentham's Goodenia) <i>Acacia rhigiophylla</i> (Dagger-leaf Wattle) <i>Austrostipa breviglumis</i> (Cane Spear-grass) <i>Olearia adenolasia</i> (Musk Daisy-bush) Cleve Hills Threatened Habitat Area	State Endangered Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened State Rare State Rare State Rare State Rare State Rare

Hotspot	Location	Description	Constraints	Rating
Hotspot area 4	From eastern side of Hincks Wilderness Area to west of Wharminda	Fragmented mallee/broombrush patches providing valuable habitat; Larger remnant patches of native vegetation.	<i>Arachnorchis tensa</i> (Greencomb Spider-orchid) <i>Microtis</i> (Nash’s onion orchid) Peregrine Falcon Wharminda Conservation Park	Nationally Threatened State Rare State listed Protected area
Hotspot area 5	From west of Butler to Green Patch (encompassing part of Koppio Hills)	Highly significant but highly fragmented vegetation; State and regionally listed TECs; Significant wildlife habitat	<i>Eucalyptus petiolaris</i> (Eyre Peninsula Blue Gum) <i>Allocasuarina verticillate</i> (Low Woodland) <i>Eucalyptus peninsularis</i> (complex Woodland) <i>Gahnia trifida</i> (Cutting grass) Sedgeland <i>Austrodanthonia/Austrostipa/Themeda triandra</i> (Tussock grassland) <i>Eucalyptus cladocalyx</i> (Sugar Gum) <i>Acacia enterocarpa</i> (Jumping-jack Wattle) <i>Acacia pinguifolia</i> (Fat-leaved Wattle) <i>Acacia whibleyana</i> (Whibley Wattle) <i>Arachnorchis brumalis</i> (Winter Spider-orchid) <i>Arachnorchis tensa</i> (Rigid Spider-orchid) <i>Haloragis eyreana</i> (Prickly Raspwort) <i>Olearia pannosa</i> (Silver Daisy Bush) <i>Prasophyllum goldsackii</i> (Leek-orchid) <i>Prostanthera calycina</i> (West Coast Mintbush) <i>Ptilotus beckerianus</i> (Ironstone Mulla Mulla) <i>Pultenaea trichophylla</i> (Tufted Bush-pea) <i>Thelymitra epipactoides</i> (Metallic Sun-orchid) <i>Acacia imbricata</i> (Feathery Wattle) <i>Daviesia pectinata</i> (Zig-zag Bitter-pea) <i>Eremophila gibbifolia</i> (Coccid Emubush) <i>Philotheca angustifolia</i> (Narrow-leaf Wax-flower) <i>Spyridium leucopogon</i> (Silvery Spyridium) <i>Spyridium spathulatum</i> (Spoon-leaf Spyridium)	Nationally & State Endangered State Endangered State Endangered State Endangered State Endangered Regionally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened Nationally Threatened State Rare State Rare State Rare State Rare State Rare State Rare
Hotspot area 6	From Green Patch to Port Lincoln outskirts	Land used mostly for agriculture	<i>Allocasuarina verticillate</i> (Low Woodland) Diamond Firetail Cape Barren Goose	State Endangered State Threatened State Threatened

6.1.5 Potential Mitigation Measures

Based on the investigations conducted to date, EBS has recommended a number of measures that could be employed to mitigate impacts. The following table documents these measures and indicates progress on implementation.

Table 14: Implementation of Mitigation Measures

Mitigation Measure	Response
Micro-site all infrastructure prior to final design to ensure areas of least impact are utilised	Ongoing during detailed design
Design structures to ensure minimal roosting sites for birds of prey and nesting sites for introduced bird species	Ongoing during detailed design
Develop detailed and extensive environmental management processes and procedures for the construction phase of the project	Ongoing during detailed design
Prepare appropriate management plans for implementation prior to, during and post construction to ensure environmental impacts are minimised as far as practicable	Ongoing during detailed design
Investigate the use of alternative construction & maintenance methods to minimise the footprint of the infrastructure & long-term impacts of the works	In progress - negotiations with construction contractors
Utilise low-impact construction methods within highly sensitive environments; for example, within dune & mallee habitats	In progress - negotiations with construction contractors
Protect & avoid construction in areas of critical habitat for known threatened species (e.g. high quality mallee vegetation, Malleefowl mounds)	Alignment diverted to avoid areas of critical habitat
Avoid areas of native vegetation in excellent condition	Alignment diverted to avoid areas of native vegetation in excellent condition
Ensure vegetation clearance or damage is restricted to the project area	In progress - negotiations with construction contractors
Seek Native Vegetation Council approval for clearance of native vegetation & establish a Significant Environmental Benefit (SEB) under the Native Vegetation Act	In progress
Lodge a referral to the Commonwealth Government under the EPBC Act	In progress
Provide funding to support recovery objectives & actions for threatened species	In progress - discussions with affected landowners

7.0 MANAGING CULTURAL HERITAGE IMPACTS

7.1 Initial desktop review

An initial desktop review of the potential cultural heritage constraints for the Transmission Supply Project was undertaken by Australian Cultural Heritage Management (ACHM) in 2012. This review found a number of sites of Aboriginal significance and a number of heritage sites including the Whyalla Conservation Park, Whyalla-Iron Knob-Iron Baron Area, Shed Tanks and Sheoak Hill Conservation Park.

ACHM also assessed the following landform elements along the proposed alignment as having a medium to high potential for the presence of Aboriginal sites (archaeological and cultural):

- Sand dunes and associated hardpan swales;
- Salt lakes and associated soaks;
- Claypans;
- Water features (e.g. waterholes, swamps, creeks and rock holes); and
- Unusual landscape features and early built environments.

7.2 Survey

An Aboriginal cultural heritage survey of the proposed transmission line corridor was undertaken in October 2013 by AECOM Australia Pty Ltd (AECOM) alongside male and female Barngarla Native Title Claimant Field Representatives (BNTCFR) under the provisions of a Cultural Heritage Agreement between Barngarla Native Title Claimants (BNTC) and ElectraNet.

The approach to the survey was to assess the corridor by way of a series of vehicle transects, with spot-checks of certain features/areas undertaken on foot or viewed from nearby vantage points. Owing to existing land use activities and health and safety considerations, the majority of the transmission line corridor was assessed from publicly accessible roads.

ElectraNet is currently negotiating an additional Cultural Heritage Survey with the Barngarla Determination Aboriginal Corporation (BDAC). This survey aims to:

- Survey areas of the alignment that have not been previously surveyed (due to changes between the 2013 alignment and the 2019 alignment);
- Re-visit Cultural Heritage sites identified in the 2013 survey to negotiate structure and access track placement based on the 2019 alignment;
- Request endorsement for use of existing tracks through Cultural Heritage sites; and
- Determine management arrangements for the project Aboriginal Cultural Heritage Management Plan.

7.2.1 Survey results

A number of sites of Aboriginal cultural importance were identified.

Sites were typically observed in elevated areas and rocky outcrops, water features (lakes, streams and claypans) and certain low-lying rocks. Some sites consist exclusively of Barngarla Dreaming sites while some sites form part of a larger site complex.

A number of archaeological sites were also identified, in addition to a number of landscape features which have been identified as culturally sensitive areas within and surrounding the proposed transmission line corridor. These include crests, hills and ranges (some with outcropping rock), rocky hillslopes, soaks, rock

outcrops and potential claypans. These features are considered to warrant more detailed investigation and/or specific management actions.

Higher-order watercourses were similarly identified as culturally sensitive landscape features.

The survey report summarises the recommended management strategy for Cultural Heritage sites which is to be formalised as part of the project Cultural Heritage Management Plan (CHMP). These management strategies include information indicating whether structure placement can be negotiated within a Cultural Heritage site, and which sites require further survey or monitoring.

7.3 Managing impacts

While the transmission line alignment has been designed to avoid identified cultural heritage sites and culturally sensitive landforms wherever possible, some residual risk associated with the construction of the proposed development remains.

Residual risk management for identified Aboriginal cultural heritage values along the proposed alignment and its environs will be through the preparation of a CHMP. The CHMP will be prepared by a suitably qualified heritage professional in consultation with Barngarla representatives and will set out detailed procedures and protocols for managing and protecting identified Aboriginal heritage values before, during and after the construction of the new transmission line, structures, substations, laydown areas, workers' camps and access tracks.

8.0 MANAGING SOCIAL IMPACTS

8.1 Community and stakeholder engagement

ElectraNet recognises the importance of effectively engaging with community and stakeholder groups throughout the duration of its major projects and initiated a comprehensive communications and engagement strategy to support the project in 2012. This strategy sought to ensure the timely delivery of the early phases of the project (in particular the identification of the transmission line corridor) and proactively identify and manage potential risks and issues arising from the project's development.

Specific engagement objectives for the project were to:

- Educate and inform stakeholders about ElectraNet, the need to reinforce transmission supply to the Eyre Peninsula, the steps involved in this process and the issues influencing route selection.
- Provide stakeholders with the opportunity to be involved in the route selection process, by helping to identify key opportunities, constraints and preferences.
- Manage expectations among stakeholders of their role in the route selection process and how decisions will be made.
- Foster positive and productive relationships with stakeholders to grow support for the project and help facilitate its planning and construction phases.

8.1.1 Engagement activities

Three major groups of stakeholders were identified as follows:

- Existing easement landowners (totalling 108 including 10 government or Crown stakeholders). This group was of high importance given their experience of the existing 132kV transmission line and the likelihood of them hosting the replacement infrastructure.
- Wider Eyre Peninsula community, including residents in close proximity to the existing transmission line and those who can see the line from their property or during their regular travel patterns.
- Representative groups and individuals including Federal and State MPs, elected members of local Councils and resident action groups.

From the outset, ElectraNet has sought the highest level of community and stakeholder involvement in the project. Input from affected community/stakeholder groups was obtained prior to decisions being made about the selection of the transmission line corridor and siting of structures, laydown areas, workers' camps and substations. More specifically, the following initiatives were implemented:

- Media releases about the project were released on a regular basis providing information and project updates. These releases also encouraged community and stakeholder members to register their details with ElectraNet to ensure they received regular project updates.
- Displays at Eyre Peninsula Field Days to elicit community views about the project.
- Introductory mail-outs to affected landowners and key stakeholders providing background information about the project and flagging an initial face-to-face meeting with project staff.
- Individual phone calls to each existing easement landowner to arrange for the initial meeting and obtain permission to access properties outside of the easement area to carry out flora and fauna surveys.
- Individual briefings with 98 existing easement landowners between November 2012 and February 2013 on the background to the project and issues experienced with the operation of the existing line. Landowners were asked to i) share information about their properties to help identify potential opportunities and constraints that might affect the project, and ii) indicate their preferences for the location of a new transmission line and whether it should take the same route as the existing line.

- Information booklets and fact sheets about the development of high voltage transmission lines were distributed to all landowners and community members.
- Three community drop-in days were held across the Eyre Peninsula at Cleve, Ungarra and Port Lincoln that included activities designed to engage children.
- Project hotline and email contacts were established to channel all landowner and community enquiries through a central platform that was monitored and responded to by ElectraNet staff.
- Project information, fact sheets, brochures, media releases and other news was made available on ElectraNet's website with hard copies distributed across the Eyre Peninsula.
- Project contact cards with specific contact details were distributed to landowners and the wider community.
- Newspaper advertisements about the project were published in the Eyre Peninsula Tribune, Port Lincoln Times, West Coast Sentinel and the Stock Journal.
- Numerous 'have your say' invitations to stakeholders/community members were distributed across the Eyre Peninsula seeking feedback about the project.

In addition, a Consultation Manager database was established and used to record and track all interactions made during the course of the engagement with a total of 730 events recorded against 183 stakeholders/community members.

8.1.2 Engagement outcomes

8.1.2.1 Support for the project

The outcomes of the community and stakeholder engagement indicated strong support for the project based on widespread recognition of the limitations of the existing transmission line and the economic growth potential a more secure and reliable supply of power would provide. While the landowner group tended to be less effusive in their support, this could be attributed to particular circumstances these landowners have faced such as negative experiences with mining companies accessing their land and issues associated with neighbouring conservation areas. The landowners consulted were, however, strongly in favour of an augmented power supply and aware of the need to act quickly given the age and deteriorating condition of the existing transmission line.

Members of the wider community also demonstrated strong support for the potential economic growth arising from the project particularly in relation to renewable energy and mining activities.

8.1.2.2 Location of the transmission line

High levels of support were attained for the location of the proposed transmission line close to or following a similar path to the existing 132kV line. Landowners were keen to discuss their preferences for where the line should go and generally confirmed their willingness to have the new line traverse their properties. Among community members, the proposed siting of the new line alongside the existing line was seen as both logical and desirable from a visual amenity perspective, fuelled in part by a desire not to have the transmission line close to their residence.

There was evidence of differing attitudes among landowners according to their location on the Peninsula. Landowners located on the northern section of the alignment were less concerned about whether the proposed transmission line would be sited east or west of the existing line easement, which can be attributed to the larger size of land holdings and the predominance of grazing (as opposed to cropping) activities being less affected by the location of the line. Landowners in the southern section of the alignment were more inclined to be quite specific about where the line should be located in order to reduce the potential impact on their property and land use activities.

Engagement participants were united in their preference for the alignment to be located away from existing residences, evidenced by landowners requesting that the new transmission line be built on the opposite side of the existing line to their dwelling. Many community participants also commented that consideration be given to avoiding areas where future residential development would likely occur.

8.1.2.3 Key issues

For the wider Eyre Peninsula community, the issues of greatest concern related to:

- The reliability of electricity supply;
- Minimising impacts on farming activities and other land uses; and
- Safety during construction.

Additional issues identified and discussed during the engagement include:

- The role of ElectraNet in the electricity supply chain.
- The need for and timing of the project, with many landowners having experienced outages and an unreliable power supply.
- Details around the negotiation and acquisition of easements, including information about the impact on existing land uses and whether landowners would be compensated.
- Potential property damage during construction and general maintenance and how this would be managed. Landowners relayed stories of maintenance crews becoming bogged during winter and causing property damage when being towed out. The maintenance of access tracks and gates was also discussed as landowners cited examples of maintenance crews driving across cropping fields when access tracks were not available.
- Bushfire risk during construction was a concern for many landowners who requested that only diesel vehicles be used when accessing their properties. Community members also expressed concerns about bushfire risk and queried whether the alignment would be diverted away from bushfire prone areas.
- Environmental issues such as flora and fauna habitat and vegetation screening. Landowners located close to Koppio Hills and the Middleback Ranges expressed particular interest in these matters.
- Weed and pest management was of particular interest to landowners who sought assurances about vehicle sanitation measures preventing the spread of weeds.
- Social issues such as visual impact, amenity, lifestyle and health were of interest to a small number of engagement participants although familiarity with the existing transmission line meant there were few concerns expressed about these matters.
- Decommissioning of the old transmission line with landowners interested in whether structure footings would be removed.

All of these issues were raised and discussed during the course of the engagement activities with participants generally satisfied with ElectraNet's proposed approach to addressing them.

8.2 Amenity issues

Potential amenity issues associated with the proposed development are to be carefully managed in line with measures outlined in the CEMP. The location of the proposed transmission line and substations adjacent the existing 132kV line and existing substations at Yadnarie and Port Lincoln respectively helps mitigate these impacts, especially as residents living in close proximity to the existing infrastructure are familiar with and accepting of the potential amenity issues.

9.0 RESIDUAL RISK AND MANAGEMENT

9.1 Development of the CEMP

As previously noted, the CEMP supporting the project is presented in two parts. The version attached to this development application has been developed before completion of the detailed design phase with a more comprehensive version to be developed by the construction contractor once the detailed design is finalised.

The CEMP has been developed using data from the ecological, cultural heritage and other investigations undertaken to support the Transmission Supply Project to ensure that ElectraNet's commitments are met and construction activities are carried out in a manner that minimises potential impacts on native flora and fauna, environmental resources, cultural and non-indigenous heritage and surrounding communities.

9.1.1 Purpose

Recognising that appropriate management of the potential construction and environmental impacts is paramount to securing ongoing community and stakeholder support for the project, the CEMP has been developed to ensure that environmentally and culturally responsible work practices are adopted and maintained during construction of the transmission line and associated structures.

The purpose of the CEMP is to:

- Provide environmental mitigation or management measures to reduce potential environmental impacts arising from the project.
- Document the policies, processes and procedures to manage potential impacts in order to meet relevant legislative requirements, approval conditions and other environmental obligations.
- Allocate responsibilities for ensuring the effective implementation of these policies, processes and procedures.
- Describe how the environmental management performance will be monitored and reviewed to drive continuous improvement.

In short, the CEMP aims to ensure that best industry practices are adhered to and that the successful construction contractor is aware of the specific environmental issues associated with the project and its specific responsibilities to avoid or minimise environmental impacts during the construction process.

9.1.2 Content of the CEMP

Construction activities subject to the CEMP include the following:

- Earthworks associated with:
 - Structure footings and structure pads
 - Construction of access tracks
 - Development of laydown areas (including crane/heavy machinery platforms)
 - Safe use and manoeuvrability of construction machinery
 - Development of temporary workers' camps
- Construction of structure footings (including piling)
- Erection of structures and associated conductor structures
- Stringing of conductors
- Installation of any permanent security fencing/gates

The CEMP will be structured as indicated in Table 17 below:

Table 15: Content of the CEMP

Section/chapter	Content details
1 - Introduction	Provides an overview of project and location; describes activities supporting project development and purpose of CEMP
2 - Project description	Outlines project rationale; provides detailed description of project components, potential impacts and construction approach
3 – Construction approach	Describes approach to vegetation, soil, watercourse, water supply, produced water (dewatering), bushfire, heritage and traffic management
4 – Legislative context	Lists relevant legislation and permit/approval requirements
5 – Environmental management system	Describes ElectraNet’s environmental management system and allocates roles and responsibilities to project participants; outlines training/induction program and lists emergency contacts
6 – Environmental management	Discusses management and mitigation of environmental, cultural heritage and amenity impacts; lists management plans to be developed by the construction contractor
7 – Incident Plan	Outlines contingency plan for events raising environmental concern including chemical spills, encountering Aboriginal artefacts and trapped/injured fauna; describes management of community complaints
8 – Monitoring, reporting and review	Outlines reporting requirements, site inspections/monitoring and compliance audits.

The CEMP will incorporate a number of management plans or regimes addressing specific aspects of the project, including but not limited to:

- Native vegetation
- Ecology (flora and fauna)
- Cultural heritage
- Bushfire management
- Weed, pest and general biodiversity management
- Surface and produced water management
- Dust and air quality management
- Noise management
- Non-Aboriginal heritage management
- Traffic management

10.0 CONCLUSION

The augmentation of the Eyre Peninsula transmission network is a critical infrastructure project of strategic importance to the ongoing growth of industries, including mining and renewable energy, across the region. In facilitating such growth, the Transmission Supply Project will make a significant contribution to the State's regional economic development and renewable energy objectives.

The investigations and analysis for the development have been underpinned by extensive site and alignment selection processes supported by a number of specialist technical reports, including ecological (flora and fauna) surveys, native vegetation assessments, cultural heritage surveys and a raft of community engagement initiatives which demonstrate the suitability of the subject land to accommodate the proposed development. In addition, a CEMP framework has been developed as part of this development application to provide guidance to the successful construction contractor in managing and mitigating the various environmental and cultural heritage impacts during construction.

The proposed development of the high-voltage transmission line and associated substations/switchyards, laydown areas, workers' camps and access tracks is considered to be appropriate for the land on which it is to be located and is not deemed to be at variance with the relevant Outback Code and Development Plan provisions. The proposed development will provide for a secure and reliable source of energy facilitating ongoing economic growth for the Eyre Peninsula region, consistent with the South Australian Government's budget and regional development objectives. The purposeful location of large infrastructure away from sensitive receptors and significant cultural heritage sites effectively minimises the potential impacts on residents of, and visitors to the region, as well as the First Peoples of the Eyre Peninsula.

In summary, when considered on its merits the proposed development warrants the granting of development consent.

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DF/LvC/ro

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APPENDIX A

Plans and Information



- LEGEND**
- Northern Towers
 - Northern Alignment
 - Substation
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park

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NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
 1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

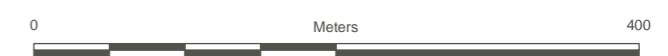
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- LEGEND**
- Northern Towers
 - Northern Alignment
 - Substation
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park



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CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 1A

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- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:50,000 GDA 1994 MGA ZONE 53

NOTE(S)
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CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

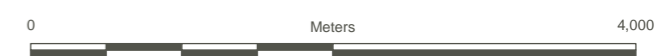
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 2

R:\TH\golder\p010\CA\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappages.mxd, CREATED ON: 2019/11/07 AT: 1:49:47 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOPIED FROM ISO A3 25mm



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks



1:50,000 GDA 1994 MGA ZONE 53

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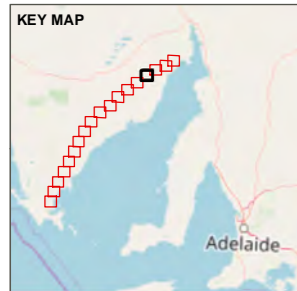
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

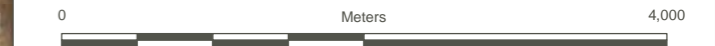
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 3

R:\TH\yopder\gpc\PA\Adelaide\Complex\Draw\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019-11-07 AT: 1:52:26 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3 25mm



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park



1:50,000 GDA 1994 MGA ZONE 53
 NOTE(S)
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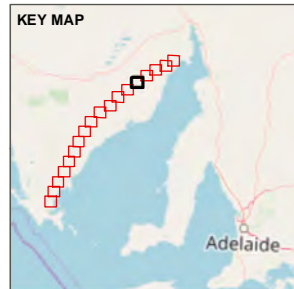
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 4

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019/11/07 AT: 1:51:06 PM

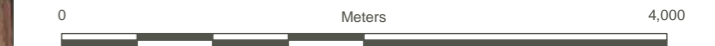
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



LEBACK ROAD



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park



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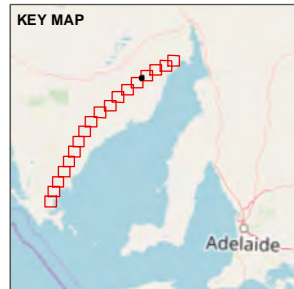
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. **18109321** CONTROL **001-R** REV. **A** FIGURE **5**

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3 28mm



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park



1:15,000 GDA 1994 MGA ZONE 53

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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 5A

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3 25mm



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park



1:15,000 GDA 1994 MGA ZONE 53

NOTE(S)
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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 5B

PATH: \\golder.com\GIS\A\Adelaide\Electraset\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\mappages.mxd, CREATED ON: 2019-11-07 AT: 1:52:56 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3 25mm



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

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SITE LOCATION PLAN

CONSULTANT		DD-MM-YYYY	07-11-2019
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PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 6

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Task\map\page.mxd, CREATED ON: 2019/11/07 AT: 1:53:36 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3 297mm



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - ▬ Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53
 NOTE(S)
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SITE LOCATION PLAN

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	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 6A

PATH: \\golder\gpc\GIS\Adelaide\CompleteData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappage.mxd, CREATED ON: 2019-11-07 AT: 1:54:12 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



LEGEND

- Main Layout Area
- Camp Location
- Northern Towers
- Northern Alignment
- 500m Buffer
- 50m Pad
- CAZ Boundary
- Proposed Camp Location
- Construction Tracks
- Conservation Park

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

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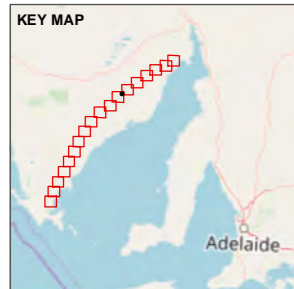
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 7

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappage.mxd, CREATED ON: 2019/11/07 AT: 1:54:53 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3 297mm



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Proposed Camp Location
 - Construction Tracks
 - Conservation Park



1:15,000 GDA 1994 MGA ZONE 53

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SITE LOCATION PLAN

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	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 7A

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - ▭ CAZ Boundary
 - ▭ Construction Tracks
 - Conservation Park



1:15,000 GDA 1994 MGA ZONE 53

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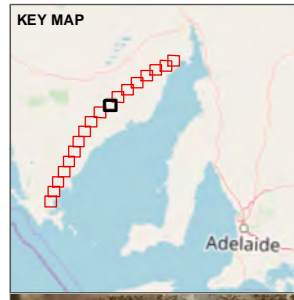
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 7B

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park



1:50,000 GDA 1994 MGA ZONE 53
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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
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	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 8

PATH: \\golder\gpc\PA\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\mappages.mxd, CREATED ON: 2019/11/07 AT: 1:56:43 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3 26mm



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Northern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park



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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
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PREPARED	HPB	
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PROJECT NO. **18109321** CONTROL **001-R** REV. **A** FIGURE **9**

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Task\map\page.mxd, CREATED ON: 2019-11-07 AT: 1:57:21 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3 26mm



- LEGEND**
- Main Layout Area
 - Northern Towers
 - Southern Towers
 - Northern Alignment
 - Southern Alignment
 - Substation
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

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TITLE
SITE LOCATION PLAN

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REVIEWED	AS	
APPROVED	DA	

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 10

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappages.mxd, CREATED ON: 2019-11-07 AT: 1:58:06 PM

THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN. THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Northern Towers
 - Southern Towers
 - Northern Alignment
 - Southern Alignment
 - Substation
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53

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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

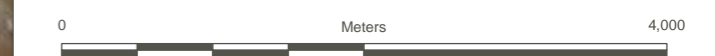
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 10A

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park



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TITLE
SITE LOCATION PLAN

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	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 11

PATH: \\golder\gpc\PA\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:05:25 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



- LEGEND**
- Main Layout Area
 - Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park
 - Wilderness Area

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 12

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappage.mxd, CREATED ON: 2019-11-07 AT: 2:09:03 PM

THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN. THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



- LEGEND**
- Main Layout Area
 - Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks
 - Conservation Park



1:15,000 GDA 1994 MGA ZONE 53

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PROJECT
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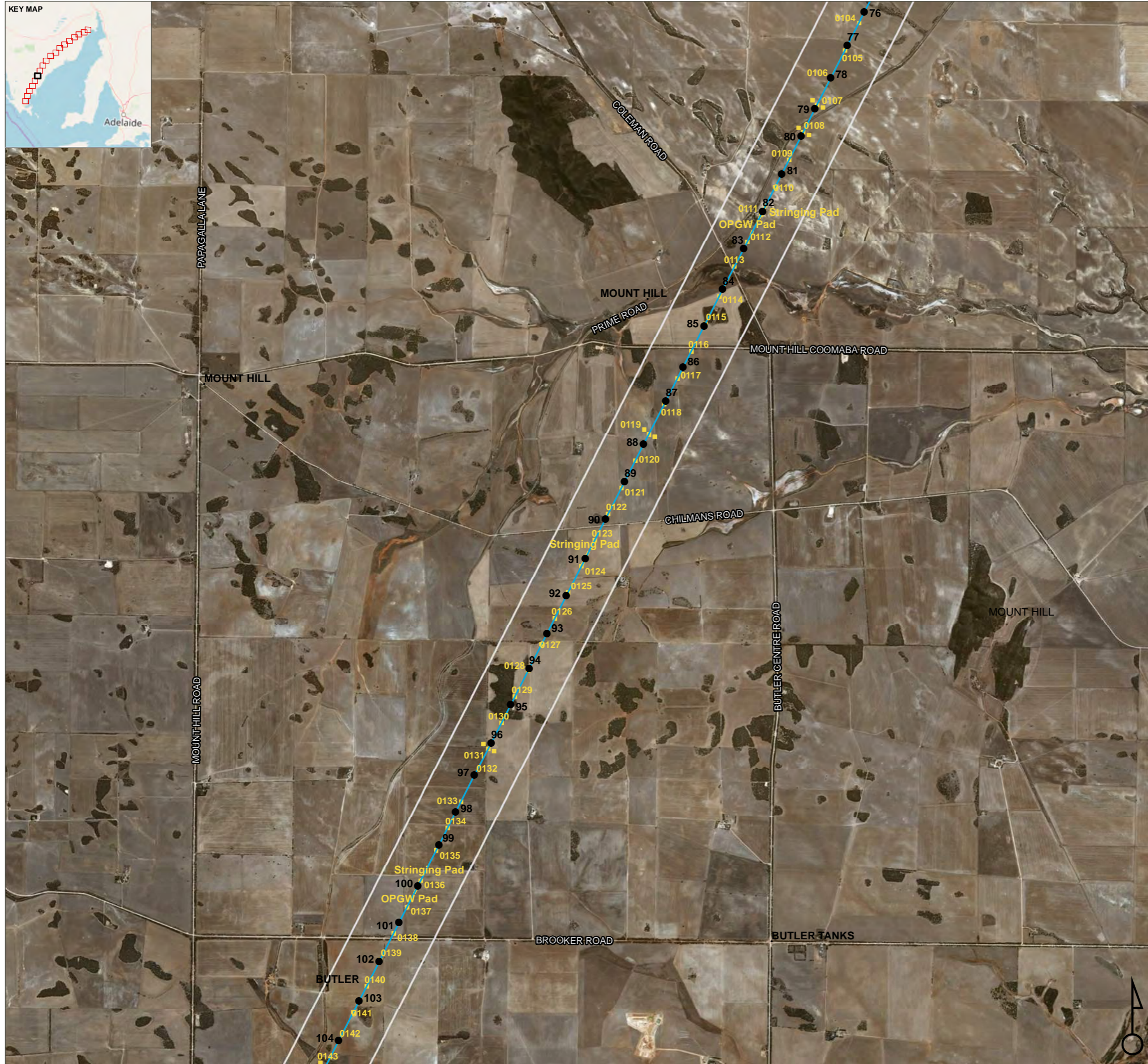
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

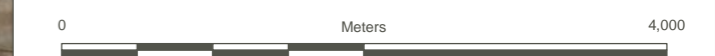
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 12A

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019/11/07 AT: 2:09:30 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



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PROJECT
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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

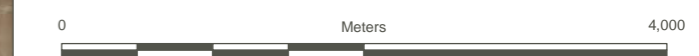
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 13

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Task\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:10:16 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



- LEGEND**
- Main Layout Area
 - Camp Location
 - Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Proposed Camp Location
 - Construction Tracks
 - Conservation Park



1:50,000 GDA 1994 MGA ZONE 53
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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 14

R:\TH\Golder\GIS\CA\Adelaide\CompleteData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:10:56 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Main Layout Area
 - Camp Location
 - Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Proposed Camp Location
 - Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53

NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
 1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

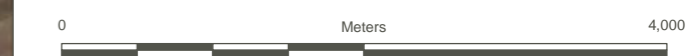
PROJECT NO. **18109321** CONTROL **001-R** REV. **A** FIGURE **14A**

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Main Layout Area
 - Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:50,000 GDA 1994 MGA ZONE 53
 NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
 1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

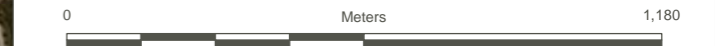
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
GOLDER	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. **18109321** CONTROL **001-R** REV. **A** FIGURE **15**

R:\TH\Golder\GIS\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Task\mappages.mxd, CREATED ON: 2019-11-07 AT: 2:12:09 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



1:15,000 GDA 1994 MGA ZONE 53

NOTE(S)
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REFERENCE(S)
 1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. **18109321** CONTROL **001-R** REV. **A** FIGURE **15A**

P:\TH\golder\p01\CA\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019/11/07 AT: 2:12:44 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

NOTE(S)
1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

CLIENT
ELECTRANET

PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

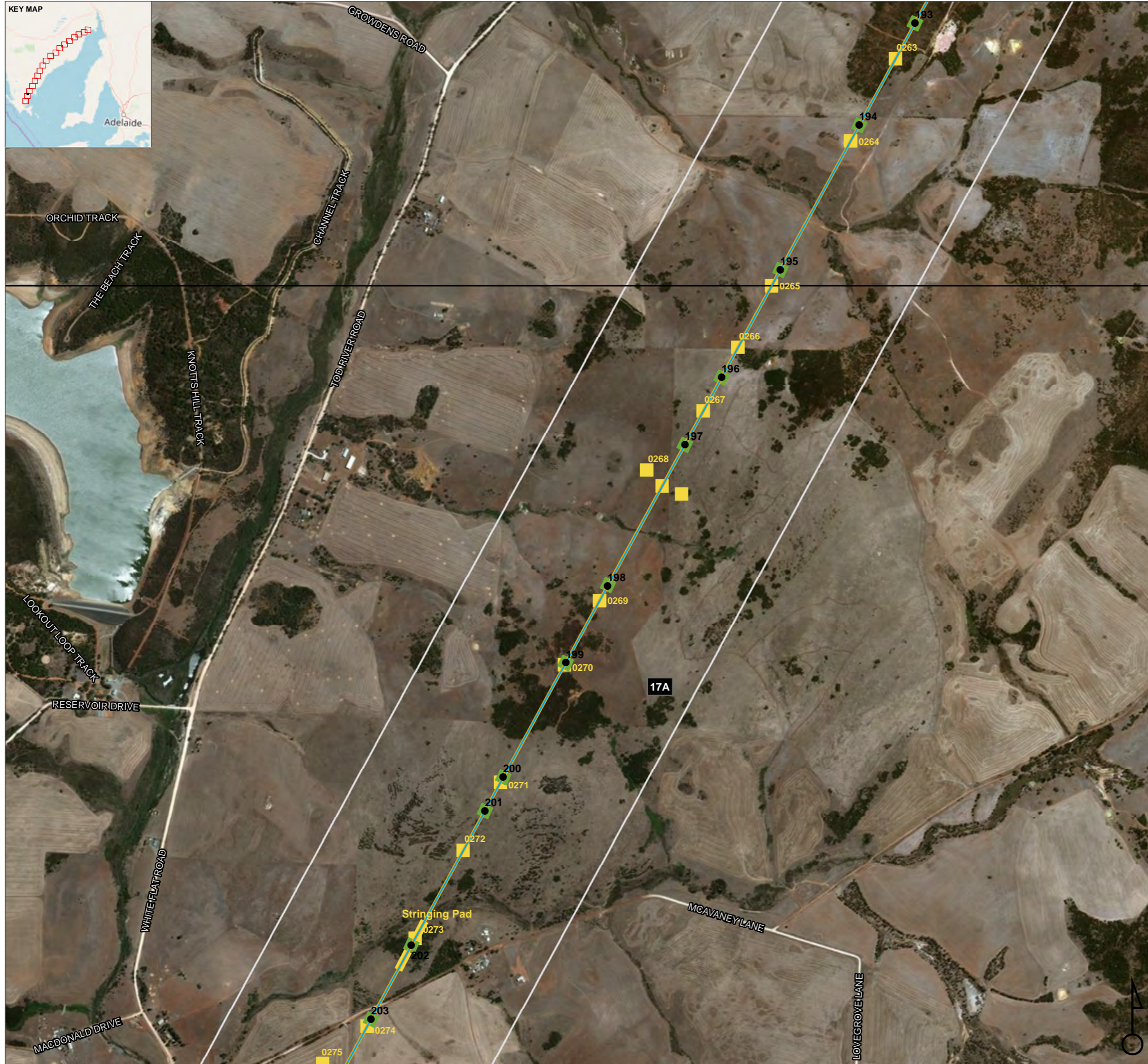
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 16

R:\TH\golder\p01\CA\Adelaide\ComplexData\ElectranelEyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:13:20 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53
 NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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PROJECT
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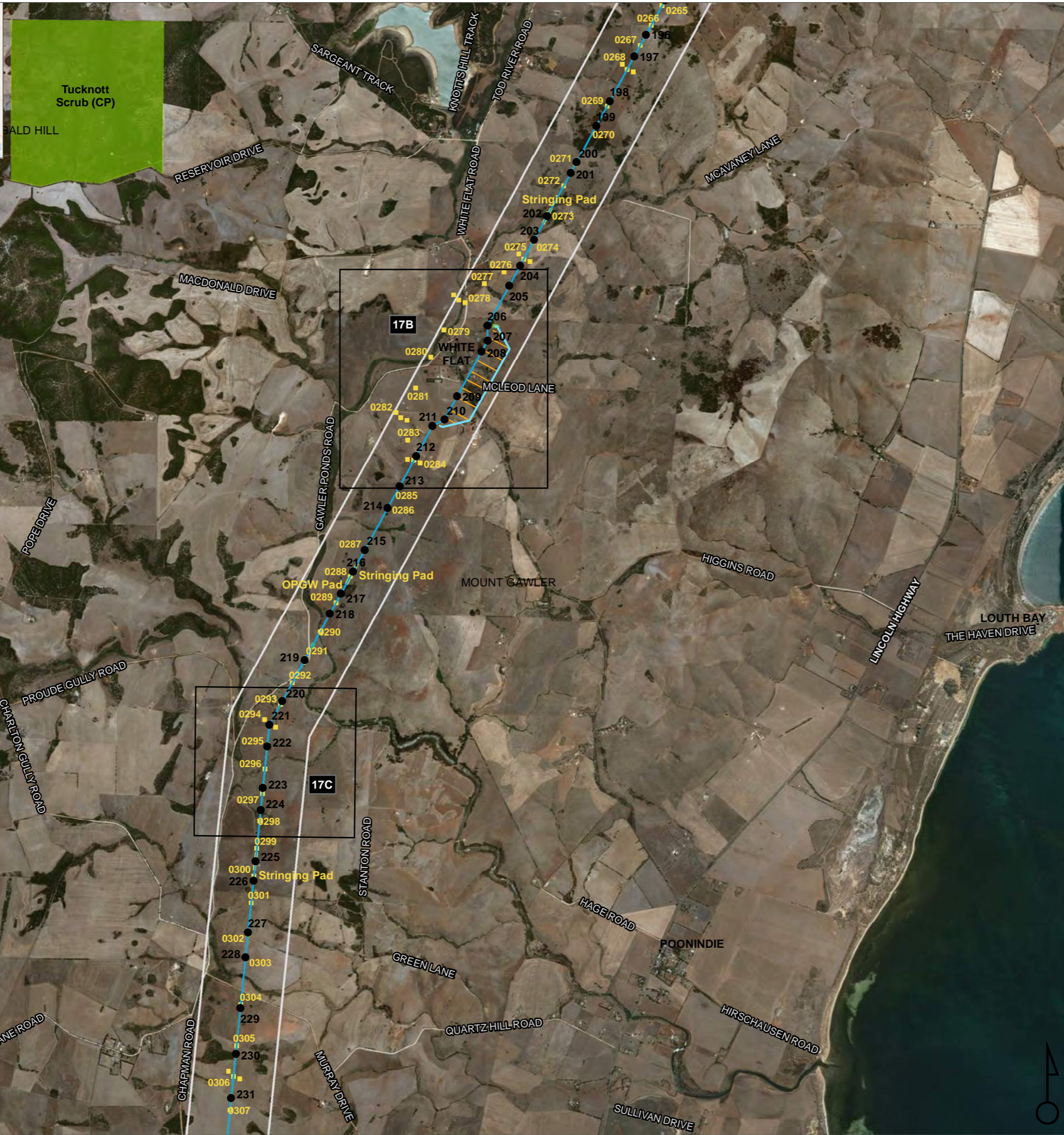
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 17

P:\18109321\18109321\18109321 - DA Reinforcement Project\Task\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:13:57 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks
 - Conservation Park

0 Meters 4,000

1:50,000 GDA 1994 MGA ZONE 53

NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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ELECTRANET

PROJECT
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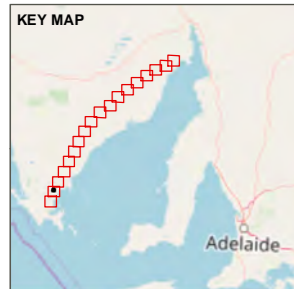
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
DESIGNED	GB	
PREPARED	HPB	
REVIEWED	AS	
APPROVED	DA	

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 17A

PATH: \\golder\gpc\A\Adelaide\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mapdata.mxd, CREATED ON: 2019-11-07 AT: 2:14:36 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3 26mm



- LEGEND**
- Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53

NOTE(S)
1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

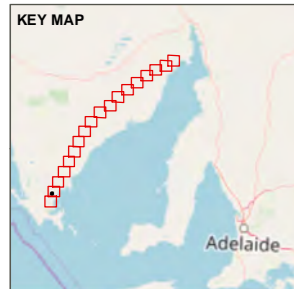
TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 17B

PATH: \\golder\gpc\PA\Adelaide\CompleteData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappages.mxd, CREATED ON: 2019-11-07 AT: 2:15:12 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:15,000 GDA 1994 MGA ZONE 53

NOTE(S)
1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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PROJECT
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TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

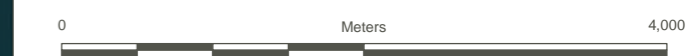
PROJECT NO. 18109321 **CONTROL** 001-R **REV.** A **FIGURE** 17C

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3 297mm



- LEGEND**
- Main Layout Area
 - Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - Substation
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks



1:50,000 GDA 1994 MGA ZONE 53

NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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CLIENT
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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
DESIGNED	GB	
PREPARED	HPB	
REVIEWED	AS	
APPROVED	DA	

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 18

PATH: \\golder\gpc\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019/11/07 AT: 2:16:30 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3 26mm



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:10,000 GDA 1994 MGA ZONE 53

NOTE(S)
1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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CLIENT
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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

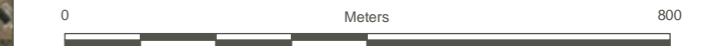
PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 18A

PATH: \\golder\gpc\p\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\ProjectStatus\mappages.mxd, CREATED ON: 2019-11-07 AT: 2:17:07 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3 297mm



- LEGEND**
- Southern Towers
 - Southern Alignment
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Construction Tracks



1:10,000 GDA 1994 MGA ZONE 53

NOTE(S)
1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
1. AERIAL PHOTOGRAPHY COPYRIGHT NEARMAP PTY LTD.

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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
	DESIGNED	GB
	PREPARED	HPB
	REVIEWED	AS
	APPROVED	DA

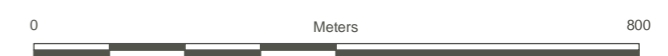
PROJECT NO. 18109321	CONTROL 001-R	REV. A	FIGURE 18B
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MOOIFIED FROM ISO A3



- LEGEND**
- Southern Towers
 - Southern Alignment
 - Temporary Alignments
 - Substation
 - 500m Buffer
 - 50m Pad
 - CAZ Boundary
 - Laydown
 - Construction Tracks



1:10,000 GDA 1994 MGA ZONE 53
 NOTE(S)
 1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP. DATE OF CAPTURE 13/01/2019. RESOLUTION 15CM.

REFERENCE(S)
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PROJECT
EYRE PENINSULA REINFORCEMENT PROJECT

TITLE
SITE LOCATION PLAN

CONSULTANT	DD-MM-YYYY	07-11-2019
DESIGNED	GB	
PREPARED	HPB	
REVIEWED	AS	
APPROVED	DA	

PROJECT NO. 18109321 CONTROL 001-R REV. A FIGURE 18C

PATH: \\golder.com\GIS\A\Adelaide\ComplexData\Electranet\Eyre Peninsula\18109321 - DA Reinforcement Project\Status\map\page.mxd, CREATED ON: 2019-11-07 AT: 2:18:18 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN HOOFED FROM ISO A3



APPENDIX B

Certificates of Title (list)

Lot Plan (Plan/Allotment or Hundred/Section)	Title ID	Property Address
D28423AL1	CL1195/34	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
H560100SE10	CL1374/44	MIDDLEBACK RD MIDDLEBACK RANGE 5600
H560500SE4	CL1374/45	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
H560500SE5	CL1195/45	24601 LINCOLN HWY MIDDLEBACK RANGE 5600
H532700SE55	CT5951/701	372 TARAGORO RD RUDALL 5642
H532700SE73	CT5951/701	372 TARAGORO RD RUDALL 5642
H533400SE1	CT5946/173	737 TARAGORO RD RUDALL 5642
H533400SE22	CT5946/173	737 TARAGORO RD RUDALL 5642
H510400SE38	CT5894/892	BAILLA HILL RD KOPPIO 5607
F130554AL1	CT5253/903	117 MCLEOD LANE WHITES FLAT 5607
F130554AL5	CT5253/903	117 MCLEOD LANE WHITES FLAT 5607
H532700SE32	CT5938/853	582 TARAGORO RD RUDALL 5642
F178907AL495	CT5547/325	485 WADELLA FALLS RD TUMBY BAY 5605
F208389AL91	CT5549/22	15 MCLEOD LANE WHITES FLAT 5607
F216409AL127	CT5619/639	527 PILLAWORTA RD YALLUNDA FLAT 5607
F216409AL128	CT5619/639	527 PILLAWORTA RD YALLUNDA FLAT 5607
F216604AL354	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
F216604AL355	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
F216604AL357	CT5618/255	239 PILLAWORTA RD YALLUNDA FLAT 5607
F216604QP361	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
F216604QP363	CT5618/255	PILLAWORTA RD YALLUNDA FLAT 5607
H531400SE27	CT5981/696	4004 COWELL-KIMBA RD MILTALIE 5602
F42968AL6	CT5857/555	BRATTEN WAY TUMBY BAY 5605
H510300SE125	CT5194/335	BRATTEN WAY YALLUNDA FLAT 5607
F216882AL91	CT5649/880	BRATTEN WAY YALLUNDA FLAT 5607
H510400SE136	CT6150/547	ROCK VALLEY RD KOPPIO 5607
H510400SE35	CT6150/545	49 ROCK VALLEY RD KOPPIO 5607
H510400SE36	CT6150/544	49 ROCK VALLEY RD KOPPIO 5607
H510400SE37	CT6150/545	49 ROCK VALLEY RD KOPPIO 5607
H510400SE67	CT6150/546	49 ROCK VALLEY RD KOPPIO 5607
F178751AL339	CT5552/927	2024 MOUNT HILL COOMABA RD BUTLER 5605
D72489AL58	CT5977/842	1 CORMORANT DR BOSTON 5607
D93428AL41	CT6138/62	134 CHAPMAN RD BOSTON 5607
H510700SE223	CT5446/676	774 WHITE FLAT RD WHITES FLAT 5607
D56914AL71	CT5888/274	1584 BROOKER RD BUTLER 5605
H530400SE31	CT5282/219	1897 CHILMANS RD BUTLER 5605
D112207AL17	CL6189/775	
H510700SE163	CT6138/356	447 MURRAY DR NORTH SHIELDS 5607
H510700SE329	CT6138/358	447 MURRAY DR NORTH SHIELDS 5607
H510700SE343	CT6138/342	447 MURRAY DR NORTH SHIELDS 5607
H510700SE376	CT6138/343	447 MURRAY DR NORTH SHIELDS 5607
D110446AL15	CT6162/434	29 COCKATOO RD BOSTON 5607

D86447AL5		
D95003AL5002	CT6151/567	4512 BIRDSEYE HWY CLEVE 5640
H510400SE130	CT5547/323	778 PILLAWORTA RD KOPPIO 5607
H510400SE134	CT5547/323	778 PILLAWORTA RD KOPPIO 5607
D72489AL59	CT5977/843	13 CORMORANT DR BOSTON 5607
H531400SE32	CT5673/580	4133 COWELL-KIMBA RD MILTALIE 5602
H531400SE40	CT5673/580	4133 COWELL-KIMBA RD MILTALIE 5602
D85850AL33	CR6140/89	IRON KNOB RD WHYALLA BARSON 0
D85850QP32	CL6164/360	1178 EYRE HWY CULTANA 5700
D93251AL67	CL6164/360	EYRE HWY CULTANA 5700
F1597AL2	CT6058/84	TOD RIVER RD KOPPIO 5607
H510400SE16	CT6058/86	TOD RIVER RD KOPPIO 5607
H510400SE68	CT6058/85	43 TOD RIVER RD KOPPIO 5607
H510700SE144	CT6106/417	WHITE FLAT RD WHITES FLAT 5607
H510700SE145	CT6106/418	WHITE FLAT RD WHITES FLAT 5607
H510700SE333	CT5545/496	CHAPMAN RD GREEN PATCH 5607
H510700SE334	CT6091/376	CHAPMAN RD GREEN PATCH 5607
H533400SE414	CT6093/50	114 DRECKOW RD CLEVE 5640
H560700SE3	CL6181/881	MIDDLEBACK RD SECRET ROCKS 5600
H560700SE4	CL6181/881	MIDDLEBACK RD SECRET ROCKS 5600
D52791AL501	CT5782/656	4440 BIRDSEYE HWY CLEVE 5640
D80257AL5051	CT6043/685	POUND LANE BOSTON 5607
D95003AL5001	CT6151/566	BIRDSEYE HWY CLEVE 5640
F148263AL23	CT5274/145	CHAPMAN RD TIATUKIA 5607
F178914AL502	CT5390/67	1774 MINE HILL RD UNGARRA 5607
F6326AL3	CT5115/141	174 CHAPMAN RD BOSTON 5607
D84960AL178	CT6067/389	32 PETREL CT BOSTON 5607
D93642AL50	CT6167/159	407 NANTOURA RD WHARMINDA 5603
F178753AL341	CT5547/716	202 COLEMAN RD BUTLER 5605
F178754AL342	CT5547/715	202 COLEMAN RD BUTLER 5605
H530400SE1	CT5949/857	1316 EAST DOG FENCE RD UNGARRA 5607
D72491AL2	CT5977/866	137 PANORAMIC DR BOSTON 5607
D72489AL76	CT5977/858	15 SEA EAGLE CT BOSTON 5607
D112207/AL18		
H531600SE17	CT5931/542	840 MANGALO-KIELPA RD MANGALO 5602
F178593AL181	CT5940/659	MOUNT DESPERATE RD MANGALO 5602
H530500SE1	CT6076/998	1275 CLEVE RD CAMPOONA 5640
H533400SE64	CT5944/780	BIRDSEYE HWY CLEVE 5640
H533400SE88	CT5944/781	388 SYVERTSEN RD CLEVE 5640
H530900SE24	CL6182/263	WOOLFORD RD MINBRIE 5602
H530900SE27	CL6182/263	WOOLFORD RD MINBRIE 5602
D23001QP28	CL504/25	1626 MIDDLEBACK RD MIDDLEBACK RANGE 5600
D23001QP31	CL513/114	268 ASH RD MIDDLEBACK RANGE 5600
H560100SE12	CL587/119	215 ASH RD MIDDLEBACK RANGE 5600
H560100SE15	CL512/62	215 ASH RD MIDDLEBACK RANGE 5600
H560600SE12	CL6205/138	MIDDLEBACK RD MIDDLEBACK RANGE 5600
H510700SE362	CT5935/172	772 CHAPMAN RD NORTH SHIELDS 5607

F215905QP92	CT5605/478	1888 BROOKER RD BUTLER	5605
H530400SE34	CT5951/411	1648 BROOKER RD BUTLER	5605
H530400SE37	CT5605/479	1888 BROOKER RD BUTLER	5605
H530400SE67	CT5605/481	1888 BROOKER RD BUTLER	5605
D32252AL3	CT5419/267	1575 LIPSON-UNGARRA RD UNGARRA	5607
D32252AL4	CT5420/288	1575 LIPSON-UNGARRA RD UNGARRA	5607
D32252AL5	CT5419/329	1575 LIPSON-UNGARRA RD UNGARRA	5607
H533100SE46	CT5942/520	736 PIPE RD VERRAN	5603
F214542AL151	CT5620/114	313 TOD RIVER RD WHITES FLAT	5607
F214542AL153	CT5620/114	313 TOD RIVER RD WHITES FLAT	5607
D72492AL6	CT5977/875	29 PETREL CT BOSTON	5607
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H531400SE46	CT5994/939	683 BROADBENT RD MILTALIE	5602
H531400SE5	CT5994/939	683 BROADBENT RD MILTALIE	5602
H531400SE6	CT5994/939	683 BROADBENT RD MILTALIE	5602
H531400SE9	CT5994/939	683 BROADBENT RD MILTALIE	5602
D80728AL14	CT6124/37	1742 EAST DOG FENCE RD UNGARRA	5607
H511600SE365	CT5991/809	1488 LIPSON-UNGARRA RD UNGARRA	5607
H511600SE433	CT5991/809	1488 LIPSON-UNGARRA RD UNGARRA	5607
H511000SE99	CT6055/313	49 UNGARRA-STOKES RD UNGARRA	5607
H511600SE400	CT6055/314	WEST DOG FENCE RD UNGARRA	5607
F35330QP1	CT6058/985	7646 BALUMBAH-KINNARD RD VERRAN	5603
H533100SE78	CT6074/876	BAKER RD VERRAN	5603
H510700SE373	CT5994/15	380 CLARKES LANE NORTH SHIELDS	5607
H510700SE374	CT5994/15	380 CLARKES LANE NORTH SHIELDS	5607
D51226AL32	CT5656/541	GAWLER PONDS RD WHITES FLAT	5607
F199758QP95	CT5955/875	689 WHITE FLAT RD WHITES FLAT	5607
F214991AL93	CT5792/848	WHITE FLAT RD WHITES FLAT	5607
D72491AE202	CT5977/895	FLINDERS HWY BOSTON	5607
D84960AE179	CT6067/390	2 COCKATOO RD BOSTON	5607
F178747AL335	CT5565/568	2289 MOUNT HILL COOMABA RD BUTLER	5605
D72489AL78	CT5977/860	1 SEA EAGLE CT BOSTON	5607
H533100SE44	CT5972/350	78 PIPE RD VERRAN	5603
H533100SE4	CT5937/179	2061 WHARMINDA RD WHARMINDA	5603
H533100SE13	CT5956/596	208 RANGE RD VERRAN	5603
H533100SE14	CT5956/596	208 RANGE RD VERRAN	5603
D72492AL5	CT5977/874	21 PETREL CT BOSTON	5607
D38006AL100	CR5772/809	COWELL-KIMBA RD MILTALIE	5602
D83666AL81	CR6059/794	MIDDLEBACK RD MIDDLEBACK RANGE	5600
D83666AL82	CR6059/795	MIDDLEBACK RD MIDDLEBACK RANGE	5600
D83666AL84	CR6059/797	MIDDLEBACK RD MIDDLEBACK RANGE	5600
D83666QP80	CR6059/793	MIDDLEBACK RD MIDDLEBACK RANGE	5600
H533100SE48	CT5957/792	MASTERS RD WHARMINDA	5603
H533100SE77	CT5880/963	MASTERS RD WHARMINDA	5603
H533100SE94	CR5772/879	RANGE RD WHARMINDA	5603
H560600SE10	CR6072/724	MIDDLEBACK RD MIDDLEBACK RANGE	5600
H531400SE50	CR5772/867	GARTHS HWY MILTALIE	5602

H533100SE55	CT5665/342	BAKER RD VERRAN 5603
F217080QP27	CT5680/304	MOUNT HILL COOMABA RD BUTLER 5605
H510700SE165	CT5489/756	MURRAY DR NORTH SHIELDS 5607
H510700SE365	CT5939/525	CHAPMAN RD GREEN PATCH 5607
F213007QP92	CT5884/798	CHAPMAN RD CHARLTON GULLY 5607
D110446AL14	CT6162/433	9 COCKATOO RD BOSTON 5607
H531600SE11	CT6143/46	BURTON RD MANGALO 5602
H531600SE12	CT5847/901	353 BURTON RD MANGALO 5602
H533100SE35	CT6074/875	7282 BALUMBAH-KINNARD RD VERRAN 5603
F178594AL182	CT5669/119	1741 MANGALO RD MANGALO 5602
H531600SE37	CT6143/47	45 BURTON RD MANGALO 5602
F6326AL1	CT5534/119	114 CHAPMAN RD BOSTON 5607
H530400SE32	CT5233/920	1830 CHILMANS RD BUTLER 5605
F199822QP91	CT5397/480	240 SOAKS RD WHARMINDA 5603
F199822QP92	CT5397/480	240 SOAKS RD WHARMINDA 5603
F199449QP93	CT5666/49	141 PRIME RD BUTLER 5605
D52679AL33	CT5733/811	GAWLER PONDS RD CHARLTON GULLY 5607
F179979AL757	CT5553/594	495 FLINDERS HWY BOSTON 5607
H533400SE28	CT5939/888	GOVT RD CLEVE 5640
H533400SE103	CT6173/412	500 NORTH SPRIGGS RD CLEVE 5640
H533400SE104	CT6173/414	500 NORTH SPRIGGS RD CLEVE 5640
H533400SE95	CT6173/413	500 NORTH SPRIGGS RD CLEVE 5640
H533400SE96	CT5942/749	96 NORTH SPRIGGS RD CLEVE 5640
H530400SE45	CT5542/697	BROOKER RD BUTLER 5605
H533400SE39	CT5928/337	225 BROADVIEW RD CLEVE 5640
H533400SE46	CT5940/707	4543 BIRDSEYE HWY CLEVE 5640
H533400SE55	CT5940/707	4543 BIRDSEYE HWY CLEVE 5640
D84960AL177	CT6067/388	6 FALCON CT BOSTON 5607
F42968AL7	CT5934/51	WADELLA FALLS RD TUMBY BAY 5605
F42968QP9	CT5934/51	WADELLA FALLS RD TUMBY BAY 5605
H510300SE129	CT5549/527	WADELLA FALLS RD TUMBY BAY 5605
H510300SE130	CT5465/916	LOG HUT RD YALLUNDA FLAT 5607
F6395AL2	CT5536/656	MINE HILL RD UNGARRA 5607
D66450QP51	CT5941/866	MINE HILL RD UNGARRA 5607
F6395AL1	CT5941/867	MINE HILL RD UNGARRA 5607
H531400SE12	CT6004/865	CLAPP RD MILTALIE 5602
H533100SE20	CT5450/559	610 PAHLS HILL RD VERRAN 5603
H533100SE42	CT5889/7	MASTERS LANE VERRAN 5603
D72489AL62	CT5977/846	26 SEA EAGLE CT BOSTON 5607
D110446AL16	CT6162/435	43 COCKATOO RD BOSTON 5607
F156084AL1	CT5281/628	231 HAIGH DR TIATUKIA 5607
F148262AL22	CT5274/146	CHAPMAN RD TIATUKIA 5607
D23001QP19	CT6128/515	MIDDLEBACK RD MIDDLEBACK RANGE 5600
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F252367AL61	CL6189/768	0
F252368QP60	CL6189/768	0
H533400SE54	CT5256/872	4231 BIRDSEYE HWY CLEVE 5640

D72489AL77	CT5977/859	7 SEA EAGLE CT BOSTON 5607
H532700SE29	CT5936/380	1756 CLEVE-VERRAN RD VERRAN 5603
F130554AL2	CT6122/308	137 MCAVANEY LANE WHITES FLAT 5607
F130554AL3	CT6122/309	137 MCAVANEY LANE WHITES FLAT 5607
H532700SE33	CT5975/345	TARAGORO RD RUDALL 5642
H533400SE24	CT5975/345	177 TARAGORO RD RUDALL 5642
F199757QP92	CT5388/607	463 WHITE FLAT RD WHITES FLAT 5607
F147689AL4	CT5269/41	613 MOUNT DESPERATE RD MANGALO 5602
H531200SE6	CT5853/934	417 BURTON RD MANGALO 5602
H531600SE23	CT5269/45	613 MOUNT DESPERATE RD MANGALO 5602
H531600SE30	CT5853/934	417 BURTON RD MANGALO 5602
D69546AL102	CT5957/762	286 DRAY POLE HILL RD YALLUNDA FLAT 5607
H511000BL10C	CT5380/595	645 UNGARRA-STOKES RD UNGARRA 5607
D58399AL50	CT5888/648	LIPSON-UNGARRA RD UNGARRA 5607
H510700SE204	CT5546/775	804 WHITE FLAT RD WHITES FLAT 5607
H533400SE74	CT5975/355	NORTH SPRIGGS RD CLEVE 5640
H533400SE75	CT5975/355	NORTH SPRIGGS RD CLEVE 5640
H510700SE364	CT6109/635	CLARKES LANE GREEN PATCH 5607
F6326AL4	CT5411/951	CHAPMAN RD BOSTON 5607
F6326AL5	CT5411/949	CHAPMAN RD BOSTON 5607
F147915AL7	CT5272/71	265 CHAPMAN RD TOOTENILLA 5607
F17131AL33	CT5322/461	HYDE RD TOOTENILLA 5607
F216503AL91	CT5802/497	538 HYDE RD TOOTENILLA 5607
F216503AL92	CT5802/497	538 HYDE RD TOOTENILLA 5607
F216503AL93	CT5802/497	538 HYDE RD TOOTENILLA 5607
F216503AL94	CT5802/497	538 HYDE RD TOOTENILLA 5607
H510700SE363	CT5698/302	CLARKES LANE NORTH SHIELDS 5607
F209442AL256		
D79748AL1000	CT6144/358	101 LINCOLN HWY WHYALLA BARSON 5601
H531400SE33	CT5979/39	28 CLAPP RD MILTALIE 5602
D72489AL61	CT5977/845	32 SEA EAGLE CT BOSTON 5607
D80257AL5052	CT6043/686	451 FLINDERS HWY BOSTON 5607
H510700SE220	CT5815/529	

APPENDIX C

**Construction Environmental
Management Plan (initial)**



REPORT

Eyre Peninsula Transmission Supply Project

Construction Environmental Management Plan

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1.0 INTRODUCTION

ElectraNet Pty Ltd (ElectraNet) has identified that components of the transmission line serving the lower Eyre Peninsula are nearing the end of their functional life and will require replacement. As a result, ElectraNet investigated several options to replace or upgrade the transmission lines, to meet the South Australian Electricity Transmission Code (ETC) reliability standards for the Eyre Peninsula.

The Eyre Peninsula Transmission Supply Project (the Project) involves the construction of a new high-voltage 275/132 kilovolt (kV) transmission line (alongside the existing 132kV line) from the Cultana substation near Whyalla in the north to the Port Lincoln terminal substation in the south, and two supporting substation developments at Yadnarie and Port Lincoln.

A development application for the Project has been submitted and will be assessed under Section 49 (Crown Development) of the *Development Act 1993* by the State Commission Assessment Panel (SCAP).

This Construction Environmental Management Plan (CEMP) provides details on how impacts associated with the development will be managed and mitigated to acceptable levels.

The Project includes the following components:

- Construction of a new double-circuit electricity transmission line from Cultana to Yadnarie that is initially energised at 132kV, but which may be energised at 275kV if required in the future.
- Construction of a new 132kV double-circuit transmission line from Yadnarie to Port Lincoln.
- Construction of a new 275kV/132kV substation immediately north of the existing Yadnarie substation.
- Extension of the existing Port Lincoln Terminal substation to accommodate additional electricity infrastructure required to support the new transmission line.

The proposed development requires the acquisition of approximately 270 lineal km (1500-3000 hectares) of land easement and installation of approximately 540 lattice structures with associated cabling, ancillary structures, access tracks, temporary laydown areas and workers' camps.

Environmental risks and potential impacts have been assessed for the Project considering the proposed construction and operational activities and with input from technical studies including ecology and heritage using desktop and field survey information.

1.1 Purpose

The purpose of this CEMP is to:

- Provide environmental mitigation or management measures to implement to reduce potential environmental impacts of the Project.
- Document the policies, processes and procedures to manage potential impacts along with legislative requirements, approval conditions, and other relevant environmental obligations.
- Allocate responsibilities for ensuring the effective implementation of these policies, processes and procedures.
- Describe how the environmental management performance will be monitored and reviewed to drive continuous improvement.

The CEMP will be used as a basis for the contractor's Construction Environmental Management Plan, to be developed by the selected construction contractor for the construction phase of the project.

This CEMP is therefore a partially completed version of the plan, as the detailed design of the project is not yet finalised. On completion of the detailed design phase, the CEMP and the management plans it incorporates will be completed in full and submitted to SCAP and other relevant authorities. The CEMP will also be updated to comply with any development approval conditions for the Project.

1.2 Related management plans

The assessment of environmental, cultural heritage and social impacts associated with the project and the related mitigation measures employed to address these impacts are provided within this CEMP where relevant. However, more details on the environmental or social aspects may be contained within the related management plan (including the Cultural Heritage Management Plan).

This CEMP incorporates the following plans, which are currently in draft format and will be updated in the next version of the CEMP:

- Bushfire Management Plan (APPENDIX B).
- Non-Aboriginal Heritage Management Plan (APPENDIX C).
- Weed and Pest Management Plan (APPENDIX D). The Weed and Pest Management Plan will be developed in consideration of two broad categories of land that the Project will be built upon to ensure management measures are targeted to the specific weeds and pests of concern in each area. The land categories are conservation (or undeveloped) land and agricultural land.
- Threatened Species Management Plan (APPENDIX E)
- Aboriginal Cultural Heritage Management Plan (APPENDIX F)
- Landholder Liaison Plan (APPENDIX G)

2.0 PROJECT DESCRIPTION

Electricity supply for the Eyre Peninsula is currently sourced via a single 275kV transmission line north of Cultana. The Whyalla to Yadnarie and Yadnarie to Port Lincoln 132kV transmission lines were built in 1967 to connect the Eyre Peninsula to the State's main transmission network. There are currently four existing ElectraNet substations servicing the 132kV transmission line between Whyalla and Port Lincoln.

The new transmission line route generally follows the existing transmission line, as shown on Figure 1. The transmission line route was selected in consideration of appropriate buffer distances to sensitive or significant environmental features and existing infrastructure (i.e. residences, farm buildings etc.).

The Project is made up of the following infrastructure components:

- Construction of a new double-circuit transmission line from Cultana to Yadnarie that is initially energised at 132kV, but which is capable of being energised at 275kV if required in the future.
- Construction of a new 132kV double-circuit transmission line from Yadnarie to Port Lincoln.
- Erection of approximately 540 new lattice structures or monopoles to support the new transmission lines.
- Construction of a new 275/132kV substation immediately north of the existing Yadnarie substation, involving installation of new electricity infrastructure, small buildings (accommodating control systems and staff facilities), cabling and security fencing.
- Extension of the existing Port Lincoln terminal substation to accommodate additional infrastructure required to support the new transmission line, including small buildings (accommodating control systems and staff facilities), cabling and security fencing.
- Minor upgrade of the Cultana substation to accommodate additional infrastructure required to support the new transmission line
- Construction of new access tracks facilitating access to the transmission line in areas where there are no existing access tracks, and upgrade of some existing access tracks to safely accommodate heavy vehicles/equipment needed for construction.
- Development of three (3) main temporary laydown areas for storage of heavy vehicles and equipment with associated site offices and amenities (within ATCO huts), security fencing and self-bunded diesel fuel storages.
- Development of two (2) temporary workers' camps with associated accommodation, amenities and kitchen (dry mess) facilities catering for approximately 70 workers. These camps will also have local power generation facilities and self-bunded diesel fuel storages.

Figure 1 shows the location of the key project components and indicative locations of the new substations. Appendix A provides the detailed map series of the complete transmission line alignment.

It should be noted that the detailed design phase of the project has yet to be completed. The information presented in the following sections is based on the preliminary design being at 90% with no changes expected to the transmission line alignment and only minor changes to key project elements. Further, the construction contractor will be responsible for the detailed siting of the proposed workers' camps and laydown areas and, once appointed, will be required to obtain all necessary licences and approvals to operate these facilities.

This CEMP covers the construction of the transmission line, structures, access tracks, substations, workers camps and laydown areas. The detailed figures of the project components are provided in Appendix A, with

the project area encompassing a map series of 18 figures, which are consistent with the ecology specialist study.

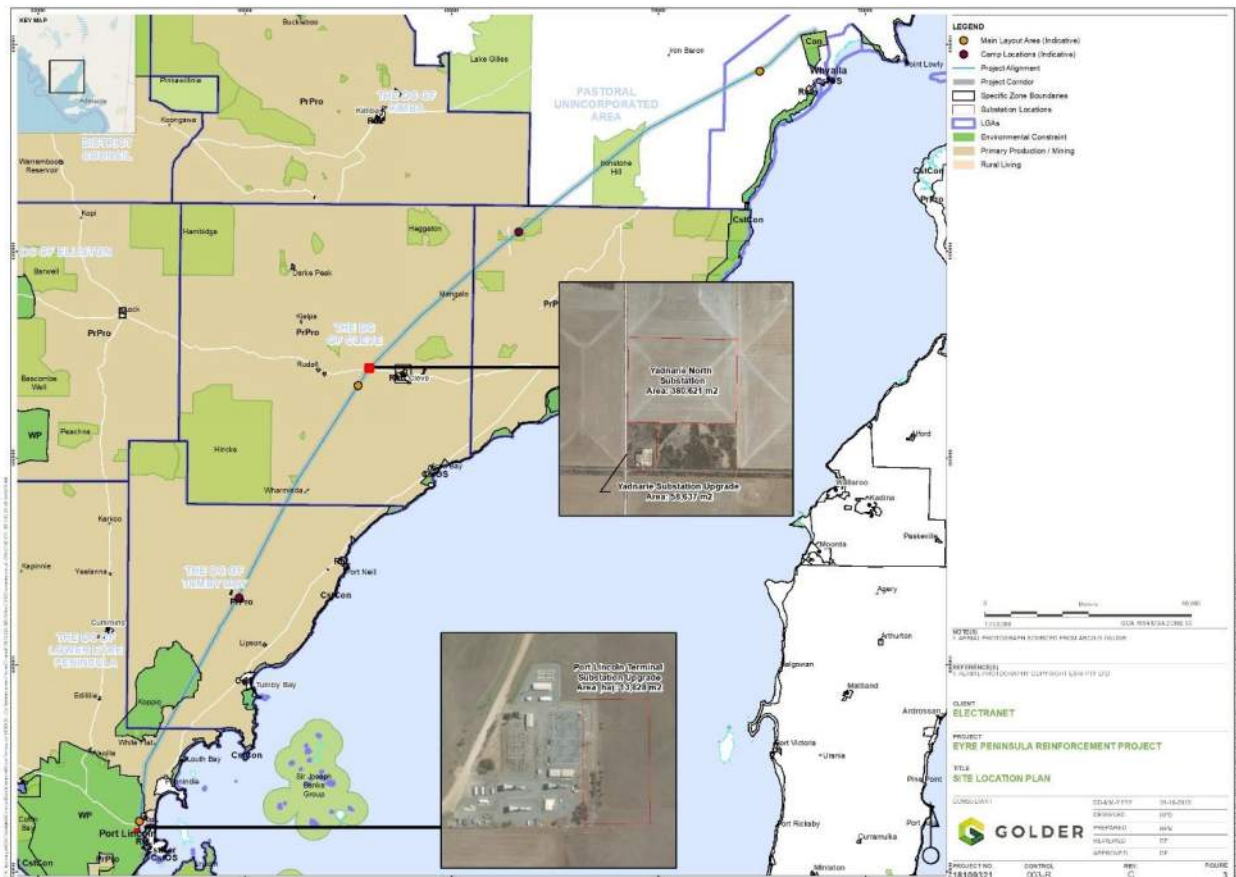


Figure 1: Site location plan

2.1 Transmission line

The transmission line is to be built within a 100 metre (m) wide easement adjacent to and generally on the western side of the existing 40m-wide 132kV transmission line easement. The transmission line will comprise:

- six (6) separate lines (conductors) mounted on 60m high lattice structures or monopoles on that part of the alignment between Cultana and Yadnarie; and
- three (3) separate conductors mounted on 50m high lattice structures or monopoles on that part of the alignment between Yadnarie and Port Lincoln.

There will be an average span of 400 – 500 m between each structure with the transmission line corridor to extend a total distance of 270 km, from the Cultana substation in the north to the Port Lincoln terminal substation in the south.

A typical program of works to erect the transmission line will involve the following:

- Geotechnical investigations.
- Development of access tracks where required (see section 2.3).

- Installation of gates for security reasons where required.
- Marking out the precise position of structures to be erected.
- Clearing and levelling the area where the structures are to be positioned to ensure a stable and safe surface for construction. Structure pads will be rolled where possible to minimise vegetation impacts. This involves 'scraping' the vegetation and associated soil materials with a bulldozer, stockpiling these materials until construction is complete, and returning the materials as close as possible to their original state to facilitate self-seeding of the vegetation.
- Erection of the structures.
- Stringing of the conductor cabling using equipment such as winches and purpose-built stringing machines. ElectraNet is currently working with potential construction contractors to determine how stringing will occur in order to minimise on-ground impacts. Where required, a separate stringing track (maximum width of 5m) will be established to accommodate the stringing process using a bulldozer with blades raised to remove larger trees while keeping shrubs, grasses and topsoil largely intact. The vehicle used to carry the conductor wires into position will be rubber-wheeled (where possible) to minimise damage to remaining vegetation. On completion of stringing, the site will be rehabilitated.

There is a possibility that aerial stringing will be used in some locations. This will be confirmed in the final version of this CEMP.

- Installation of security devices and measures, including ground earthing and anti-climbing devices.
- Inspections and commissioning tests prior to the transmission line being energised and put in service.

Construction of the transmission line will typically proceed in a linear fashion along the easement, concurrently at several different sites.

2.1.1 Transmission line diversions

For most of the alignment, the new transmission line will run parallel to the existing line. However, there are exceptions to this where constraints posed by the proximity of dwellings, difficult terrain and/or environmentally and culturally sensitive areas have led ElectraNet to divert the transmission line in order to avoid these areas and minimise impacts.

The plans and information contained in Appendix A show where diversions have been designed into the proposed alignment to minimise potential impacts.

2.2 Structures

As noted, the proposed transmission line is to be supported by large lattice structures or monopoles of up to 60m in height. A total of around 540 structures will be distributed along the alignment as follows:

- Approximately 300 structures measuring 60m in height in the northern section from Cultana to Yadnarie. Structures in this section of the alignment are generally higher in order to clear native vegetation with minimal disturbance; and
- Approximately 240 structures measuring 50m in height in the southern section between Yadnarie and Port Lincoln where cropping activities are predominant.

Figure 2 below shows the typical transmission structures used by ElectraNet.

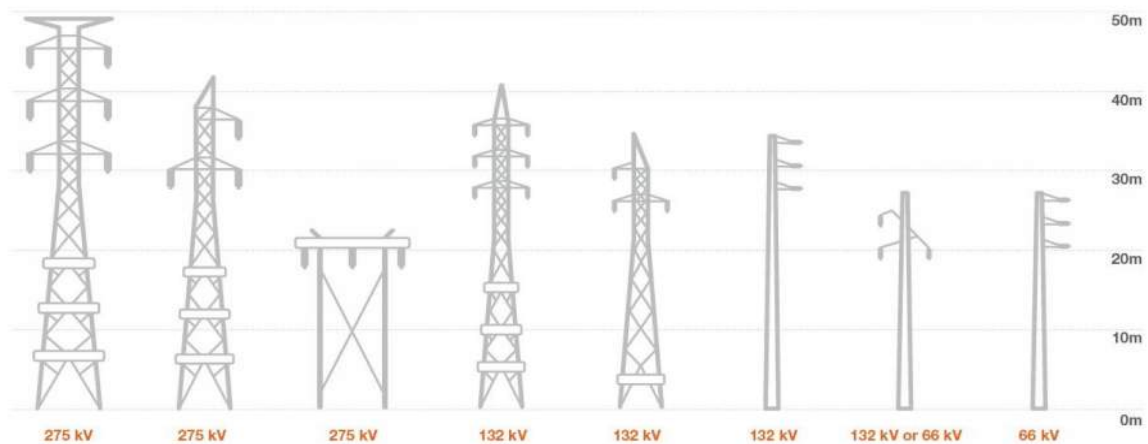


Figure 2: Typical transmission structures

The structures will be mounted on concrete structure pads measuring approximately 10m x 10m, enclosed within a 50m x 50m maximum construction area to allow space for positioning large equipment (cranes, piling rigs and winches) required to erect the structures and string the transmission line. The construction footprint will be minimised wherever possible, with structure pads of 30m x 30m achievable in some locations.

It should be noted that the *Electricity (General) Regulations 2012* require minimum clearance or setback distances from structures and vegetation that could present a risk to either the electricity infrastructure itself or the surrounding environment through bushfire. ElectraNet will apply these statutory clearances when erecting the structures and transmission line which will necessarily lead to some clearance of native vegetation. In all cases, ElectraNet has sought to minimise the extent of native vegetation clearance when determining the precise location of each structure and will erect higher structures if required to ensure it meets the regulatory standards.

The sequence of construction for the structures involves the following:

- Installing foundations – drilling and excavation of soil and rock material to a depth of between 10-15m before driving piles and/or filling with concrete. Excavated fill will be spread across the site if agreed to by the landowner. If not, it will be removed and either used off-site (for capping or donated to local landowners) or transported to an appropriate disposal facility.
- Assembling the structure – structure sections will be delivered to the site and then erected in sections using a large mobile crane and winch.

In areas of significant slope, the site will first be levelled and made safe for the subsequent erection of structures.

2.2.1 Concrete batching plants

Concrete batching plants will be used to provide the footing material for the structures and structure pads. The type, number and location of these plants will be confirmed on engagement of the construction contractor who will liaise with the Environment Protection Authority (EPA) to obtain the necessary licences for the use of these plants.

2.3 Access tracks

Existing access tracks used to maintain the 132kV line will be used as much as possible to access the proposed transmission line alignment. Where new access tracks are needed, bulldozers and graders will be used to clear vegetation (where required) to provide a trafficable surface. The tracks will be designed to take

the shortest route (with the potential to use short spur tracks off existing access tracks) and with as little impact as possible on existing cropping/grazing activities, native vegetation and sensitive areas. Some of the existing tracks will need to be upgraded to safely accommodate the type of vehicles and equipment required for the development, with upgrades similarly designed to minimise impacts.

Work on all access and spur tracks will be undertaken in accordance with ElectraNet's standards. During the development of these tracks, ElectraNet will maintain contact with affected landowners to ensure minimal disturbance.

2.4 Substations

The three substation (or switchyard) developments at Cultana (within the existing substation footprint), Yadnarie (approximately 10km west of the township of Cleve) and Port Lincoln (extension of the existing Port Lincoln terminal substation) will accommodate additional electricity infrastructure required to support the high voltage transmission line. The switchyards will also require the installation of small buildings to accommodate staff facilities and technical control and protection systems that allow the site to be remotely monitored and operated. Security fencing and other measures typical of substation developments will be installed to ensure public safety and protection of the infrastructure.

2.5 Temporary workers' camps

Two (2) temporary workers' camps, each approximately one (1) hectare in size, will be developed as part of the project owing to the paucity of available accommodation facilities along the proposed alignment. One of these camps will be located at Ungarra (approximately 80km north of Port Lincoln) while the other will be located on the periphery of the Sheoak Hill Conservation Park (approximately 35km north-west of Cowell). These camps will be sited in areas already disturbed by development of access tracks or maintenance activities, or in areas with limited native vegetation using the following criteria:

- Site is located close to alignment, is relatively flat, stable and capable of being secured and screened;
- Access for B-double trucks is available;
- Site has been previously cleared requiring no (or minimal) native vegetation clearance;
- No listed flora and fauna species are present;
- Items or sites of cultural heritage significance are not affected; and
- Site is located away from residences and other sensitive receptors.

Each camp will provide accommodation, amenities and kitchen (dry mess) facilities for around 70-80 workers and will incorporate local power generation facilities (requiring integrated self-bunded diesel fuel storage tanks), wastewater treatment and stormwater management regimes. The construction contractor will obtain all licences and approvals for establishing and operating the camps from the relevant authorities.

2.6 Temporary laydown areas

Three (3) main all-weather laydown areas for storage of heavy vehicles, equipment and bulk materials needed to construct the transmission line will be developed at locations close to Cultana, Yadnarie and Port Lincoln north. These laydowns will include site offices and amenities housed within ATCO huts, security fencing, gates and areas for storage of diesel fuel within integrated self-bunded tanks.

Final siting of the proposed laydown areas will be determined by the construction contractor as part of the detailed design phase with site selection criteria the same as that for the workers' camps. The construction contractor will obtain all necessary licences and approvals to establish and operate the laydown areas.

Contractors undertaking the works will access the main laydown areas to collect equipment and materials which will then be transported to specific construction sites along the alignment. Smaller temporary laydown areas will be set up on existing access tracks along the alignment (where possible) to erect the structures and conductors with contractors required to meet ElectraNet's siting criteria when establishing these areas.

All laydown sites will be rehabilitated immediately after use.

The layout of the proposed laydown areas will be included in the next version of this CEMP.

3.0 CONSTRUCTION APPROACH

Given the variability of terrain along the proposed alignment, the approach to constructing the transmission line will vary according to existing ground and access conditions.

The construction contractor must ensure that the construction process meets ElectraNet's standards in relation to minimising environmental harm, protecting areas of cultural heritage significance, adhering to agreements made with landowners and ensuring that all relevant approvals/licences have been obtained.

This CEMP (and future updates to the document) aims to provide the details on how this will be achieved during the construction process.

The key construction phase activities to be undertaken consist of the following:

- Clearing and grubbing of structure locations and preparation of layout area.
- Earthworks for roads and crane platform/hardstands.
- Stockpiling of topsoil resulting from earthworks.
- Earthworks for structure footings.
- Bore piling and pouring of concrete footings.
- Installation of structures.
- Installation of insulators.
- Stringing and connection of electrical conductors.
- Commissioning of transmission line.
- Clean-up of waste materials.
- Installation of any permanent security fencing/gates.

The following sections summarise the construction approach to managing vegetation, soil, watercourse crossings, bushfires, heritage and traffic with more detailed mitigation measures to minimise impacts provided in Section 6.0.

3.1 Vegetation management

All efforts will be taken to minimise the extent of native vegetation clearance and the potential disturbance of fauna habitat resulting from the construction of the proposed transmission line. ElectraNet will provide a suitable SEB offset to the Native Vegetation Council for vegetation clearance while a referral to the Commonwealth Department of the Environment and Energy under the EPBC Act will be made to determine the extent to which the project may affect matters of NES. The ecological assessments completed to date confirm that the proposed transmission line is likely to impact some listed ecological flora and fauna communities.

The proposed alignment also passes over a number of native vegetation heritage agreement areas with ElectraNet to negotiate the amendment of these agreements with landowners and the Native Vegetation Council for the period of construction.

During construction, measures will be employed to prevent or minimise the potential for weed invasion (see Section 6.4) with a stand-alone Weed and Pest Management Plan to be provided in the updated version of this CEMP.

Post-construction, rehabilitation of the affected environment (including access tracks, laydown areas and workers' camps) will be undertaken with the aim being to return the land to its pre-construction state as much as possible.

3.2 Soil management

Temporary stockpiling of topsoils and subsoils may be required during the construction phase of the project for the establishment of structure pads and temporary laydown areas along the alignment. Assuming the worst case of an average depth of clearance being approximately 100mm, each structure would require a temporary stockpile of around 250 cubic metres (m³) with stockpiles to be limited to a height of 2m and area of 225m² (depending on the dimensions of the available cleared area).

Clearance will be minimised wherever possible and stockpiles will be located away from watercourses and sensitive areas and may be temporarily covered with cleared vegetation to reduce the potential for wind erosion (see Section 6.4).

3.3 Watercourse management

The transmission line crosses over several ephemeral streams along the corridor with all efforts to be taken to avoid or minimise impacts on these watercourses. The construction contractor will be instructed to ensure that no structures are placed in waterways during construction and where access tracks are required to cross a waterway, the contractor will liaise with Natural Resources Eyre Peninsula to obtain the necessary Water Affecting Activity permits to minimise impacts on surface water hydrology (see Section 6.4).

3.4 Water management

Potable water will be needed for use in concrete manufacture, workers' camps and staff amenities, with lower quality water to be used for compaction of the foundations at structure sites and for dust suppression of cleared areas along the alignment.

The water is likely to be obtained from several sources, including existing and new groundwater wells and the State's potable water network. Water may be stored in large, temporary above-ground storages (water tanks or turkeys nests) with detailed information on the supply and storage of water to be confirmed as part of the detailed design phase. All relevant permits will be obtained by the construction contractor.

3.5 Bushfire management

The proposed development passes through areas of significant bushfire risk. For this reason, ElectraNet intends to develop and implement a Bushfire Management Plan (see Appendix B for the draft) which includes a hierarchy of measures aimed at mitigating bushfire risk (see Section 6.4).

The State Bushfire Co-ordination Committee (SBCC) is responsible for bushfire management planning in South Australia. The State is divided into nine Bushfire Management Areas and the Project area is within the Upper Eyre Peninsula and Lower Eyre Peninsula areas. As part of the development of the Bushfire Management Plan the details of the project will be supplied to the two committees for inclusion into the risk database and online Bushfire Management Area Plan map. This is a strategic level document designed to provide policy direction for fire, emergency and land management agencies and Bushfire Management Committees.

3.6 Heritage management

There are two local heritage listed properties along the proposed alignment. These include a cottage and outbuilding located at 689 White Flat Road in the District Council of Lower Eyre Peninsula and a dwelling located at Section 126, Hundred of Koppio, Yallunda Flat in the District Council of Tumby Bay. Both Councils have been informed about the proximity of the proposed transmission line to these places and both have

confirmed that they have no concerns that the heritage value of these places will be impacted. The management of works in these areas will ensure appropriate protection of heritage values. Details of protection measures are provided in Section 6.8.

A Non-Aboriginal Heritage Management Plan has been developed as part of the CEMP to ensure that the heritage values of these items are protected during construction of the proposed development (see Section 6.8 and Appendix C). The Cultural Heritage Management Plan is a separate stand-alone document.

3.7 Traffic management

Relevant local councils have been consulted to discuss the potential traffic management issues associated with the proposed development.

The maximum size of vehicles transporting equipment and infrastructure will be B-doubles, which can be accommodated on all roads forming the route to construction sites and laydown areas. A Traffic Management Plan (a separate stand-alone document) confirming the type and size of vehicles and routes taken to deliver infrastructure components and the areas of the road network that will need to be reinforced (in consultation with the Department of Planning, Transport and Infrastructure (DPTI) and local councils) will be submitted by the construction contractor during the detailed design phase.

4.0 LEGISLATIVE CONTEXT

Table 1 summarises the project approvals and the requirements that have been considered within this CEMP, future updates to the CEMP or the related management plans.

Table 1: Project approvals and requirements

Relevant legislation	Approval authority	Type of approval	Responsibility and timing
South Australian Legislation			
<i>Development Act 1993</i> (Development Act)	State Commission Assessment Panel (SCAP)	Development Approval A Development Application will be submitted to SCAP for assessment	ElectraNet Prior to construction Relevant conditions of approval to be included in the next version of the CEMP
<i>Environment Protection Act 1993</i> (EP Act)	South Australia Environment Protection Authority (EPA)	Licence to undertake a prescribed activity of environmental significance under Schedule 1 of the EP Act (i.e. concrete batching plant)	ElectraNet and contractors Throughout construction and operation
<i>Natural Resources Management Act 2004</i> (NRM Act)	Department of Environment and Water (DEW) - including Natural Resources Eyre Peninsula	Water affecting activity permit for activities with the potential to impact on the health and condition of water resources, water dependant ecosystems and other water users Appropriate management of weed and pests during construction and rehabilitation of construction sites	ElectraNet and contractors Water Affecting Activity permits will be obtained by the construction contractor prior to works being undertaken near a watercourse. Weed and pest management prior to construction activities
<i>Native Vegetation Act 1991</i>		Approval for the removal of native vegetation through the Native Vegetation Branch. A Significant Environmental Benefit (SEB) offset to be established in accordance with NVC requirements	ElectraNet Prior to vegetation clearance
<i>National Parks and Wildlife Act 1972</i>		Measures to minimise potential impacts to listed flora and fauna species during construction are established	Prior to construction activities

Relevant legislation	Approval authority	Type of approval	Responsibility and timing
Commonwealth Legislation			
<i>Environment Protection and Biodiversity Conservation (EPBC) Act 1999</i>	Department of Environment and Energy	Desktop and field investigations along the proposed route alignment have indicated that the EPBC Act is likely to be triggered in relation to this project with a formal referral to the Commonwealth to be submitted.	EPBC Act referral to be submitted Conditions from the assessment and approval to be implemented in construction and operation activities
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	Department of the Premier and Cabinet	A number of culturally significant items were identified during the survey and it was agreed that a Cultural Heritage Management Plan detailing appropriate protocols for protecting these items during the construction of the transmission line and substations would be prepared and implemented.	Cultural Heritage Management Plan to be developed prior to construction

Relevant guidelines, standards and Codes of Practice for construction activities that will be complied with include:

- All EPA Environment Protection Policies.
- Stormwater Pollution Prevention: Code of Practice for the Building and Construction Industry. Environment Protection Agency, 1999. Government of South Australia.
- AS/NZS 1940-2004 Storage and handling of flammable and combustible liquids.
- Bunding and spill management guideline, EPA, 2016.
- National Code of Practice [NOHSC:2017 (2001)] Storage and Handling of Workplace Dangerous Goods.

5.0 ENVIRONMENTAL MANAGEMENT SYSTEM

ElectraNet has an environmental management system, certified to ISO14001, which aims to ensure protection of the environment through the planning and construction of new developments and throughout the asset lifecycle.

5.1 Policies and Environmental Operating Requirements

ElectraNet's *Health, Safety, Environment and Sustainability Policy* (last reviewed 2019) sets out ElectraNet's commitments and expectations for decisions, activities and behaviours concerning the management of health, safety, environment and sustainability.

The Environmental Policy outlines ElectraNet's systematic approach to environmental management and is supported by Environmental Operating Requirements (EOR) which define the environmental management requirements for staff and contractors, all of whom are expected to understand and apply the environmental procedures detailed in the EORs. These EORs address key environmental aspects, or themes, during all phases of ElectraNet's activities, and are continuously reviewed and improved where gaps are identified.

The key elements of the Environmental Policy include:

- Developing and maintaining ElectraNet's environmental management system at a scale appropriate to its activities;
- Assessing assets and activities to identify environmental risks and prevent pollution;
- Complying with local, state and national environmental requirements;
- Training staff in the management of environmental issues facing the energy and infrastructure industries;
- Participating in initiatives that contribute to understanding and addressing the impacts of climate change.

ElectraNet requires the development and implementation of an Environmental Management Plan (EMP) for all projects and project phases, in accordance with the minimum requirements set out in the EORs.

5.2 Management responsibilities and general duties

The Project will be undertaken in a manner that addresses the requirements of the EP Act general environmental duty, specifically:

A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

Table 2 identifies the key stakeholders for the project, their representative(s) and the respective roles and responsibilities.

Table 2: Project responsibilities

Stakeholder	Role	Responsibilities
ElectraNet	Principal	<ul style="list-style-type: none"> ■ Overarching responsibility for the project. ■ Implementation of the CEMP during operation. ■ Site inspections and auditing of site works against the CEMP to ensure appropriate measures are implemented. ■ Management of stakeholder engagement. ■ Updating the CEMP as new information for the project becomes available.

Stakeholder	Role	Responsibilities
		<ul style="list-style-type: none"> ■ Facilitating regular reviews of the CEMP. ■ Follow up Contractor(s) non-compliance and corrective action requirements. ■ Regular audits of the contractor's Construction Environmental Management Plan.
Construction Contractor	Environmental Manager	<ul style="list-style-type: none"> ■ Developing a contractor's Construction Environmental Management Plan in accordance with this CEMP. ■ Ensuring compliance with the contractor's Construction Environmental Management Plan. ■ Undertaking the required construction monitoring and reporting. ■ Responding where mitigating measures during construction are not adequate or where the contractor's Construction Environmental Management Plan requires amendments.
	Project Manager	<ul style="list-style-type: none"> ■ Delivery of the construction of the Project. ■ Engaging contractors to implement the construction works. ■ Control of site operations during construction. ■ Ensuring overall works compliance with the contractor's Construction Environmental Management Plan.
Environmental advisors/technical experts	Qualified heritage professional(s)	<ul style="list-style-type: none"> ■ Developing a Cultural Heritage Management Plan (CHMP) for the project. ■ Recommendations for controls and mitigation measures for culturally sensitive sites/objects. ■ Heritage induction measures for contractors on site. ■ Respond to unexpected finds as required.

5.3 Training and awareness

5.3.1 Inductions

Prior to commencement on site, all project personnel will undergo a Site Induction covering awareness of quality, safety, site rules and administration; and environmental issues and measures specific to this project. The induction may include, but not be limited to:

- Purpose, objective and key issues of the EMP/CEMP.
- Conditions of environmental licences, permits and approvals.
- Emergency response procedures and reporting processes for environmental incidents.
- Soil erosion and drainage management measures.
- Watercourse and dewatering management measures.
- Aboriginal heritage issues, including identification of heritage sites and procedures for discovery of heritage sites.

- Management of dust from construction activities.
- Management of construction noise and vibration.
- Contamination management procedures.
- Site-specific issues such as location of refuse bins, refuelling and maintenance of vehicles, plant and equipment.

Induction records will be kept confirming that all relevant personnel have been appropriately inducted. Inductions will be updated as required, i.e. when significant changes occur on site or within the environmental management framework of the Project.

5.3.2 Construction pre-starts and toolbox talks

In addition to the site inductions, pre-start talks will be undertaken at the beginning of each day of construction activities (before work commences). Environmental issues will be raised and discussed at these meetings, as required. Records of Toolbox talks and the issues discussed will be retained.

5.4 Emergency contacts

Organisation		Contact Details
Emergency- Fire, Ambulance, Police		000
ElectraNet		TBA
Construction Contractor		TBA
CFS- Eyre Peninsula and West Coast		(08) 8682 4266
Natural Resource Centre- Whyalla		(08) 8640 3100
Natural Resource Centre- Port Lincoln		(08) 8688 3111
Wildlife hotline (Fauna Rescue SA)		(08) 8289 0896
Environment Protection Authority		(08) 8204 2004
Underground Services	AAPT	1800 786 306
	APA SA	1800 427 532
	NBN Co SA/NT	1800 626 762
	Nextgen NCC-SA	1800 032 532
	Optus and/or Uecomm SA	1800 505 777

Organisation		Contact Details
	PIPE Networks SA	1800 201 100
	SA Power Networks	131 366
	SA Water	(08) 7424 1117
	SEA Gas	1800 103 542
	Telstra SANT	Submit Form via DB4YD website
	Vocus Communications	1800 262 663

6.0 ENVIRONMENTAL MANAGEMENT

The environmental risk assessment undertaken to inform the development application identified a number of potential impacts which require additional management during the construction phase of the project.

6.1 Key environmental aspects

This CEMP provides strategies for the management of potential impacts associated with the Project as described. The strategies address the following environmental aspects:

- Flora (Section 6.2).
- Fauna (Section 0).
- Weeds and pests (Section 6.4).
- Water and soil resources (Section 6.5).
- Air quality, noise and vibration (Section 6.6).
- Contamination (Section 6.7).
- Cultural heritage (Section 6.8).
- Bushfire hazard (Section 6.9).
- Visual amenity (Section 6.10).
- Waste management (Section 6.11).

The health and safety and traffic management aspects will be detailed in management plans developed by the contractor and its subcontractors, as required (see Section 6.12 and 6.13).

6.2 Flora

Approximately 45% of the project area consists of remnant native vegetation in the form of long continuous tracts of mallee and Western Myall / chenopod low woodlands, roadside reserves and scattered trees. The remainder of the area has been cleared for predominantly agricultural purposes.

The condition of vegetation communities ranged from poor to excellent, with most of the vegetation in good condition found in the northern portion and most of the vegetation in poor condition found in the southern portion of the project site. Removal of native vegetation will require an approval from the Native Vegetation Council and provision of an associated Significant Environmental Benefit (SEB) offset.

Five flora species of national conservation significance and 19 of State conservation significance were identified during vegetation surveys, mostly within intact vegetation and roadside reserves.

Further ecological site surveys will be undertaken prior to construction to confirm vegetation community distribution and associated weed species present within the project footprint.

Six (6) biodiversity 'hotspots' were observed along the proposed transmission line corridor reflecting high concentrations of nationally and State threatened species records, TECs, protected areas, remnant native vegetation or recognised threatened habitat areas such as Koppio Hills and Cleve Hills.

Table 3 outlines potential impacts to native vegetation and mitigating measures to minimise these impacts. Potential impacts and mitigation measures for fauna habitat is provided in Section 0.

EBS Ecology (EBS) was commissioned by ElectraNet to complete an ecological assessment of the Transmission Supply Project with an initial assessment conducted in 2012. An updated ecological assessment of the proposed transmission line easement is currently being prepared and the results will be included in the newer version of this CEMP.

Similarly, the outcomes of the referral to the Commonwealth Department of the Environment and Energy under the EPBC Act will also be updated in the next version of this CEMP when the decision and approval conditions are known.

Table 3: Native vegetation management

Aspect	Clarification
Environmental Objectives	Minimise adverse impacts to existing native vegetation. Comply with the obligations under the <i>Native Vegetation Act 1991</i> , NRM Act and EPBC Act.
Potential Impacts	<ul style="list-style-type: none"> ▪ Destruction and disturbance of existing native vegetation from construction activities. ▪ Spread of weeds through project activities including surface disturbance and traffic movement.
Mitigation Measures	<ul style="list-style-type: none"> ▪ Develop a factsheet of key flora species for dissemination to contractors. ▪ Induct all site personnel to provide an understanding of the relevant vegetation protection issues including an awareness of weed species. ▪ Appropriate approvals to be sought prior to any vegetation removal and/or major pruning, if required. ▪ Delineate exclusion zones around vegetation to be protected. ▪ Restrict vehicle movement to defined tracks and access/egress points. ▪ Restrict vehicle movement and machinery disturbance from within and around existing vegetation. ▪ Movement, control and destruction of declared plants to be in accordance with the NRM Act. This includes obtaining appropriate approvals prior to transporting declared plants on public roads. ▪ Management of entry/exit points (i.e. using a rumble pad) so that site soils (potentially containing weed propagules) are not tracked to or from the site. ▪ Ensure imported fill is clean and free of weed propagules. ▪ Regular monitoring of weeds. ▪ Progressive stabilisation/revegetation/rehabilitation of disturbed areas, including access tracks and laydown areas. ▪ Spot spraying where declared weeds are identified. ▪ Keep records of vegetation cleared specifically for SEB calculations.
Site Specific Measures	<ul style="list-style-type: none"> ▪ Appendix A provides the map series for the project indicating the specific areas with environmental constraints to be aware of during construction. ▪ Six (6) biodiversity 'hotspots' were observed along the proposed transmission line corridor reflecting high concentrations of nationally and State threatened species records, TECs, protected areas, remnant native vegetation or recognised threatened habitat areas such as Koppio Hills and Cleve Hills. These hotspots present constraints for the precise siting of infrastructure components associated with the project. The locations of the

Aspect	Clarification
	hotspots on a figure are not provided in this version of the CEMP and will be included in the next version.

ElectraNet will continue to engage with landowners during the rehabilitation process and has secured agreement from some landowners to leave access and spur tracks in place to facilitate ongoing maintenance and inspections of the transmission line infrastructure. This information will be provided to the construction contractor when it becomes available.

6.3 Fauna

Desktop assessment identified many native fauna species within the route alignment of which 6 were of national conservation significance and 51 of State conservation significance.

Eight nationally listed fauna species were highlighted in, five of which were considered 'likely' to occur within the project area, including: Sandhill dunnart (*Sminthopsis psammophia*), Slender-billed Thornbill (*Acanzithiza iredalei iredalei*), Malleefowl (*Leipoa ocellata*), Southern Emu-wren (*Stipiturus malachurus parimeda*) and the Fairy Tern (*Sterna nereis nereis*).

Table 4 outlines potential impacts to fauna and mitigating measures to minimise these impacts.

EBS Ecology (EBS) was commissioned by ElectraNet to complete an ecological assessment of the Project with an initial assessment conducted in 2012. An updated ecological assessment of the proposed transmission line easement is currently being prepared and the results will be included in the newer version of this CEMP.

Similarly, the outcomes of the referral to the Commonwealth Department of the Environment and Energy under the EPBC Act will also be updated in the next version of this CEMP when the decision and approval conditions are made.

Table 4: Fauna management

Aspect	Clarification
Environmental Objectives	Minimise adverse impacts to fauna and habitats - particularly those of conservation significance. Comply with the obligations under the <i>Native Vegetation Act 1991</i> , <i>National Parks and Wildlife Act 1972</i> , NRM Act and EPBC Act.
Potential Impacts	<ul style="list-style-type: none"> ▪ Increased potential for collision with vehicles due to increased traffic in the site area. ▪ Facilitation of the movement of feral predators into areas of important habitat. ▪ Disturbance to important habitat for species of significance. ▪ Sandhill Dunnart. Direct removal of habitat, degradation or further fragmentation of the habitat, direct removal of individuals and increased vulnerability to predation by cats and foxes. ▪ Malleefowl. Direct disturbance to malleefowl mounds. Clearing and fragmentation of habitat is a significant threat to the Malleefowl together with increased predation from feral cats and foxes. ▪ Southern Emu-wren. While suitable habitat for the Southern Emu-wren occurs within the transmission line alignment, none were observed during

	<p>the survey (although the species can be very shy and unpredictable). While suitable habitat has recovered and could sustain the Southern Emu-wren, it is not known whether the species will re-habituate in these areas given the highly fragmented habitat between the areas and the species' poor long-distance movement. It is considered that potential impacts to the species can be minimised by sensitive micro-siting of the infrastructure.</p>
<p>Mitigation Measures</p>	<ul style="list-style-type: none"> ▪ Develop a factsheet of key fauna species for dissemination to contractors. ▪ Induct all site personnel to provide an understanding of the fauna potentially present. ▪ Undertake pre-construction surveys for species of conservation significance and implement appropriate protection if identified. ▪ Utilise the EBS survey data which indicate the known malleefowl locations and potential locations to micro site infrastructure away from these mounds. ▪ Minimise vehicle movement and machinery disturbance within and around retained vegetation. ▪ Minimise impacts to species of significance by micro-siting of the infrastructure within habitat areas. ▪ Restrict vehicle movement to defined tracks. ▪ Minimise number and connectivity of vehicle access tracks. ▪ Contact the relevant authority in the event of encountering trapped or injured fauna.
<p>Site Specific Measures</p>	<ul style="list-style-type: none"> ▪ Appendix A provides the map series for the project indicating the specific areas with environmental constraints to be aware of during construction. ▪ Sandhill Dunnart habitat exists within a large tract of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park. There are numerous records of the species from within this area. See map sheet 5, 5A, 5B, 7, 7A, 7B, and 12 within Appendix A. Note: the dunnart habitat data is not currently available and will be inserted into the map series in the next version of the CEMP. ▪ Critical habitat for the Malleefowl was found along approximately 35km of the alignment within the northern section between Iron Duchess to the southern end of Sheoak Conservation Park. ▪ Malleefowl mounds exist along the transmission line corridor, specifically map sheet 4, 5, 5A, 5B, 6, 7, 7A, 7B and 8 within Appendix A. Note: Malleefowl mound data are not currently available and will be included within the next version of the CEMP.

6.4 Weeds and pests

Twenty-four weed species were recorded during the surveys, with five of those declared under the NRM Act, in addition to eleven environmental weed species.

Onion Weed is not regarded as Declared within the District Councils of Whyalla, Franklin Harbour, Tumby Bay, Cleve and Lower Eyre Peninsula. Cane Cactus (*Austrocylindropuntia cylindrica*) is not specifically listed as declared, however it is listed as a WONS (Weed of National Significance). Horehound was scattered but widespread throughout the project area and broader region but was not observed within the larger more intact blocks of pristine mallee and woodland. Onion Weed, Silver-leaf Nightshade and African Boxthorn only

appeared to be associated with disturbances and mainly present along the margins of cleared and cultivated land. Both Silver-leaf Nightshade and African Boxthorn are also WONS. Individual landowners and managers are ultimately responsible for managing WONS and the State government is responsible for overall legislation and administration. Under the NRM Act, landholders are obliged to control declared weeds on their property, as they are known to cause significant economic, social and environmental impacts.

A range of environmental weeds were also recorded, some having significant potential for further spread if unregulated, particularly across property boundaries. Most of these species were associated with disturbed edges of remnant vegetation, access tracks and across grazing and cropping land, particularly Bearded Oat, Wild Turnip, Perennial Veldt Grass, Coastal Galenia, Wild Sage and Apple of Sodom. Wards Weed was only widespread throughout the pastoral country north of the Middleback Ranges.

The Weed and Pest Management Plan (Appendix D - note this plan is not yet finalised) will be developed in consideration of two broad categories of land that the Project will be built upon, to ensure management measures are targeted to the specific weeds and pests of concern in each area. The land categories are conservation (or undeveloped) land and agricultural land.

This plan will include management measures for the weeds and pests of concern in conservation areas and undeveloped land such as the Cultana firing range. The plan will be developed in consultation with Natural Resources Eyre Peninsula (NREP) staff and local ecologists to ensure it is aligned with and complements local strategies.

This plan will also focus on management measures specific to agricultural land, considering the weeds/pests of concern and any existing practices/regimes being applied.

Table 5: Weed and pest management

Aspect	Clarification
Environmental Objectives	Prevent the spread of pest plants and animals. Comply with the obligations under the <i>Native Vegetation Act 1991</i> , NRM Act and EPBC Act.
Potential Impacts	Spread of weeds through Project activities including excavation and traffic movement. Impacts to flora and fauna species. Site-based waste attracting pest animals.
Mitigation Measures	<ul style="list-style-type: none"> ■ Prepare factsheets of weed and pest species for dissemination to contractors. ■ Induct all site personnel to provide an understanding of the declared plants present onsite and requirements of the NRM Act. ■ Movement, control and destruction of declared plants to be in accordance with the NRM Act. This includes obtaining appropriate approvals prior to transporting declared plants on public roads. ■ Management of entry/exit points (i.e. using a rumble pad) so that site soils (potentially containing weed propagules) are not tracked to or from the site. ■ Ensure imported fill is clean and free of weed propagules. ■ Regular monitoring of weeds. ■ Dirty vehicles / plant potentially containing weed material to be cleaned-down prior to entering and leaving Project area.

Aspect	Clarification
	<ul style="list-style-type: none"> ▪ Cleared areas rehabilitated as soon as practicable after the area is no longer required. ▪ Areas to be rehabilitated will use soil stripped from areas with similar vegetation communities. ▪ Rehabilitated areas will be actively managed against weeds. ▪ Restrict vehicle access to defined tracks and access/egress points. ▪ Ensure waste is appropriately stored to discourage pest animals. This includes covering putrescible and organic storages associated with crib rooms and offices. ▪ No waste is to be disposed on site. ▪ Spot spraying where declared weeds are identified. ▪ Ensure that any construction machinery is clean and free from soil pathogens such as Phytophthora and any plant materials before entering the area. This includes performing appropriate hygiene before entering and leaving the project area to avoid potential spread. ▪ Control of the declared and environmental weed species should be undertaken in the area prior to construction works commencing to help prevent the spread of weeds within the construction site. ▪ Follow detailed procedures in the Weed and Pest Management Plan (Appendix D).

6.5 Water and soil resources

The construction and operation of the transmission line is not expected to have a significant impact on surface water, either from contamination or sedimentation.

While transmission structures have been placed to avoid obvious surface water drainage pathways, there is potential for some impacts on surface water as a result of placement and orientation. During construction, access tracks and the relocation of construction project infrastructure have the potential to impact on existing surface water drainage pathways.

The proposed transmission line spans across three surface water catchments, the Eyre Peninsula Basin, Gairdner Basin and Spencer Gulf Basin. Within these catchments, the Project encounters multiple areas of land that are subject to inundation, along with many small feeder creeks and rivers. These include Salt Creek, Watchanie Creek, Mernittie Creek, Yadnarie Creek, Chinmina Creek, Oolanta Creek, the Dutton River and Tod River. In addition, the perennial lake 'Little Swamp' sits between 500m to 1km on the western side of the southern-most part of the transmission line.

The Project may also require the extraction of water for use in concrete production and in workers' camps/staff amenity buildings.

Should dewatering be required during construction, appropriate approvals will be obtained from the Environment Protection Authority (EPA) under the obligations of the EP Act and the Environment Protection (Water Quality) Policy 2015.

Under the *Natural Resources Management Act 2004*, an approved permit is required to undertake Water Affecting Activities, which are activities and works that can impact on the health and condition of water resources, water dependant ecosystems and other water users. ElectraNet recognise that a Water Affecting

Activity permit may not be required as the Project is being assessed under the Development Act. However, to ensure there is no ambiguity with the process, ElectraNet prefer to apply for the Water Affecting Activity permit for construction of access tracks across watercourses, construction of culverts, bore extraction or erosion control measures.

The Water Affecting Activity permit application form (FORM NO. EP2v1819) will be submitted for each water affecting activity. The form will include details of the proposed works (erosion control, vehicle crossing, bore extraction, maintenance etc) with detailed drawings and plans if necessary. Information regarding the removal of any vegetation and excavation of rock, sand or soil will also be provided.

If any diversion of water is required, the application form and supporting information (FORM NO. EP1v1920) will be submitted to Natural Resources Eyre Peninsula.

In relation to soil resources, all stockpiled soils and vegetation in both conservation and agricultural areas will be re-spread over the cleared area on completion of construction activities, with sites left to naturally revegetate. If soil is unsuitable for restoration, it will be disposed of in accordance with EPA Waste Fill requirements.

To mitigate any potential impacts on surface water drainage pathways and soil resources, the management measures listed in Table 6 should be implemented during construction where runoff is expected/observed.

Table 6: Surface water and soil management

Aspect	Clarification
Environmental Objectives	Minimise erosion of soils and protect surface water drainage pathways. Integration of construction controls to mitigate potential impacts.
Potential Impacts	<ul style="list-style-type: none"> ■ Increased erosion due to soil cover disturbance and changes to surface water flow patterns. ■ Decrease in surface water quality. ■ Disturbance or removal of common ecosystems and/or intact, rare, threatened or vulnerable ecosystems within and surrounding the surface water drainage pathways. ■ Compacted and depleted topsoil in agricultural areas, affecting future cropping.
Mitigation Measures	<ul style="list-style-type: none"> ■ Induct all site personnel to provide an understanding of the issues associated with surface water and the management zones and strategies in place. ■ Progressive stabilisation of soil and areas disturbed by earthworks using vegetation (hydro seeding), matting and various other techniques. ■ Soil to be stockpiled at least 50m away from drainage pathways. ■ Manage the seedstock/topsoil in conservation areas and scrape and stockpile topsoil in agricultural areas. ■ Stockpile topsoil on the side of the pad and after construction scarify the land to reduce compaction and then spread the topsoil back over. ■ Treatment measures such as sediment fences, silt socks and temporary swales and basins placed to manage erosion and drainage. These should be used in sequence where sediment loads are expected to be high. ■ Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using

Aspect	Clarification
	<p>measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies.</p> <ul style="list-style-type: none"> ▪ Storage of construction materials and hazardous waste at least 40m from drainage lines or watercourses. ▪ Control the entry and exit of stormwater runoff from work areas including to divert clean stormwater away from and around materials storage areas. ▪ Obtain approvals, where necessary, from the EPA under the obligations of the EP Act and the <i>Environment Protection (Water Quality) Policy 2015</i>. ▪ Stop work in the event of encountering potentially contaminated soil and reassess site drainage to ensure sediments from potentially contaminated soils are contained. ▪ Obtain Water Affecting Activity permits for construction of access tracks across watercourses, bore extraction, and construction of culverts or erosion control measures.
Site Specific Measures	<ul style="list-style-type: none"> ▪ Appendix A provides the map series for the project indicating the specific areas with environmental constraints to be aware of during construction. ▪ Obtain appropriate approvals for dewatering activities that may be required at certain structure footing locations. ▪ The perennial lake 'Little Swamp' (also Women's site 4) sits between 500m to 1km on the western side of the southern-most part of the transmission line. See map sheet 18 and 18C within Appendix A.

6.6 Air quality, noise and vibration

The Project activities are not expected to have a significantly adverse impact on air quality. Dust levels may increase as a result of construction which could have a minor and temporary impact on some sensitive land uses near the route alignment, including residents, as well as flora and fauna of Wharminda Conservation Park.

Operation of construction plant and machinery will cause a noticeable level of noise during construction activities, which may have a minor and temporary impact on some project 'hot spots' including residents and flora and fauna of Wharminda Conservation Park near the alignment.

Based on the separation distance to buildings and structures, vibration impacts are expected to be minor and temporary.

Engagement with local communities, and residents near the Project site, will be undertaken prior to starting and during construction works.

Operational air quality, noise and vibration impacts are expected to be negligible.

Table 7 outlines the potential impacts to air quality and measures to minimise these impacts.

Table 8 summarises the potential impacts as a result of the increase in noise and vibration and mitigating measures to minimise these impacts.

Table 7: Air quality management

Aspect	Clarification
Environmental Objectives	Minimise impacts to air quality such as dust, vehicle emissions and odours. Comply with the National Environment Protection (Ambient Air Quality) Measure 1998, <i>Environment Protection (Air Quality) Policy 2016</i> , SA EPA and SA EPA guidance.
Potential Impacts	Increased levels of dust generated during construction activities. Increased level of vehicle emission and particles by plant machinery.
Mitigation Measures	<ul style="list-style-type: none"> ▪ Induct site personnel to provide an understanding of the issues associated with air quality management and the mitigating strategies in place. ▪ Maintain plant machinery and equipment for efficient operation and minimise engine idle times and queuing. ▪ Designated vehicle access routes and protocols to be determined and communicated to all contractors. ▪ Cover or wet-down soil and construction material stockpiles to minimise dust mobilisation. ▪ Stop work in areas where construction activities are generating unacceptable levels of dust. ▪ Minimise use of on-site cutting and grinding. Where used, employ equipment and techniques such as dust extractors and surface wetting to minimise dust. Consider use of specific plant such as wet cutting saws, vacuum extraction or block/slab splitters. ▪ Regularly water exposed surfaces, including exposed stockpiles and unsealed roadways, or seal high use access tracks to suppress dust generation. ▪ Maintain transparent communication lines for community members to contact the Construction Manager (or delegate).

Table 8: Noise and vibration management

Aspect	Clarification
Environmental Objectives	Comply with the <i>Environment Protection (Noise) Policy 2007</i> , SA EPA guidance and general environmental duty of care regarding construction noise. Comply with legislative and regulated construction vibration levels.
Potential Impacts	Increase in noise and vibration causing nuisance to residences and sensitive receptors such as fauna in the Wharminda Conservation Park near the site. Potential structural damage to buildings near the site due to increased vibration from construction machinery.
Mitigation Measures	<ul style="list-style-type: none"> ▪ Induct all site personnel to provide an understanding of the issues associated with noise and vibration management and the mitigating strategies in place. ▪ Ensure EPA approvals for night works are obtained if required.

Aspect	Clarification
	<ul style="list-style-type: none"> ▪ Machinery at the site to operate in accordance with relevant sections of the SA <i>Environment Protection (Noise) Policy 2007</i> and the SA EPA Noise Information Sheet (2014). ▪ Implement proactive noise control strategies if required, such as shielding for compressors, power generators and other fixed plant; and temporary acoustic barriers or enclosures. ▪ Substitution of alternative processes if excessive noise or vibration is produced. ▪ Truck movements to be limited to the designated freight route. ▪ All vehicles and equipment will be appropriately serviced and maintained. ▪ Ongoing communication with the community regarding times of excessive noise or vibration if required.

6.7 Contamination

The risk of encountering contaminated material is considered low, given the rural nature of the project. There may be a requirement for the disposal of surplus soils requiring offsite disposal during construction.

Interaction with groundwater is not expected during Project activities. Should shallow unconfined aquifers be encountered during installation of structures, mitigation measures will be employed and documented in the final version of this CEMP.

Table 9 outlines the potential impacts associated with contamination as a result of Project activities and measures to minimise these impacts.

Table 9: Contamination management

Aspect	Clarification
Environmental Objectives	Comply with <i>Environment Protection Act 1993</i> and relevant SA EPA Guidelines.
Potential Impacts	Accidental spills causing contamination. Contaminated soil mixing with 'clean' soil, further contaminating the site. Illegal disposal of contaminated material. Stockpiled contaminated soil becoming airborne or entering surface water drainage pathways.

Aspect	Clarification
Mitigation Measures	<ul style="list-style-type: none"> ▪ Undertake risk review of potential contaminants that could be encountered during construction. ▪ Induct site personnel to provide an understanding of the issues associated with contamination management and the mitigating strategies in place. ▪ Spill kits to be available on site. ▪ Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies. ▪ Hazardous materials to be appropriately stored on sealed areas with bunding, and away from drainage pathways. ▪ Refuelling to be undertaken on sealed areas at least 50m away from drainage pathways. ▪ Mixing of soil types to be avoided (i.e. contaminated/non-contaminated). ▪ Material removed from the site to landfill, or for reuse at another site, will be undertaken in accordance with SA EPA regulatory requirements, such as a Waste Soil Assessment on surplus soils. ▪ Only clean materials will be imported to the site. ▪ Soil or other material spilled onto roadways having originated from vehicles to be removed. ▪ Surface water management controls to be put in place, as described in Section 6.5 ▪ Air quality controls to be put in place, as described in Section 6.6. ▪ Emergency response plan to be followed for accidental spills.

6.8 Cultural heritage

The Project site is considered to present a medium risk of encountering Aboriginal sites.

A cultural heritage survey was undertaken by AECOM in 2013 in accordance with the *Heritage Agreement (2013) Between ElectraNet Pty Ltd and members of the Barngarla Native Title Claimants (BNTC)*.

Several areas of cultural heritage associated with Women's sites, Men's sites, archaeological sites and Barngarla Dreaming sites were identified.

The final transmission line design will be developed with consideration of these sites and incorporated into the preparation of a specific Cultural Heritage Management Plan (CHMP) by a suitably qualified heritage professional in consultation with the Barngarla Determination Aboriginal Corporation (BDAC).

Any refined measures for cultural heritage preservation will be incorporated into future revisions of this CEMP with the management of works to ensure appropriate protection of heritage values. The CHMP has not been included within the CEMP as it is currently in development.

Table 10 outlines the potential impacts to Aboriginal heritage because of Project activities and measures to minimise these impacts.

Table 10: Aboriginal heritage management

Aspect	Clarification
Environmental Objectives	Minimise impacts to Aboriginal sites. Comply with the South Australian Aboriginal Heritage Act 1988 and the Aboriginal and Torres Strait Islander Heritage Protection Act 1984.
Potential Impacts	Disturbance of Aboriginal sites or objects within the project site.
Mitigation Measures	<ul style="list-style-type: none"> ■ Site personnel to be inducted to the site, including provision of an understanding of the cultural heritage considerations associated with the Project, including examples of indicators of potential cultural significance. ■ If suspected Aboriginal heritage items, including stone artefacts, hearths or burials are exposed during excavations, work will stop immediately in the vicinity of the site with the Principal and an appropriately qualified Heritage Consultant to be contacted immediately. ■ Works must cease until direction has been provided by an appropriately qualified Heritage Consultant, and/or appropriate authorities. ■ Exclusion areas to surround culturally sensitive sites within or in proximity of the project area as per recommendations in the CHMP. ■ If human skeletal remains are found, these must be immediately reported to the Division of State Aboriginal Affairs (if suspected to be of Aboriginal origin).
Site Specific Measures	<ul style="list-style-type: none"> ■ Appendix A provides the map series for the project indicating the specific areas with cultural heritage constraints to be aware of during construction. ■ Residual risk management for identified Aboriginal cultural heritage values of the Project area will be through the preparation of a CHMP. This CHMP will be prepared by a suitably qualified heritage professional in consultation with the BDAC and will set out in detail procedures and protocols for managing and protecting the identified Aboriginal heritage values of the proposed transmission line corridor and its environs before, during and after the construction of the new transmission line. The measures included in the CHMP will be implemented during construction and the CHMP will form part of this CEMP (within future revisions).

Note, this is assuming that the management recommendations (such as structure placement relocations) have been implemented by ElectraNet and Barngarla as per recommended in the AECOM report.

6.9 Bushfire hazard

The Project passes through areas of significant bushfire risk. Fires could be related to ignition sources from construction activities. They could impact on native vegetation, fauna, property, health and safety of the community and road users.

A Bushfire Management Plan (see Appendix B for the draft) will be developed to formalise the following measures:

- On days of **catastrophic** fire danger, no work will be undertaken.

- On days of **extreme** fire danger, a risk assessment will be undertaken at every construction site of the work scheduled for that day and whether this work would constitute a serious risk in the conditions. If it is considered that the risk could be adequately mitigated and the landowner agrees with that assessment, work may proceed, although no 'hot work' (angle grinding, welding and the like) will be undertaken. If the risk cannot be adequately mitigated, work will cease. On extreme fire danger days, it is more likely that no work will occur.
- On days of **severe** fire danger, the same risk procedure as that for days of extreme fire danger will be implemented with no 'hot work' to be undertaken and no work at all if risks cannot be adequately mitigated. On these days, it is more likely that work will occur with the proviso that the risk will be monitored throughout the day.
- At all times, contractors will be required to keep fire-fighting equipment on each construction site, including a fire pump mounted on a minimum 400 litre water tank and high-pressure hoses. Mobile work teams will also be required to carry fire-fighting equipment in the form of (smaller) water tanks and hoses. Contractors will also be required to comply with Country Fire Service (CFS) permits in relation to undertaking 'hot work'.

Table 11: Bushfire risk prevention and management

Aspect	Clarification
Environmental Objectives	Minimise the risk of bushfires as a result of project construction activities. Comply with the <i>Fire and Emergency Services Act 2005</i> , <i>Native Vegetation Act 1991</i> , <i>National Parks and Wildlife Act 1972</i> and relevant CFS guideline material.
Potential Impacts	Impact on native vegetation, fauna, property, health and safety of the community and road users. Reduced visual amenity.
Mitigation Measures	<ul style="list-style-type: none"> ■ Develop a Bushfire Management Plan with additional measures to prevent and manage fire risk, in consultation with the CFS and State Emergency Service (SES). ■ Liaise with the State Bushfire Co-ordination Committee (SBCC) regarding project development. ■ Contractors will be required to keep fire-fighting equipment on each construction site, including a fire pump mounted to a minimum 400 litre water tank and high-pressure hoses. Mobile work teams will also be required to carry fire-fighting equipment in the form of (smaller) water tanks and hoses.

6.10 Visual amenity

The location of the proposed transmission line and substations adjacent the existing 132kV line and existing substations at Yadnarie and Port Lincoln respectively helps mitigate these impacts, especially as residents living near the existing infrastructure are familiar with and accepting of the potential amenity issues.

In relation to electrical magnetic field exposure, homes that are more than 50m from a high voltage powerline are generally not expected to have higher than typical magnetic fields. For substations the magnetic fields at

distances of 5-10m are generally indistinguishable from typical background levels in the home which are generally well below the exposure limit in international guidelines.

There are no specific visual amenity management measures proposed to be implemented for the Project.

6.11 Waste management

A variety of wastes, potentially hazardous and non-hazardous and including general refuse, may be produced during construction and operational activities associated with the Project.

The waste hierarchy will be implemented during all activities at the site, as practicable. Table 12 outlines the potential impacts of waste as a result of Project activities and measures to minimise these impacts. ElectraNet is also looking at the potential to reuse many of the packaging streams generated by the Project to aid sustainability outcomes.

Table 12: Waste management

Aspect	Clarification
Environmental Objectives	Prevent negative environmental impacts associated with construction waste. Prevent waste from impacting on land and surface water. Comply with <i>Environment Protection Act 1993</i> and relevant SA EPA Guidelines.
Potential Impacts	Inappropriate storage and disposal of waste impacting on land and surface water. Accumulation and attraction of pest animals. Reduced visual amenity. Spills or leaks of chemicals or fuels.
Mitigation Measures	<ul style="list-style-type: none"> ▪ Site personnel inductions to include appropriate storage (including separation) and disposal/recycling of waste. ▪ Work areas to be maintained in a neat and orderly manner. ▪ Waste will be disposed of regularly by the persons/organisation undertaking the activities, with appropriate signage and separation of hard organic material from putrescible organic material. ▪ Off-site waste disposal will be in accordance with SA EPA and Zero Waste SA guidelines/requirements. ▪ Handle fuels in accordance with relevant standards and guidelines. ▪ Ensure diesel fuel storages at laydown areas are bunded. ▪ Clean up spills if they occur, according to guidelines. ▪ Prevent contaminants including waste, fuels, sediment and other potentially contaminated runoff from entering surface water drainage pathways using measures including containment, bunding, cover, separation buffers and spill response and clean up contingencies. ▪ Store chemicals and fuels in appropriate containers suitable for purpose.

6.12 Health and safety

Health and safety documentation for public safety will be developed by the Contractor including an Emergency Response Plan (ERP). The ERP will be developed in collaboration with the Country Fire Service and will include details such as:

- Health and safety inductions for site staff, contractors and visitors
- Roles and responsibilities
- Muster point locations
- Bushfire emergency procedures including access and watering points
- Locations of, and access to fire extinguishers, spill kits and other necessary emergency equipment
- Incident reporting requirements.

6.13 Traffic management

A Traffic Management Plan will be prepared by the contractor and its subcontractors and will include details such as:

- Roles and responsibilities
- Public notification and procedures for heavy oversized vehicles
- Parking facilities and site capacities
- Speed zones and give-way requirements
- Constraints on travel at dawn and dusk (for fauna management)
- Vehicle access restrictions
- Emergency and incident reporting procedures for vehicle accidents.

7.0 INCIDENT PLAN

A contingency plan is provided to guide site personnel if an environmental concern is raised during Project activities.

Examples of events that warrant concern could include (but is not limited to):

- Chemical spills.
- Encountering potential Aboriginal artefacts.
- Unapproved clearance of native vegetation.
- Community complaints.
- Encountering trapped or injured fauna.

The following contingency plan will be followed:

- 1) **Stop Work:** where required, works will cease in the area of the environmental issue, or entire site (depending on severity of the event).
- 2) **Secure the Area:** the area will be made safe. This could include the following:
 - Containment of chemicals.
 - Containment of contaminated water to prevent runoff going offsite.
 - Flagging off areas.
- 3) **Communicate:** the incident will be communicated as soon as practicable to the Principal and any relevant authorities.
- 4) **Resolve:** the offending activity will not continue until the issue/concern has been resolved, corrective actions have been put in place, and the Principal has given approval to proceed.

7.1 Complaint management

Community concerns will be managed in an accountable, transparent, timely and meaningful way. The complaints management procedure outlines how personnel should handle, report and address complaints during construction activities.

Information recorded relating to any complaints received include:

- Name, address and contact number of the complainant.
- Time and date of complaint.
- Reasons for the complaint.
- Investigations undertaken.
- Conclusions formed.
- Actions taken to resolve the complaint.
- Abatement measures implemented.
- Person responsible for resolving the complaint.

These procedures will be emphasised during the induction training of personnel involved in the construction activities. The information will be recorded in a register and the nature of the complaint will be communicated to the relevant personnel on site to determine the next course of action.

The process for complaints includes:

- All complainants will be treated courteously and kept informed of the progress of their complaint throughout the process.
- Complaints will be recorded in a register.
- Further investigation into the complaint and implementation of appropriate abatement measures if needed.
- Monitoring if required.
- Record actions taken to address the complaint, abatement measures and monitoring activities.
- Continual improvement in construction activities through third party feedback/complaints.

8.0 MONITORING, REPORTING AND REVIEW

Reporting requirements, site inspections and any audits of compliance with the CEMP will be in accordance with ElectraNet's requirements.

9.0 SUMMARY

This CEMP provides a summary of the key environmental aspects in the Project area, the potential impacts associated with the construction activities and the management measures that will be implemented during the construction phase.

It is a stand-alone document for reference during construction to ensure minimal impact on the environment, cultural heritage and the community within the Project area.

The roles and responsibilities for environmental management activities have been identified (Section 5.2) and the ongoing management activities provided in Section 6.0. These management activities will be used as a high-level guidance for the contractor to develop site specific procedures to be provided to on-ground personnel.

Implementation of the CEMP and procedures will aim to ensure environmental impacts are adequately managed during construction of the Project.

Signature Page

Golder Associates Pty Ltd

Jayne Rutter
Senior Environmental Scientist

Lissa van Camp
Principal Environmental Consultant

HK/LvC/ro

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APPENDIX A

Map Series

APPENDIX B

Bushfire Management Plan

APPENDIX C

Non-Aboriginal Heritage Management Plan

APPENDIX D

Weed and Pest Management Plan

APPENDIX E

Important Information

APPENDIX F

Threatened Species Plan

APPENDIX G

**Aboriginal Cultural Heritage
Management Plan**

APPENDIX H

Landholder Liaison Management Plan



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APPENDIX D

EBS Ecology Report

APPENDIX E

**Local Heritage Places - Council
Response**

Decelis, Jody

From: Lisa Salisbury <lisa.salisbury@ebsheritage.com.au>
Sent: Thursday, 31 October 2019 1:44 PM
To: Lisa Salisbury
Subject: FW: Local Heritage Place ID: 20957

Hi Lisa

Leith has asked me to get back to you.

I have attached the survey sheet from the relevant heritage survey undertaken back in 1985 which resulted in the building being designated a Local Heritage Place.

While I have not had time to undertake a site visit I think this is the correct item given the location description.

ElectraNet is State agency under the Development Act, and therefore you will need to contact the State Commission Assessment Panel in regard to the relevant development assessment process.

From the information provided it appears that the proposed new transmission line will not adversely impact the Local Heritage Place and accordingly, Council has no concerns.

Kind regards

Jodie Isle
Planning Consultant

P/T Tues, Wed, Thurs



District Council of Lower Eyre Peninsula
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"Working with our Rural and Coastal Communities"



From: Lisa Salisbury <lisa.salisbury@ebsheritage.com.au>
Date: 18 October 2019 at 16:19:16 ACDT
To: "leithb@dclep.sa.gov.au" <leithb@dclep.sa.gov.au>
Subject: FW: Local Heritage Place ID: 20957

Good afternoon Leith

About an hour after I sent you the previous email ElectraNet provided us with an update of the transmission line. As you will note from the attached map the line has been moved from the west to the eastern side.

The Heritage Place is still not impacted however. Also do you have any accurate spatial data for the exact location of the Cottage as the Heritage Database shows it as out in a paddock with no building visible.

Kind regards

Lisa

From: Lisa Salisbury
Sent: Friday, 18 October 2019 2:41 PM
To: leithb@dclep.sa.gov.au
Subject: Local Heritage Place ID: 20957

Good afternoon Leith

ElectraNet is constructing a new transmission line from Cultana to Port Lincoln to replace the existing insufficient transmission line.

The current line already crosses the heritage footprint of Local Place ID 20957, and the new line will also cross the heritage foot print but to the west, further away from the Heritage Place. The transmission line does not impact on either the cottage or the outbuilding and is limited to the open fields (see attached map). Therefore the Project will impact the property but will not impede the exiting dwelling.

Heritage No	Name	Address	LGA	Details	Class	Council Reference
20957	Cottage	689 White Flat Road Part Section 201, Hundred Louth, WHITES FLAT	Lower Eyre Peninsula	Cottage and outbuilding behind School House	Local	38

SECTION 23 INFORMATION

- a - it displays historical, economic or social themes that are of importance to the local area
- b - it represents customs or ways of life that are characteristic of local area

Can you confirm if Council has any concerns with regard to the impact the proposal will have on the heritage significance of the Heritage Place and whether any special permissions or approvals will be required?

If you would like any further information, please do not hesitate to contact me.

Kind regards

Lisa


Lisa Salisbury

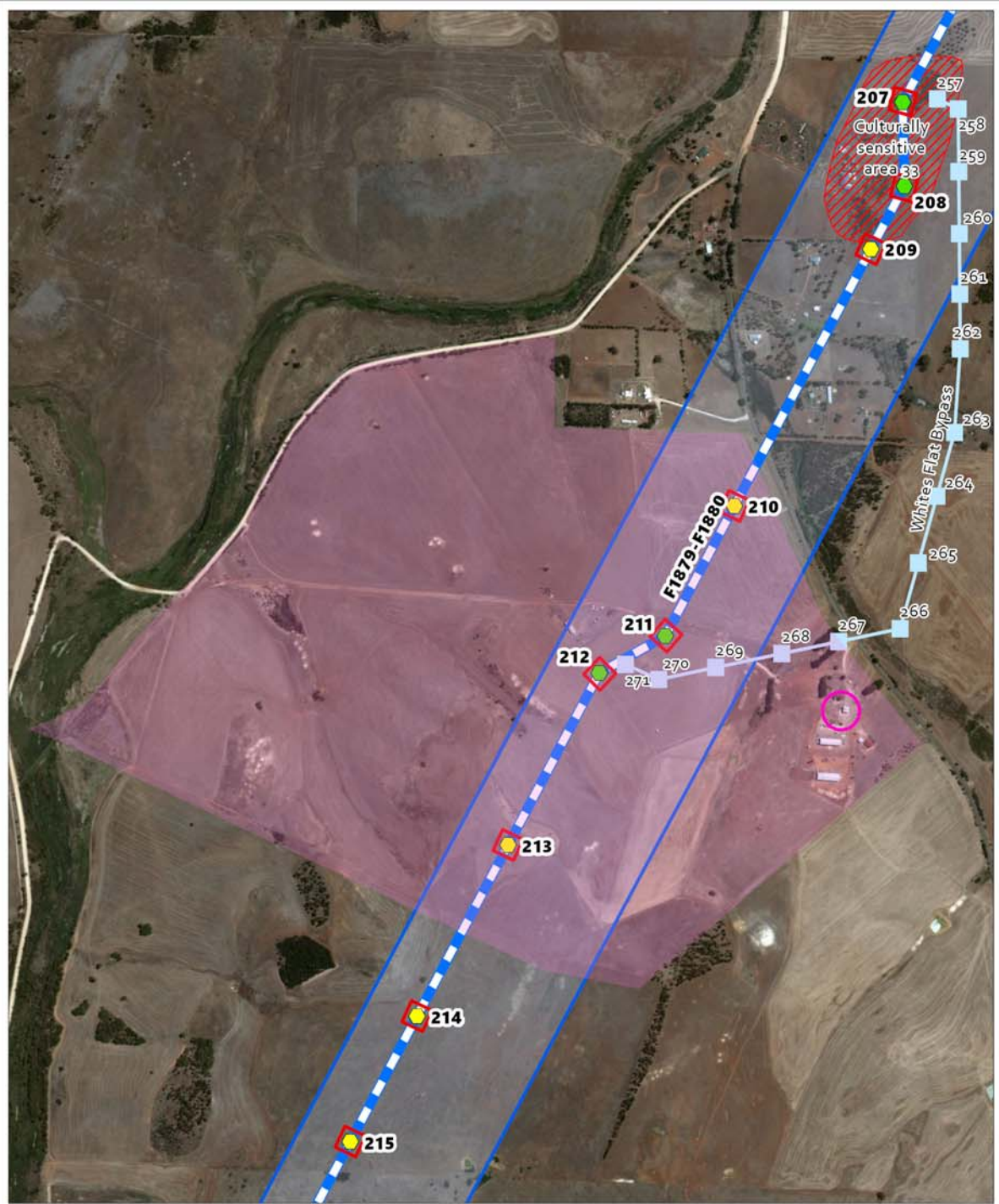
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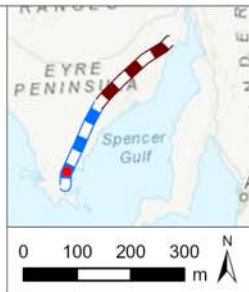


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- Heritage site location
- Strain Pole
- Heritage footprint
- Suspension Tower
- Structure Pad 50m
- F1879-F1880 Alignment (08/10/2019)
- Temporary Structures
- Culturally sensitive area
- Cultural heritage survey extent
- Temporary Alignment



Decelis, Jody

From: Emma McDonald <EMcDonald@tumbybay.sa.gov.au>
Sent: Friday, 20 September 2019 12:53 PM
To: Lisa Salisbury
Subject: Sec 126 Hd Koppio - Heritage

Hi Lisa, as per our phone conversation I can confirm that Section 126 Hd Koppio Yallunda Flat is listed in the Local Heritage Places section of the Tumby Bay Development Plan.

The local heritage listing is for a dwelling in particular and is not concerned with the remainder of the allotment. The project as you have described will impact the property but will not impede on the existing dwelling. Council doesn't have any further detail on the dwelling.

Council does not have any concerns with regard to the impact the proposal (as you described) will have on the heritage significance of the existing dwelling.

Emma McDonald Manager Environmental Services

District Council of Tumby Bay
PO Box 61, Tumby Bay SA 5605
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DISTRICT COUNCIL OF TUMBY BAY

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**Eyre Peninsula Transmission Line -
Biodiversity Assessment Report**

Eyre Peninsula Transmission Line - Biodiversity Assessment Report

9 July 2014

Final Version

Prepared by EBS Ecology for ElectraNet

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GLOSSARY AND ABBREVIATION OF TERMS

BDBSA	Biological Database of South Australia
CP	Conservation Park
CR	Conservation Reserve
DEWNR	Department of Environment, Water and Natural Resources
DPTI	Department of Planning, Transport and Infrastructure
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EBS	EBS Ecology
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP	Eyre Peninsula
EPNRMB	Eyre Peninsula Natural Resources Management Board
EYB	Eyre Yorke Block (IBRA Bioregion)
IBRA	Interim Biogeographical Regionalisation of Australia
NP	National Park
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM Act	<i>Natural Resources Management Act 2004</i>
NSW	New South Wales
NV Act	<i>Native Vegetation Act 1991</i>
NVC	Native Vegetation Council
SE	South East
SEB	Significant Environmental Benefit
spp.	species (plural)
ssp.	subspecies (fauna)
subsp.	subspecies (flora)
WA	Wilderness Area
YP	Yorke Peninsula

EXECUTIVE SUMMARY

EBS Ecology assessed the potential terrestrial flora and fauna constraints for Eyre Peninsula Reinforcement Project, from Cultana Substation near Whyalla to the outskirts of Pt. Lincoln, South Australia.

The assessment involved desktop research and field survey to identify:

- the vegetation type and condition
- flora and fauna species present
- value of habitats present
- threatened species occurring or expected to occur at the site
- identification of knowledge gaps and further survey required.

The proposed transmission line corridor (project area) was approximately 290 km long, and covered an area of approximately 15,741.5 hectares.

Three baseline flora surveys (December 2012, January 2013 and February 2013) were aimed at ground truthing DEH floristic data and recording the condition of the vegetation within the assessment corridor. Opportunistic threatened species records were also collected as well as species lists for each vegetation association. These were followed by four threatened species targeted surveys undertaken in August, October and early November 2013.

Three bird surveys were (December 2012, January 2013 and February 2013) undertaken, where opportune sightings of other fauna species were recorded.

A number of protected areas were intersected by the proposed transmission line corridor: Six NPW reserves (Conservation Parks, Conservation reserves and Wilderness Areas), 18 Heritage Agreement and two Significant Environmental Benefit (SEB) offset areas. The project area also intersects two known Threatened Habitat Areas identified on the Eyre Peninsula; Cleve Hills and Koppio Hills. These areas are identified based on a number of factors including State and regionally threatened ecosystems, low remnancy and highly fragmented and isolated vegetation blocks, low representation within the reserve system and large numbers of threatened species, many at a national level.

Flora

Approximately 45% of the project area consisted of remnant native vegetation, in the form of large continuous tracts of mallee and Western Myall / chenopod low woodlands, fragmented patches, roadside and rail reserves, and scattered trees. The dominant native vegetation communities were mallee which covered 20% of the project area, followed by woodlands (13%), chenopod shrublands (6.5%), tall shrublands (4%) and native grasslands and sedgeland (0.7%). The remainder of the area was cleared for predominantly agricultural purposes and was not considered to contain significant flora and fauna implications.

Seventy-five vegetation associations were described throughout the project area. The condition of the vegetation communities ranged from very poor (SEB 1:1) to excellent (SEB 10:1). 32.7% ranged from good to very good, and most of this vegetation was located in the northern half of the project area. 32% was in

moderate condition and 34.4% was in poor to very poor condition. Most of the poorest quality vegetation was located in the southern section.

One threatened ecological community (TEC) was highlighted in the EPBC Protected Matters Search as potentially occurring within the vicinity of the project area; Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia. Although areas were mapped as *Eucalyptus odorata* Woodland, the EPBC listing advice excludes occurrences of Peppermint Box that are a part of 'mallee' Eucalyptus woodlands with a shrubby understorey. An additional TEC, Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, was listed under the EPBC Act, 2003 as Endangered, on 13 Aug 2013. There are a number of remnants mapped as *Eucalyptus petiolaris* Woodland along the alignment, however most are in moderate to poor condition and therefore some of these may not qualify as the TEC under the Approved Conservation Advice.

Six State listed Threatened Ecological Communities were recorded in the project area:

- *Allocasuarina verticillata* Low Woodland - State Vulnerable
- *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia* - State Vulnerable
- *Eucalyptus peninsularis* , *E. dumosa* complex Woodland – State Endangered
- *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland – State Endangered
- *Gahnia trifida* (Cutting Grass) Sedgeland – State Endangered
- *Austrodanthonia* spp. / *Austrostipa* spp. +/- *Themeda triandra* Tussock Grassland – State Endangered

There were twenty-two nationally threatened flora species identified during the EPBC Protected Matters Search. Nine of these are endemic to Eyre Peninsula and 16 were recorded within 10kms of the project area from the BDBSA search and considered either possible or likely to occur on site. A total of 97 State threatened flora species were recorded through database searches and advice from local experts, with 65 of those considered either likely or possible to occur within the alignment. These species were targeted during 2013 spring surveys to help determine presence / absence and area of occupancy. Based on existing records, all patches of intact vegetation with good quality understorey and limited weed invasion were considered potential threatened habitat. The following nationally threatened species were targeted:

- *Acacia cretacea* (Chalky Wattle), EPBC Endangered, State Endangered
- *Acacia praemorsa* (Senna Wattle), EPBC Vulnerable, State Endangered
- *Acacia rheticarpa* (Resin Wattle), EPBC Vulnerable, State Vulnerable
- *Acacia whibleyana* (Whibley Wattle), EPBC Endangered, State Endangered
- *Arachnorchis brumalis* (Winter Spider-orchid), EPBC Vulnerable, State Vulnerable
- *Arachnorchis tensa* (Rigid Spider-orchid), EPBC Endangered
- *Frankenia plicata*, EPBC Endangered, State Vulnerable
- *Haloragis eyreana* (Prickly Raspwort), EPBC Endangered, State Endangered
- *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush), EPBC Vulnerable, State Vulnerable
- *Prasophyllum goldsackii* (Goldsack's Leek-orchid), EPBC Endangered, State Endangered

- *Prostanthera calycina* (West Coast Mintbush), EPBC Vulnerable, State Vulnerable
- *Pterostylis* sp. Eyre Peninsula (R.Bates 19474), EPBC Vulnerable, State Vulnerable
- *Ptilotus beckerianus*, (Ironstone Mulla Mulla), EPBC Vulnerable, State Vulnerable
- *Pultenaea trichophylla* (Tufted Bush-pea), EPBC Endangered, State Rare
- *Swainsona pyrophila* (Yellow Swainson-pea), EPBC Vulnerable, State Rare
- *Thelymitra epipactoides* (Metallic Sun-orchid), EPBC Endangered, State Endangered

Over 350 flora species were recorded during the baseline and targeted field surveys, including five flora species of national conservation significance and 19 of State conservation significance. Most occurrences were found in intact vegetation or on roadside reserves. The species include:

- *Acacia enterocarpa* (Jumping-jack Wattle) – nationally Endangered, State Endangered
- *Acacia pinguifolia* (Fat-leaf Wattle) - nationally Endangered, State Endangered
- *Arachnorchis tensa* (Inland Green-comb Spider-orchid) - nationally Endangered
- *Pultenaea trichophylla* (Tufted Bush-pea) - nationally Endangered, State Rare
- *Olearia pannosa* ssp. *pannosa* (Silver Daisy-bush) - nationally Vulnerable, State Vulnerable
- *Santalum spicatum* (Sandalwood) - State Vulnerable
- *Acacia dodonaeifolia* (Hop-bush Wattle) - State Rare
- *Acacia hexaneura* (Six-nerve Spine-bush) - State Rare
- *Acacia imbricata* (Feathery Wattle) - State Rare
- *Acacia rhigiophylla* (Dagger-leaf Wattle) - State Rare
- *Austrostipa tenuifolia* - State Rare
- *Austrostipa breviglumis* (Cane Spear-grass) - State Rare
- *Daviesia benthamii* ssp. *humilis* (Mallee Bitter-pea) - State Rare
- *Daviesia pectinata* (Zig-zag Bitter-pea) - State Rare
- *Eremophila gibbifolia* (Coccid Emubush) - State Rare
- *Eucalyptus cretata* (Darke Peak Mallee) - State Rare
- *Goodenia benthamiana* (Bentham's Goodenia) - State Rare
- *Maireana suaedifolia* (Lax Bluebush) - State Rare
- *Microtis* sp. Nash (R. Bates 44740) (Nash's Onion Orchid) - State Rare
- *Olearia adenolasia* (Musk Daisy-bush) - State Rare
- *Philotheca angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) - State Rare
- *Prostanthera chlorantha* (Green Mintbush) - State Rare
- *Spyridium leucopogon* (Silvery Spyridium) - State Rare
- *Spyridium spathulatum* (Spoon-leaf Spyridium) - State Rare

Twenty-four weed species were recorded during the surveys, with five of those declared under the *Natural Resources Management Act 2004* (NRM Act), in addition to eleven environmental weed species.

Fauna

A total of seven nationally listed fauna species were highlighted in the Protected Matters Search of which four were considered 'Likely' to occur within the project area. All of these except the Fairy Tern were recorded in the BDBSA search.

- Sandhill Dunnart (*Sminthopsis psammophila*), EPBC Endangered, State Vulnerable
- Malleefowl (*Leipoa ocellata*), EPBC Vulnerable, State Vulnerable
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*), EPBC Vulnerable, State Endangered
- Fairy Tern (Australian) (*Strenua nereis nereis*), EPBC Vulnerable, State Endangered

Both Malleefowl (*Leipoa ocellata*) and Sandhill Dunnart (*Sminthopsis psammophila*), were targeted in 2014, whilst the Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) was targeted in spring 2013.

Sandhill Dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation and the large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of Sandhill Dunnart habitat within the proposed corridor and there are numerous current records of the species from this area. The potential impacted posed by the development area considered to be direct removal, degradation or further fragmentation of suitable *Triodia* habitat and connective non-*Triodia* habitat used for dispersal and feeding, direct removal of individuals and increased predation of the species via further accessibility of suitable habitat to exotic species such as Cats and Foxes.

Critical habitat for the Malleefowl was found along approximately 35 km within the northern section, from between Iron Duchess to the southern end of She-oak Conservation Park. The clearing and fragmentation of Malleefowl habitats is highlighted as a key threat to the species, in addition to increased predation resulting from a greater access to feral Cats and Foxes.

In addition the data suggests that proximity to the transmission line may negatively influence nest site selection and possibly nesting success in Malleefowl. Confirmed mound densities along the transmission line were 28% lower than densities on the remote transect, suggesting recently active Malleefowl mound density and hence possibly nesting success, is reduced by approximately one third in the vicinity of the existing ElectraNet transmission line.

The Southern Emu-wren (Eyre Peninsula) sub-species is restricted to the extreme south of the Eyre Peninsula in numerous small disjointed populations. Preferred habitat includes shrubland or heathland, mallee and sedgeland, of which some suitable areas occur within the Transmission Line corridor. Surveys were therefore undertaken in areas historically known to have Southern Emu-wrens, however none were observed, although the species can be very cryptic and shy making confirmed detection very difficult. The known population within the Koppio Hills has been decimated by the 2005 'Black Tuesday' fires and the historical population within Charlton Gully has not been observed since 2005. Suitable habitat has recovered and could sustain this species, but it is unknown if this species will re-habituate this area, particularly given the highly fragmented habitat between the sites and the species' poor long distance

movements. Any potential impacts to the species can be minimised by sensitive micro-siting of infrastructure.

The Fairy Tern (*Strenua nereis nereis*) population has dramatically declined over the past ten years. Results from the November 2010 State-wide census recorded a range between 650 and 750 Fairy Tern across South Australia. This species, if occurring on site, would likely to be as a fly-over species with impact from the proposed easement being difficult to predict but assumed as unlikely.

There were 323 native fauna species (excluding marine species) from the BDBSA search (10km buffer), of which five were nationally listed, 10 migratory and 44 State listed. The nationally listed species include two bird species, considered unlikely to occur within the project area and the three species listed previously in the EPBC search.

Ten nationally listed migratory species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area. Eight of these are considered as possible or likely visitors to the project area:

- Fork-tailed Swift (*Apus pacificus*)
- Great Egret (*Ardea alba*)
- Cattle Egret (*Ardea ibis*)
- Red-necked Stint (*Calidris ruficollis*)
- Latham's Snipe (*Gallinago hardwickii*)
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
- Malleefowl (*Leipoa ocellata*)
- Rainbow Bee-eater (*Merops ornatus*)

A total of 85 individual point count surveys were undertaken for avian species along the current easement during the bird surveys. Surveys were placed at 2 km intervals along the line in large tracts of remnant vegetation, or where largely cleared, in any substantial vegetation patches. Opportunistic observations were also recorded, generally when moving between survey sites. This resulted in 94 species of bird being identified. These included ten State listed and three introduced.

Biodiversity Hot spots

Six 'hot spots' have been highlighted along the project area that identify key constraints associated with areas possessing a high concentration of nationally and State threatened species records, TECs, protected areas, remnant native vegetation or associated with recognised threatened habitat areas, Koppio Hills and Cleve Hills.

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1 INTRODUCTION

Electrical demand on the Eyre Peninsula has grown steadily over the years as a result of agricultural, residential, commercial and light-industrial development. Population is projected to increase by 33% over the next 30 years and combined with an increase in commercial and agricultural activity, load growth on the lower part of the Peninsula is expected to vary between 3.3% and 4.9% per annum. The Eyre Peninsula Region also has significant mineral and renewable energy and resources and over the next few decades mining investment and outputs are expected to grow substantially.

ElectraNet are proposing to upgrade the existing 132 kV transmission line from Cultana to Port Lincoln (Figure 1) to address the growing power demands and provide sufficient infrastructure to meet Electricity Transmission Code (ETC) reliability standards. EBS Ecology (EBS) was contracted by ElectraNet to assist with the ecological considerations. This report presents findings from an initial baseline flora and fauna assessment, followed by a series of targeted flora and fauna surveys. It also provides more specific information in relation to key areas to consider during the planning process.

1.1 Objectives

The objectives of the project were to:

- summarise relevant legislation and regulations
- identify areas that represent key fauna habitats and faunal or floral assemblages
- identify flora and fauna species (including pest plants and animals) that are known to occur
- identify any matters of national, State or local conservation significance
- assess the likelihood of the presence of species of conservation significance
- identify any 'no-go' zones
- identify potential management actions for mitigation of project impacts
- present findings from targeted flora and fauna surveys



Figure 1. Location of the proposed transmission line development.

2 COMPLIANCE AND LEGISLATIVE SUMMARY

A summary of key legislation relating to flora and fauna consideration and their relevance to the proposed project is provided in Table 1.

2.1 Native Vegetation Act 1991

All native vegetation in South Australia is protected under the provisions of the *Native Vegetation Act 1991*. Clearance of vegetation is prohibited unless approved by the Native Vegetation Council (NVC) or the activity requiring the clearance is exempt by the regulations under the Act. In most circumstances, including exemptions, approval to clear vegetation is contingent upon the proponent providing a management plan that creates a Significant Environmental Benefit (SEB) (set aside of land for the management of native vegetation that results in a net gain for the environment).

Heritage Agreements

The Heritage Agreement Scheme is a program that encourages landowners to conserve native vegetation on their properties forming an important network of 'off park' areas that are managed for biodiversity conservation. When a Heritage Agreement is entered into, it formally protects the indigenous flora and fauna within the area in perpetuity, and the Agreement is listed on the Certificate of Title. The Scheme is administered by Department of Environment, Water and Natural Resources (DEWNR) on behalf of the NVC. When ownership of the property is transferred, so is the responsibility for the care of the Heritage Agreement area.

Any alterations to Heritage Agreements (for the purposes of creating easements and undertaking clearance) are not normally favoured by the NVC. The NVC would initially discourage any alterations to a Heritage Agreement and require other alternatives to be investigated and considered as a priority (P. Farmer, NVC, pers. comm. 2012). Should an easement through or clearance within a Heritage Agreement be proposed, an application to the NVC would be required. The application should outline the proposed action, and the reason for clearance. Support from the NVC would then be required in relation to the concept and design of the project, and management measures to be implemented to reduce or mitigate impacts relating to the clearance. The application would be reviewed by the NVC and, if approval is granted, the Minister is required to sign off on the proposal.

2.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides protection for matters of national environmental significance. Any action that has, will have or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act.

2.3 National Parks and Wildlife Act 1972

The South Australian *National Parks and Wildlife Act 1972* covers the protection of native plants within reserves and native animals throughout the State. Threatened plant and animal species are listed in Schedules 7 (endangered species), 8 (vulnerable species) and 9 (rare species).

2.4 Natural Resources Management Act 2004

Under the *Natural Resources Management Act 2004* (NRM Act), landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation. The majority of the project area falls within the jurisdiction of the Eyre Peninsula Natural Resources Management Board (EPNRMB). Some sections of the northern alignment fall under the jurisdiction of the South Australian Arid Lands Natural Resources Management Board (SAALNRMB).

Table 1. Summary of relevant State and Commonwealth legislation.

Legislation	Summary	Relevance
Commonwealth		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>To protect 'matters of national environmental significance':</p> <ul style="list-style-type: none"> • World Heritage properties • National Heritage properties • wetlands of international importance (Ramsar wetlands) • listed threatened species and ecological communities • migratory species • Commonwealth marine areas • the Great Barrier Reef Marine Park • nuclear actions (including uranium mining). <p>To determine whether an action is likely to have a significant impact on a matter of national environmental significance, refer to the <i>Significant Impact Guidelines (Commonwealth of Australia 2009)</i> at: http://www.environment.gov.au/epbc/publication/s/pubs/nes-guidelines.pdf.</p>	<p>Where an activity may trigger requirements of the EPBC Act, this legislation must be taken into account.</p> <p>Any action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires referral and approval. Significant penalties apply.</p>
South Australian		
<i>Native Vegetation Act 1991</i>	<p>To preserve, enhance and manage the State's native vegetation; provide a regulatory framework to control clearance of vegetation; and provide incentives and assistance to landowners to encourage them to preserve and enhance native vegetation.</p> <p>The Act protects all native vegetation that naturally occurs, i.e. vegetation which has not been planted. This includes all naturally occurring local native plants, from small ground covers and native grasses to mallee scrub and tall trees. It does not cover planted trees.</p> <p>Under the Act, clearance is defined as:</p> <ul style="list-style-type: none"> • the killing or destruction of native vegetation • the removal of native vegetation • the severing of branches, limbs, stems or trunks of native vegetation • the burning, poisoning and slashing of native vegetation • any other substantial damage to native vegetation including activities such as the 	<p>Approval is required under the Act for the clearance of native vegetation.</p> <p>Persons wanting to clear native vegetation must apply for a permit from the Native Vegetation Council (NVC) (ss.7,14), unless exempt under the regulations. The NVC will take into account the impacts of the proposed clearance and may grant consent, refuse consent or grant consent subject to certain conditions (s.29). A net environment benefit is generally conditional on an approval being granted.</p> <p>Significant penalties apply if a person clears native vegetation without the permission of the NVC (s.26). The NVC can also take civil enforcement proceedings in the District Court for an order that the native vegetation be reinstated (s.31).</p> <p>The Act also provides the opportunity for landholders to enter into voluntary "Heritage Agreement(s)" to ensure vegetation on private land is protected for perpetuity (s.23).</p> <p>The propose clearance associated with the upgrade of the transmission line is likely to be considered to comply with Exemption 5 (1)(d) Building or provision of infrastructure including infrastructure in the public interest. However, for</p>

	<p><i>draining for the reclamation of wetlands or flooding of land</i></p> <ul style="list-style-type: none"> • <i>grazing land where stock have been excluded for more than ten years.</i> 	<p>this exemption to apply, the criteria within the regulation (detailed below) must be satisfied.</p> <p>Pursuant to Section 27(1)(b) of the Act, native vegetation may, subject to any other Act or law to the contrary, be cleared if—</p> <p>(i) —</p> <p>(A) <i>the clearance is incidental to the construction or expansion of a building or infrastructure and the Minister has, by instrument in writing, declared that he or she is satisfied that the clearance is in the public interest; or</i></p> <p>(B) <i>the clearance is required in connection with the provision of infrastructure or services to a building or proposed building, or to any place; and</i></p> <p>(ii) <i>any development authorisation required by or under the Development Act 1993 has been obtained; and</i></p> <p>(iii) <i>the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that, after taking into account the need to preserve biological diversity and the nature and purposes of any proposed building or infrastructure that is yet to be constructed, the proposed site of the building or infrastructure is the most suitable that is available; and</i></p> <p>(iv) <i>the Council is satisfied (on the basis of information provided to the Council by the person seeking the benefit of this paragraph and such other information as the Council thinks fit) that, there is no other practicable alternative that would involve no clearance or the clearance of less vegetation or the clearance of vegetation that is less significant or (if relevant) the clearance of vegetation that has been degraded to a greater extent than the vegetation proposed to be cleared; and</i></p> <p>(v) <i>the clearance is undertaken in accordance with a standard operating procedure determined or approved by the Council for the purposes of this provision or a management plan that has been approved by the Council, and either—</i></p> <p>(A) <i>there will be a significant environmental benefit on the property where the clearance is being undertaken or within the same region of the State; or</i></p> <p>(B) <i>either—</i></p> <p><i>the owner of the land (or a person acting on his or her behalf); or</i></p> <p><i>a person connected with the construction or expansion of the building or infrastructure, or the provision of the infrastructure or services (as the case requires), has, on application to the Council to proceed with clearing the vegetation in accordance with this provision, made a payment into the Fund of an amount considered by the Council to be sufficient to achieve a significant environmental benefit in the manner contemplated by section 21(6) of the Act.</i></p>
<p><i>National Parks and Wildlife Act 1972</i></p>	<p><i>Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters); provides for the protection of native flora and fauna; identifies flora and fauna species considered to be of conservation significance (under Schedules 7, 8, and 9 of the Act); and provides for the use of approved wildlife through a system of permits allowing certain actions, i.e. keeping and selling (s.58), harvesting (s.60G), farming (s.60C), hunting (s.68A), releasing (s.55) and undertaking scientific research (s.53) on/of native fauna species, and for the taking of plants (s.49).</i></p>	<p><i>A person must not “take” a native plant, protected animal or the eggs of a protected animal without approval (s.48A). Maximum penalties of \$10 000 apply (\$100,000 in the case of a marine mammal). The most serious penalties apply where the plant or animal is of an endangered species.</i></p> <p><i>To take a native plant means to remove the plant or part of the plant, from the place in which it is growing; or to damage the plant. To take a protected animal means to remove, hunt, catch, restrain, kill or injure an animal, or attempt to do so.</i></p> <p><i>A person may take non-prescribed plant species from private land with the consent of the owner; however these species may also be covered under the Native Vegetation Act 1991.</i></p> <p><i>There are a number of non-complying activities in parks and reserves that result in penalty (parts 4-6).</i></p>

<p><i>Natural Resources Management Act 2004</i></p>	<p><i>To promote and facilitate integrated and sustainable management of all natural resources (water, soil, biodiversity etc); and to provide for arrangements to involve the community in the development and implementation of regional initiatives to improve the management of the natural resources.</i></p> <p><i>Key components include the establishment of regional Natural Resource Management (NRM) Boards and development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; requirement to control pest plants and animals, and activities that might result in land degradation.</i></p> <p><i>A 'duty of care' is a fundamental component of this Act, i.e. ensuring one's environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.</i></p> <p><i>Section 188(5) of the Act requires that the NRM Board must take into account any relevant provision of the regional NRM plan.</i></p>	<p><i>The NRM Board may appoint authorised officers to administer and enforce the Act. Authorised officers possess powers of entry, powers to give directions, powers to collect evidence and seize and remove animals and plants. An authorised officer may issue a protection order for the purpose of securing compliance with specified provisions of the Act:</i></p> <ul style="list-style-type: none"> <i>- breach of the general statutory duty;</i> <i>- breach of the duty not to damage watercourses or lakes;</i> <i>- failure to take action to destroy or control certain animals or plants;</i> <i>- failure to comply with the terms of a management agreement entered into under the Act; and</i> <i>- any other requirement imposed by the NRM Act or a repealed Act and which has been specified in the NRM Regulations.</i> <p><i>An owner of land who is, or is likely to be, in breach of the general statutory duty under the Act resulting or likely to result in land degradation may be required to prepare an action plan. Failure to comply with a notice requiring preparation of an action plan is an offence. An NRM authority or a State authorised officer may issue a reparation order in certain circumstances where a person has caused harm to a natural resource and repair is necessary. Enforcement action in the ERD Court can be taken if necessary.</i></p>
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Note: this summary is not intended to be a substitute for particular legal advice. It should be recognised that in the case of particular environmental issues precise legal opinion may be required. This summary does not address the legal implications of every set of circumstances and situations that may arise in the course of activities.

3 BACKGROUND INFORMATION

3.1 Project area

The proposed new transmission line is planned to broadly follow a similar alignment to the existing 132 kV line, as shown in Figure 1. The transmission line will be approximately 290 km long, with the final route alignment and distance dependent on any route constraints. The line runs from the Cultana substation just north-west of Whyalla, south to Port Lincoln, Eyre Peninsula. The preliminary plans require new 275/132 kV substations at Yadnarie and a location north of Port Lincoln. The assessment area covers approximately 15,741.5 hectares.

3.1.1 Region

The site is located on Eyre Peninsula, South Australia covering approximately five million hectares. The landforms spanning the site are dominated by undulating limestone plains overlain by longitudinal dune systems (Brandle, 2010) in the more arid northerly sections, shallow, low hills and ranges and shallow freshwater creeks and drainage lines through the Cleve Hills and Koppio Hills.

The region supports some extremely sensitive environmental areas, including large tracks of remnant vegetation, conservation parks and reserves, which include a number that are located within the project area (Sheoak Hill Conservation Park and Whyalla Conservation Park, the Middleback Ranges, Cleve Hills, Koppio Hills and the Tod River Wetland System), 18 Heritage agreements and two SEB offset areas managed for conservation.

3.1.2 Existing Land Use

Land use in the northern section of the proposed transmission alignment is mainly confined to pastoral activities and conservation, whilst in the southern sections, land is utilised for cropping, grazing and residential purposes and small areas devoted to revegetation and conservation.

3.2 Environmental setting

3.2.1 Landscape position

Interim Biogeographical Regionalisation of Australia (IBRA) is a landscape based approach to classifying the land surface across a range of environmental attributes, which is used to assess and plan for the protection of biodiversity (DSEWPaC 2013). In this system, Eyre Peninsula forms part of the Eyre Yorke Bioregion and the Gawler Bioregions, which are large regions, separated into numerous IBRA subregions and Environmental Associations based on landforms, climate and vegetation associations (Laut et al. 1977) (Table 2). A map showing the IBRA Sub-regions present across the project area is shown in Figure 3 and Environmental Associations in Figure 4.

Table 2. IBRA Bioregions, Sub-regions and environmental associations present across the project area.

Gawler IBRA Bioregion	
Semi arid to arid, flat topped to broadly rounded hills of the Gawler Range Volcanics and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of aeolian sand or gibbers and rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with black oak and myall low open woodlands, open mallee scrub, bluebush/saltbush open chenopod shrublands and tall mulga shrublands on shallow loams, calcareous earths and hard red duplex soils.	
Myall Plains IBRA Subregion (GAW1)	
Gently undulating calcrete plains and occasional quartzite or granite hills. Includes a zone of salt lakes and gypsum dunes at Lake Gillies and steep strike ranges at the Middleback Ranges. To the east out cropping conglomerate occurs with mangrove flats along the coastal margin. Acacia papyrocarpa/Casuarina pauper low woodland is found on grey brown calcareous earths, red calcareous earths and dense brown loams on the plains. Rocky outcrops support Eucalyptus incrassata/Melaleuca uncinata open scrub and Allocasuarina verticillata low woodland on dense brown loams. The lowest areas support chenopod shrubland of Halosarcia halocnemoides on grey calcareous loams. Light grazing occurs in most areas.	
Landform	Gently undulating calcrete plains and occasional hills. Includes a zone of salt lakes and gypsum dunes at Lake Gillies and steep strike ranges at the Middleback Ranges.
Geology	Calcrete development; gypsum dunes; playa lakes with silt and clay deposits and evaporites.
Soil	Red calcareous earths, sandy soils with mottled yellow clayey subsoils.
Vegetation	Arid and semi-arid acacia low open woodlands and shrublands with chenopods.
Remnant vegetation	97% (948,908ha) of the subregion is mapped as remnant native vegetation.
Protected Areas	11% of the subregion is protected (92,695ha in formal reserves and conserved in private Heritage Agreements under the <i>Native Vegetation Act 1991</i>). This is 10% of the mapped native vegetation.
Red Rock Environmental Association (4.4.7)	
Landform	Hills on conglomerate with long dissected footslopes.
Geology	Conglomerate, colluvium and alluvium.
Soil	Dense brown loams, hard pedal red duplex soils and crusty red duplex soils.
Vegetation	Low open woodland of Western Myall and Black Oak/ Western Myall.
Remnant vegetation	100% (45,230ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,172ha).
Whyalla Environmental Association (4.4.6)	
Landform	Easterly sloping calcreted plain with occasional hills on outcropping conglomerate, and with mangrove flats along the coastal margin.
Geology	Calcrete, conglomerate, silts, metasediments and sands.
Soil	Red calcareous earths, dense brown loams, grey calcareous loams and whitish calcareous sands.
Vegetation	Low open woodland of Black Oak and Western Myall sometimes with False Sandalwood, low woodland of Mangrove and chenopod shrubland of Samphire.
Remnant vegetation	95% (69,604ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (2,418ha).
Buckleboo Environmental Association (4.4.2)	
Landform	Gently undulating calcrete plains and occasional quartzite or granite hills.
Geology	Calcrete, quartzite, granite and alluvium.
Soil	Grey-brown calcareous earths, hard pedal red duplex soils, dense brown loams and black calcareous loams.
Vegetation	Low woodland of Western Myall and Black Oak, open scrub of Beaked Red Mallee and Yorrell, low open woodland of Western Myall and chenopod shrubland of Samphire.
Remnant vegetation	99% (492,213ha) of the association is mapped as remnant native vegetation, where 12% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (57,040).

Middleback Range Environmental Association (4.4.5)	
Landform	Steep strike ridges with long footslopes.
Geology	Metasediments, colluvium, sand and calcrete.
Soil	Dense brown loams and red calcareous earths.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush, low woodland of Drooping Sheoak and low open woodland of Western Myall.
Remnant vegetation	96% (34007ha) of the association is mapped as remnant native vegetation, where 5% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,747ha).
Eyre and Yorke Block IBRA Bioregion	
<p>Archaean basement rocks and Proterozoic sandstones overlain by undulating to occasionally hilly calcarenite and calcrete plains and areas of aeolian quartz sands, with mallee woodlands, shrublands and heaths on calcareous earths, duplex soils and calcareous to shallow sands, now largely cleared for agriculture.</p>	
Eyre Hills IBRA Subregion (EYB3)	
<p>This subregion consists of the southern section of the uplands along the east coast of the Eyre Peninsula, and the undulating to low hilly plains to the west. The uplands rise abruptly from a narrow coastal foreland to altitudes of between 200m and 400m then slope gradually to the west where they merge into the undulating plain. The eastern and highest section of the uplands is formed of metasediments, predominantly quartzite, and is mainly hilly while the slightly lower-lying western part constitutes a dissected laterite plateau. Moderately deep yellow duplex soils with lateritic concretions occur on the uplands and support low open woodland of <i>Eucalyptus cladocalyx</i>, <i>E. odorata</i> and <i>E. leucoxydon</i>. The plains to the south and west are formed predominantly on old alluvium, or on calcarenite near the coastal fringe where some dunes and cliffs occur. Shallow reddish loams with rock outcrops support <i>E. incrassata</i> / <i>Melaleuca uncinata</i> mallee on the plains or <i>Melaleuca lanceolata</i> woodland along the coastal fringe. Lincoln National Park occupies the south eastern tip of the subregion and consists of 15 971ha of coastal mallee. The majority of this subregion is cleared for winter cereal cultivation and grazing livestock.</p>	
Landform	Low limestone dune ridges: small granitic islands with dunes.
Geology	Ripon Calcrete; Loveday Soil in aeolian sand sheets, dune sand, red soils (terra rossa).
Soil	Sands soils of minimal pedologic development, brown calcareous earths, brown sand soils, shallow red brown sandy soils, with yellow clayey mottled subsoil.
Vegetation	Mallee heath and shrublands.
Remnant vegetation	30% (350,795ha) of the subregion is mapped as remnant native vegetation.
Protected Areas	11% of the subregion is protected (124,693ha in formal reserves and conserved in private Heritage Agreements under the <i>Native Vegetation Act 1991</i>). This is 36% of the mapped native vegetation.
Ironstone Hill Environmental Association (4.3.14)	
Landform	Undulating plain with low hills of outcropping bedrock and occasional dunes.
Geology	Sand, calcrete, conglomerate and alluvium.
Soil	Brown calcareous earths, dense brown loams, brownish sands and crusty red duplex soils.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow-leaved Mallee and Broombush, sometimes with Beaked Red Mallee and Yorrell and a low chenopod shrubland of Samphire and Nitrebush.
Remnant vegetation	99% (26,659ha) of the association is mapped as remnant native vegetation, where 4% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,034ha).
Midgee Environmental Association (4.3.12)	
Landform	Sandy plain with frequent short dunes, sloping to the east, and locally interrupted by low fault scarps or granite inselbergs. Low cliffs and tidal flats alternate along the coastline.
Geology	Sand, calcrete, metasediments, granite and silts.
Soil	Reddish calcareous earths, brown sands, brown calcareous earths and grey calcareous loams.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush sometimes with Beaked Red Mallee and Yorrell and low woodland of mangroves.
Remnant vegetation	65% (73,526ha) of the association is mapped as remnant native vegetation, where 40% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (29,624ha).

Yalarna Environmental Association (4.3.13)	
Landform	Calcreted plain and occasional low hills, mainly overlain by parabolic dunes.
Geology	Sand, calcrete and quartzite.
Soil	Whitish sands and brown calcareous earths.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow-leaved Mallee and Broombush.
Remnant vegetation	72% (16,908ha) of the association is mapped as remnant native vegetation, where 37% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (6,311).
Messenger Environmental Association (4.3.17)	
Landform	Undulating plain with isolated dunes, and narrow strike ranges on outcropping quartzite.
Geology	Sand, metasediments, quartzite and alluvium.
Soil	Hard pedal red duplex soils, dense brown loams, hard pedal mottled-yellow duplex soils and yellow-brown sands.
Vegetation	Open scrub of Beaked Red Mallee and Yorrell, Ridge-fruited Mallee and Broombush sometimes with a low woodland of Drooping Sheoak.
Remnant vegetation	34% (64,642ha) of the association is mapped as remnant native vegetation, where 47% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (30,247ha).
Mt Desperate Environmental Association (4.3.10)	
Landform	Hills on metasediments with short footslopes and fans.
Geology	Metasediments, colluvium and alluvium.
Soil	Dense brown loams, hard pedal red duplex soils and hard pedal mottled-yellow duplex soils.
Vegetation	Open scrub of Beaked Red Mallee, Yorrell, Ridge-fruited Mallee and Broombush and low woodland of Drooping Sheoak.
Remnant vegetation	38% (33,553ha) of the association is mapped as remnant native vegetation, where 17% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (5,622ha).
Cleve Environmental Association (4.3.9)	
Landform	Gently sloping sandy plains and footslopes with some dunes and low cliffs along the coastline.
Geology	Sand and metasediments.
Soil	Red calcareous earths, hard pedal red duplex soils, brownish sands and whitish calcareous sands.
Vegetation	Open scrub of Beaked Red Mallee and Yorrell, sometimes with Ridge-fruited Mallee and Broombush, open heath of Coast Daisy Bush, Coast Beard Heath and Coastal Wattle.
Remnant vegetation	18% (17,456ha) of the association is mapped as remnant native vegetation, where 18% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (3,125ha).
Eyre Mallee IBRA Subregion (EYB5)	
<p>This subregion is distinguished climatically by being more arid than regions to the south. The mallee that once dominated this subregion has been cleared for wheat cultivation. The northern margin is formed by the dunefields of the Great Victoria Desert and the eastern margin of the Gawler Ranges. The region consists of an undulating plain with an extensive cover of dunes and sand sheets. A mallee association of <i>Eucalyptus socialis</i> and <i>E. gracilis</i> occurs on the shallow calcareous earths or deeper duplex soils of the plains with <i>E. incrassata/Melaleuca uncinata</i> mallee on the dune sands. To the east the subregion includes hilly uplands on metasediments small intramontane basins. Isolated quartzite ranges and granite outcrops form prominent inselbergs such as Darke Peake and Wudinna Hill which occur throughout the region. Livestock grazing and cereal cropping has resulted in the clearance and/or degradation of much of the native vegetation in this subregion.</p>	
Landform	Stable NW-SE longitudinal dunes, locally broken by granite hills and ridges of metamorphic rocks. Dunes closely spaced.
Geology	Vast dune sand and interdune corridors of clay, silt and very fine sand; evaporite deposits in numerous salt lakes (gypsum, halite); kopi ridges and dunes; some silcrete and calcrete (rare).
Soil	Sand soils with weak pedologic development, red calcareous earths, red siliceous sands.
Vegetation	Mallee heath and shrublands.
Remnant vegetation	35% (811,497ha) of the subregion is mapped as remnant native vegetation.

Protected Areas	20% of the subregion is protected (437,121ha in formal reserves and conserved in private Heritage Agreements under the <i>Native Vegetation Act 1991</i>). This is 54% of the mapped native vegetation.
Hambidge Environmental Association (4.3.7)	
Landform	Extensive undulating plain with parallel dunes and occasional low inselbergs and with tidal flats and sand dunes on the coastal margin.
Geology	Sand, calcrete, inselberg, alluvium and metamorphics.
Soil	Sandy pedal mottled-yellow duplex soils, brownish sands, dense brown loams, grey calcareous loams and whitish calcareous sands.
Vegetation	Open scrub of Ridge-fruited Mallee, Narrow Leaved Mallee and Broombush, low woodland of mangroves, low chenopod shrubland of samphire and low shrubland of Coastal Wattle and Coast Beard Heath.
Remnant vegetation	28% (99,967ha) of the association is mapped as remnant native vegetation, where 73% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (73,287ha).
Wharminda Environmental Association (4.3.5)	
Landform	Undulating plain with sand sheets and dunes, and isolated hills.
Geology	Sand, calcrete, quartzite, alluvium and calcarenite.
Soil	Sandy pedal mottled-yellow duplex soils, brownish sands, dense brown loams, crusty red duplex soils and whitish calcareous sands.
Vegetation	Chenopod shrubland of samphire and Nitrebush.
Remnant vegetation	9% (6,179ha) of the association is mapped as remnant native vegetation, where 3% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (156ha).
Hincks Environmental Association (4.3.2)	
Landform	Plain with a thick sand cover forming high parabolic dunes.
Geology	Sand.
Soil	Brownish sands.
Vegetation	Open scrub of Coastal Mallee and open scrub of Coastal Mallee, Ridge-fruited Mallee, Narrow Leaved Mallee and Broombush.
Remnant vegetation	83% (23,953ha) of the association is mapped as remnant native vegetation, where 91% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (21,795ha).
Butler Environmental Association (4.1.18)	
Landform	Undulating plain on partly calcreted alluvium with isolated quartzite hills, ending in low cliffs along the coastline.
Geology	Alluvium, calcrete, quartzite and metasediments.
Soil	Hard pedal mottled-yellow duplex soils, red friable loams and crusty red duplex soils.
Vegetation	Open scrub of Ridge-fruited Mallee and Broombush and chenopod shrubland of samphire and Nitrebush.
Remnant vegetation	7% (5,127ha) of the association is mapped as remnant native vegetation, where 0% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves.
Yalunda Environmental Association (4.1.9)	
Landform	Low hills derived from the dissection of a former lateritic plateau.
Geology	Laterite and alluvium.
Soil	Hard pedal mottled-yellow duplex soils and grey calcareous loams.
Vegetation	Woodland of SA Blue Gum and Sugar Gum and low open forest of Sugar Gum.
Remnant vegetation	20% (21,661ha) of the association is mapped as remnant native vegetation, where 9% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves (1,984ha).
Mt Gawler Environmental Association (4.1.8)	
Landform	Rounded hills and low ranges on metasediments.
Geology	Metasediments and alluvium.

Soil	Hard pedal mottled-yellow duplex soils and brown weakly structured sandy soils.
Vegetation	Grasslands and open parkland of Peppermint Box.
Remnant vegetation	9% (1,660ha) of the association is mapped as remnant native vegetation, where 0% is conserved in private protected areas as Heritage Agreements under the <i>Native Vegetation Act 1991</i> and NPW reserves.

Source: DEH 2007; DSEWPaC 2013.

Since European settlement, approximately 55% (2,783,000 ha) of the original native vegetation on Eyre Peninsula has been cleared primarily for agricultural purposes (Matthews et al, 2001). Remnancy within the more arid pastoral country characterised in the Myall Plains IBRA Subregion is at 97%, where land use is almost exclusively stock grazing and conservation. Remnant vegetation across the Eyre and Yorke Block IBRA Bioregion, where the majority of the proposed alignment is located, is calculated at 32% (DEH 2007). Likewise with both IBRA Subregions, Eyre Hills and Eyre Mallee, where approximately 80% of the proposed alignment is located, contain 30% and 35% native vegetation respectively. Most of this remaining vegetation is concentrated in areas less suitable for agriculture, such as on hilly country, deep sands, saline soils or sheet limestone (Matthews et al, 2001). Further south where rainfall is higher and land is better suited to agriculture, the lower the remnancy figures. A number of the more southern IBRA Environmental Associations exhibit remnancy figures of less than 10%.

3.2.2 Protected Areas

NPW Reserves

A number of reserves dedicated under the *National Parks and Wildlife Act 1972* (NPW Act) are within the transmission line corridor (Table 3 and Figure 5) (DEWNR (2013b)). The proposed alignment traverses four reserves; Whyalla Conservation Park, Ironstone Hill Conservation Park and Sheoak Hill Conservation Park and Sheoak Hill Conservation Reserve, all of which are located approximately halfway along the alignment between Whyalla and Cleve, and Wharminda Conservation Park which is located approximately 5 kilometres east of Hincks Wilderness Area.

Table 3. NPW Act Reserves within the project area.

NPW Act Reserve	Size (ha)
Hincks Wilderness Area	66,934
Ironstone Hill Conservation Park	13,968
Sheoak Hill Conservation Park	747
Sheoak Hill Conservation Reserve	1,680
Wharminda Conservation Park	269
Whyalla Conservation Park	1,980

Heritage Agreements

There are 18 Heritage Agreements intersected by the proposed transmission corridor (Figure 5). Location details for the Heritage Agreements have been obtained from the Native Vegetation Council (NVC) Secretariat.

SEB offset Areas

There are two SEB offset areas intersected by the proposed transmission corridor. Location details have been obtained from the Native Vegetation Council (NVC) Secretariat.

3.2.3 Existing conservation initiatives

The project area falls within the DEWNR 'East meets West' Naturelinks. 'East meets West' is one of five Naturelinks corridors identified by DEWNR for the conservation of wildlife. The aim is to conserve the biological diversity of northern Eyre Peninsula and the Far West, protect dynamic and broad-scale ecosystem processes and lessen the impacts of changing climatic conditions. This is to be achieved by connecting habitats through a comprehensive system of parks and reserves buffered and linked by lands with complementary land management objectives. The approach of Naturelinks is characterised by a shift away from managing patches of land and discrete wildlife populations towards holistic land and wildlife management where connectedness and functioning ecosystems are of prime concern (Government of South Australia, 2012).

In addition to Naturelinks, DEWNR, in partnership with the EPNRMB, and other conservation bodies is involved in recovery efforts for priority threatened flora and fauna on Eyre Peninsula. Figure 2 shows the location of priority focus work areas for threatened flora. Within the vicinity of the proposed transmission line routes, priority work areas include Barwell Conservation Park (CP), the large heritage agreement adjacent to Barwell CP (north of Lock), Hambridge Wilderness Area (WA), Hincks WA, and coastal areas near Sheep Hill. Numerous other smaller priority areas are scattered throughout the project area as shown.

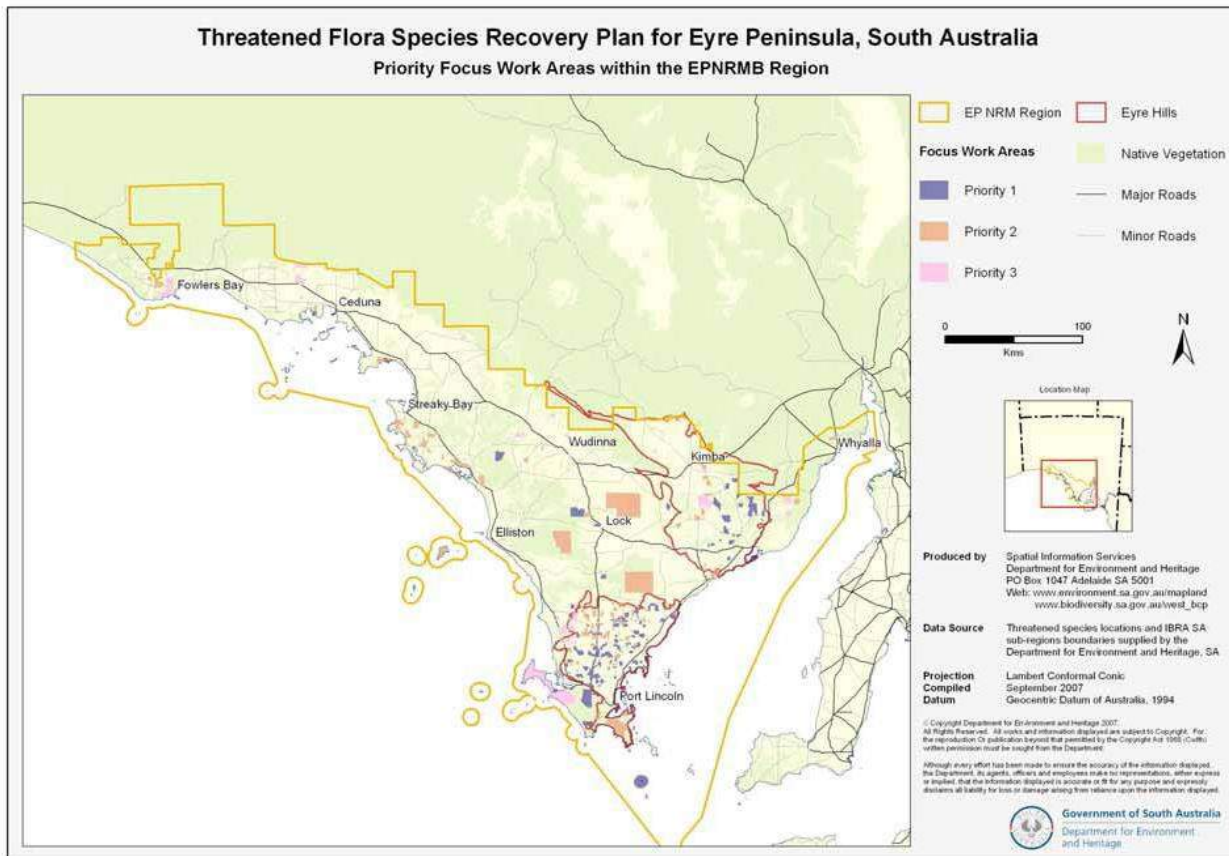


Figure 2. Priority focus areas for threatened species recovery efforts on Eyre Peninsula (Pobke 2007).

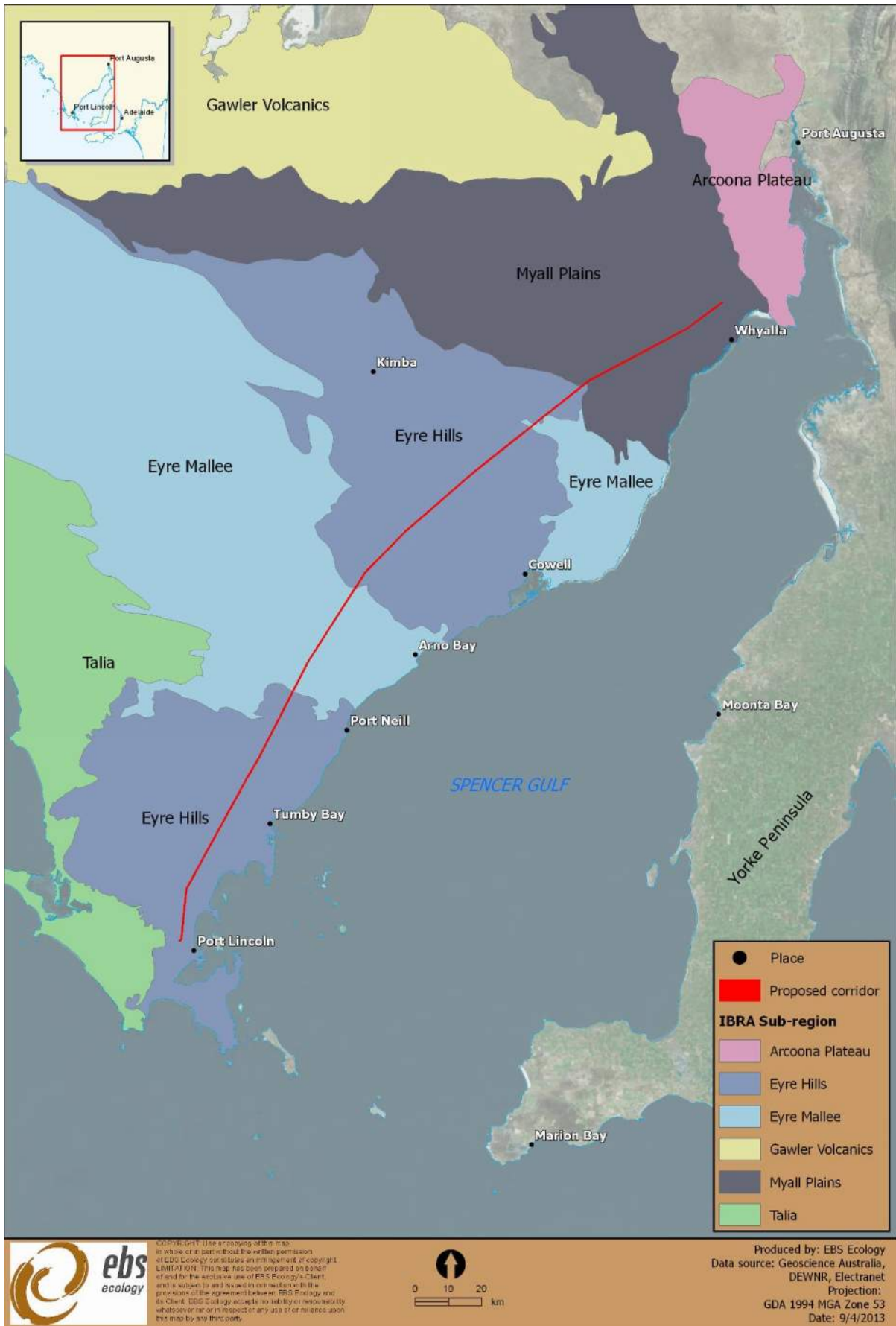


Figure 3. IBRA Sub-regions present across the project area.

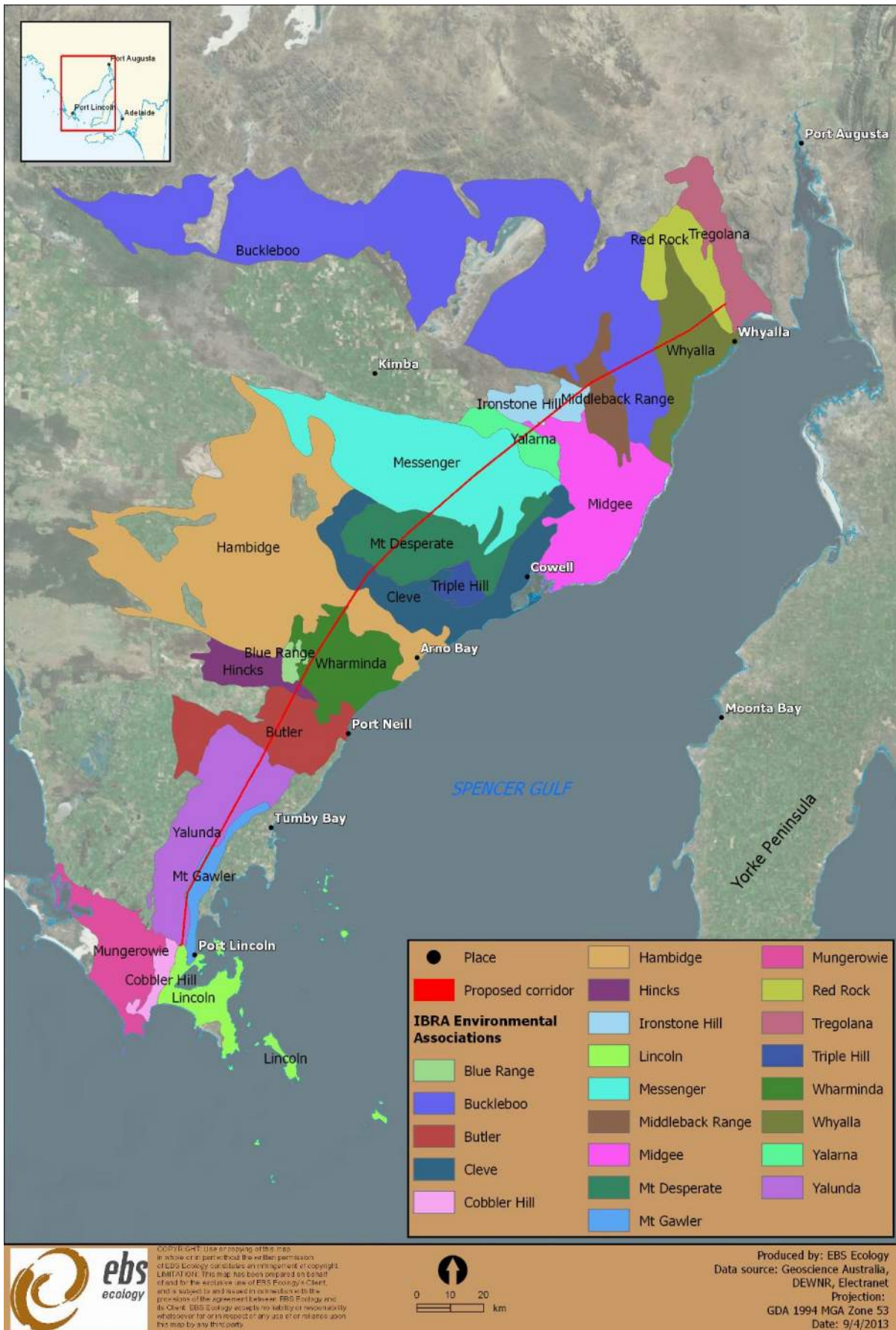


Figure 4. IBRA Environmental Associations present across the project area.



Figure 5. Protected areas located within the project area.

3.2.4 Previous surveys conducted

A biological survey of the Eyre Peninsula was undertaken in 1999 (Brandle 2010). In total, 433 previous DENR flora survey sites and 72 previous DEWNR fauna survey sites are located within 10 km of the proposed alignments (DENR 2013b). Brandle (2010) summarises a range of previous vegetation and fauna studies undertaken on Eyre Peninsula.

The following roadside vegetation surveys have previously been undertaken by Transport SA (now Department of Planning, Transport and Infrastructure (DPTI)) along main transport corridors (road and rail) in proximity to the proposed transmission corridor:

- Pt Lincoln-Thevenard (Cummins- Buckleboo) Railway Corridor Survey, 2000
- Far West Eyre Peninsula Standard Roadside Survey, Kimba – Cleve Road 1999
- North Eastern Eyre Peninsula Standard Roadside Survey, Lincoln Road, 2002
- North Western Eyre Peninsula Standard Roadside Survey, Iron Knob – Puddle Holes Dam Road, and Kimba – Lincoln Highway (Whyalla Road)
- Eyre Highway Standard Roadside Survey, Eyre Highway, Ceduna – Kimba, 2001
- Lower Eyre Peninsula Standard Roadside Survey, Lock – Cowell Road, Mount Hope – Tumbly Bay Road, and Lincoln Road, 1998
- Southern Eyre Aleppo Pine Management Group Standard Roadside Survey, Koppio – Tod Reservoir Road, 1999.

3.2.5 Climate

Eyre Peninsula is characterised by a Mediterranean climate, having predominantly winter rains and hot dry summers (Table 4, Table 5, and Table 6). The northern and central sections of the alignment are subject to the warm drier inland climates of the north and northeast of the region, whilst the southerly portion experiences relatively mild moist coastal climates that define the south and southwest. The mean annual rainfall is about 500 mm in the south of the region, and exhibits a general decrease to approximately 250 mm in the northeast. Cleve can receive a rise to over 400 mm due to a slight increase in elevation (Matthews et al, 2001) (Figure 6, Figure 7 and Figure 8).

Table 4. Average monthly rainfall and temperature figures for Whyalla Aero weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	14.5	25.2	20.4	19.5	24.6	25.2	23.8	22.1	27.1	25	21	24
Mean max temp (°C)	30.1	29.5	27.2	23.9	20.5	17.2	16.9	18.5	21.6	23.8	26.6	28.2

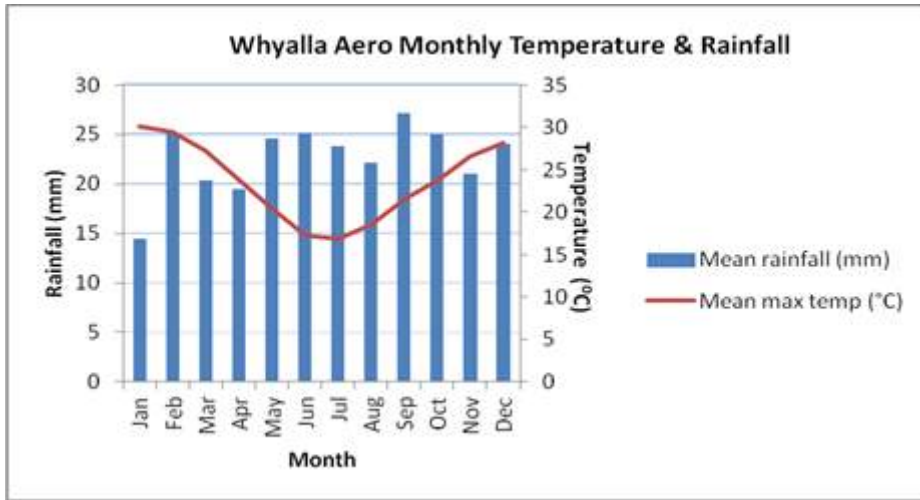


Figure 6. Average monthly rainfall and temperature data for Whyalla Aero weather station (Lat: 33.05° S; Lon: 137.52° E from 2002 to 2012) – northerly section.

Table 5. Average monthly rainfall and temperature figures for Cleve weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	15.4	22.4	21.9	28.4	40.8	46.6	46.1	48	42.4	36.6	27.2	26
Mean max temp (°C)	28.3	27.7	25.9	22.7	18.9	16	15.3	16.6	19.4	22.3	24.9	26.8

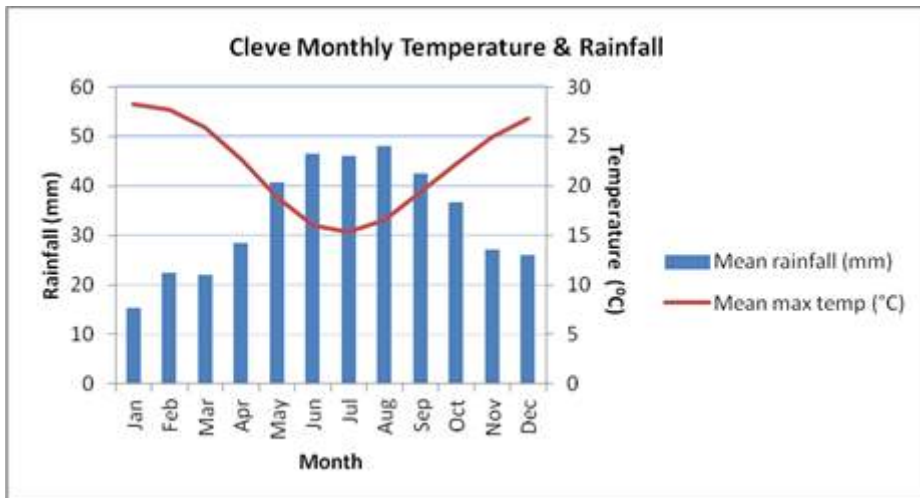


Figure 7. Average monthly rainfall and temperature data for Cleve weather station (Lat: 33.70° S; Lon: 136.49° E from 2002 to 2012) – central section.

Table 6. Average monthly rainfall and temperature figures for North Shields weather station.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	10.2	12.4	18.6	28.3	45.1	58.8	70.6	60.7	43.7	30.3	20.1	20.3
Mean max temp (°C)	26	25.9	24	22.1	19.4	16.8	16.1	16.8	18.6	20.5	23	24.4

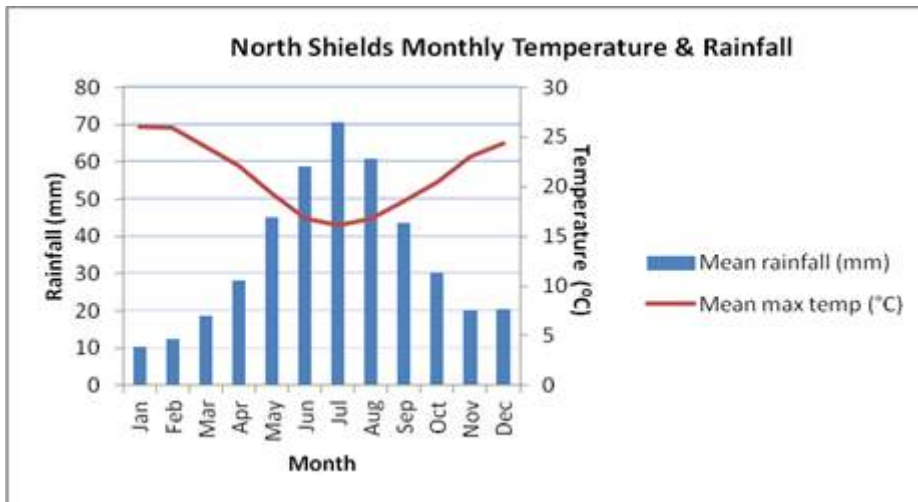


Figure 8. Average monthly rainfall and temperature data for North Shields (Pt Lincoln AWS) weather station (Lat: 34.60 S; Lon: 135.88° E from 2002 to 2012) – southern section.

Source: Australian Government – Bureau of Meteorology, (2013)

4 METHODS

4.1 Database searches

The online Protected Matters Search Tool was used to determine matters of national environmental significance under the Commonwealth EPBC Act that may occur or may have suitable habitat occurring within the project area (DSEWPaC 2013b).

A search of the Biological Databases of South Australia (BDBSA) was originally obtained from the Department of Environment, Water and Natural Resources (DEWNR) in March 2012, to identify flora and fauna species previously recorded within a 50 kilometre buffer around the project area (DEWNR 2012a). Data used in this report was subsequently clipped to a 10 kilometre buffer along the proposed transmission corridor from Cultana to Pt Lincoln. The BDBSA is comprised of an integrated collection of corporate databases which meet DEWNR standards for data quality, integrity and maintenance. In addition to DEWNR biological data the BDBSA also includes data from partner organisations (Birds Australia, Birds SA, Australasian Wader Study Group, SA Museum, and other State Government Agencies). This data is included under agreement with the partner organisation for ease of distribution but they remain owners of the data and should be contacted directly for further information.

Marine species have been excluded from the database search results as the project area is entirely inland.

4.2 Desktop review

A broad preliminary desktop assessment was undertaken in 2012 by EBS Ecology to collate existing biological data for the wider project area which included several other alignments within the region. Existing information relevant to the project area was reviewed, including:

- aerial imagery
- spatial datasets: DEWNR biological survey sites, vegetation cover, protected areas, National Vegetation Information System (NVIS) floristic mapping, TSA roadside vegetation survey
- online database and literature searches including EPBC Protected Matters Search, Birdlife Australia and Atlas of Living Australia (ALA) website
- reports and plans, including:
 - Biodiversity Plan for Eyre Peninsula (DEH 2002)
 - West region species status assessment (Gillam and Urban 2009)
 - Eyre Peninsula Natural Resources Management Plan (EPNRMB 2004)
 - A Biological Survey of the Eyre Peninsula, South Australia (Brandle 2010).

Some of this information has been used to create lists of species known to occur in the area, whilst vegetation association data has been ground truthed during recent field surveys.

4.3 Field Surveys

4.3.1 General vegetation survey

The general vegetation survey focused on obtaining a greater understanding of the vegetation communities and vegetation condition within the project area. This involved surveying all accessible areas of native vegetation within the 600m wide easement and recording the following:

- Location of vegetation associations,
- Species list for each vegetation association,
- Vegetation condition, determined using criteria adopted by the Native Vegetation Council to calculate significant environmental benefit (SEB) offset requirements for native vegetation clearance. Using these criteria, vegetation is assigned an SEB condition ratio based on factors such as the percentage of native and exotic species in the understorey, disturbance, and intactness of vegetation stratum (Table 10),
- Flora species of conservation significance,
- Threatened Ecological Communities.

4.3.2 Threatened flora

Native vegetation within the project area was broadly surveyed for nationally and State threatened flora species that possibly occurred within the area. The locations of historic BDBSA threatened flora records within the project area were visited. The survey was undertaken mainly from the vehicle along the existing access tracks, with regular survey on foot within representative areas and those considered potential habitat for threatened species. The survey was also undertaken on foot in larger patches of native vegetation considered to be in good to excellent condition. A ramble survey method was adopted (i.e. randomly walking through areas of vegetation, attempting to cover different topography and habitats) to ensure best coverage of the patches of vegetation within the time available.

Opportunistically observed threatened species were marked during the baseline surveys and this information fed directly into the dataset collated during the targeted surveys. Areas of native vegetation considered of a suitable quality to support threatened orchid species were also recorded and assisted during the planning for targeted surveys.

Prior to the targeted surveys, an assessment of the likelihood of each threatened species occurring in the project area was undertaken (Table 7). A likelihood of occurrence rating was assigned to each threatened species identified in the Protected Matters Search and BDBSA database searches. This rating, 'Highly Likely', 'Likely', 'Possible' and 'Unlikely' takes the following criteria into consideration:

- date of the most recent record (taking into consideration the date of the last surveys conducted in the area)
- proximity of the records (distance to the project area)
- landscape location of the records, vegetation remnancy and vegetation type of the record location (taking into consideration the landscape, remnancy and vegetation type of the project

area, with higher likelihood assigned to species that were found in similar locations/condition/vegetation associations)

- knowledge of the species habitat preferences, causes of its decline, and local population trends.

Table 7. Likelihood of occurrence criteria.

Likelihood category	Criteria
Unlikely	<ul style="list-style-type: none"> • No BDBSA records despite survey effort considered adequate, or • No BDBSA records and survey effort is considered not adequate, and no suitable habitat is known to occur in the area, or • No BDBSA records and survey effort is not considered adequate, and no suitable is known to occur in the area, and species of similar habitat needs have no records either.
Possible	<ul style="list-style-type: none"> • No BDBSA records, survey effort is considered not adequate, suitable habitat does occur (or isn't known if it does occur) and species of similar habitat needs have been recorded in the area, or • BDBSA records within the last 40 years, and the area is not largely intact, or • BDBSA records in the last 10 years, the species does not have highly specific needs, and habitat is largely intact.
Likely	<ul style="list-style-type: none"> • BDBSA records in the last 10 years, the species does not have highly specific habitat needs and the habitat is largely intact, or • BDBSA records in the last 10 years, the species does have highly specific habitat needs and these needs occur in the area.
Highly likely	<ul style="list-style-type: none"> • BDBSA records in the last 10 years, the species does not have highly specific needs, and the habitat is largely intact.

4.3.3 Targeted surveys

Some of the flora and fauna species of conservation significance which were recorded within or in close proximity to the project area have been targeted to gather more information regarding presence / absence and area of occupancy within the transmission line corridor. A series of targeted surveys were undertaken in the spring of 2013 to gather this information which will aim to assist with State and Commonwealth legislative approvals such as EPBC Act 1999, and Native Vegetation Act, 1991. The EBS Ecology surveys were conducted in:

- 12th – 16th August 2013
- 27th – 29th August 2013
- 30th September – 2nd October 2013
- 5th – 7th November 2013

A 120m wide corridor on the western side of the existing transmission line was identified by ElectraNet as the preferred alignment.

The Malleefowl targeted survey which included the field data capture and data analysis and modelling was undertaken between 30 November 2013 and 26 February 2014 by Ecological Horizons Pty. Ltd.

The Sandhill Dunnart targeted surveys occurred between April 2009 and May 2013.

FLORA

During the targeted flora surveys, remnants were selected based on previously mapped condition ratings of over 4:1 (Moderate condition) and habitat suitability for threatened species. Smaller remnants (<10ha) were thoroughly searched on foot. All threatened species were marked with a GPS coordinate and some samples were collected for later identification. A number of other attributes were recorded including size of the population, vegetation association, date of collection and a photograph record. Larger remnants (>10ha) were also partially traversed on foot, whereby the vehicle was used to move to each change of vegetation association and representative areas were thoroughly searched. It will be important to incorporate spring micro-siting surveys prior to construction to finalise the layout design, given that it was not practical to thoroughly search every area within the assessment corridor. Table 8 lists the national and State threatened flora species which were targeted.

Table 8. Broad Targeted Survey Planning 2013.

Species	Status	Flowering Time (annuals)	Targeted Survey timing
<i>Acacia cretacea</i> (Chalky Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia enterocarpa</i> (Jumping-jack Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia pinguifolia</i> (Fat-leaved Wattle)	EPBC Endangered, State Endangered		July - August
<i>Acacia praemorsa</i> (Senna Wattle)	EPBC Vulnerable, State Endangered		July - August
<i>Acacia rheticocarpa</i> (Resin Wattle)	EPBC Vulnerable, State Vulnerable		July - August
<i>Acacia whibleyana</i> (Whibley Wattle)	EPBC Endangered, State Endangered		July - August
<i>Arachnorchis brumalis</i> (Winter Spider-orchid)	EPBC Vulnerable, State Vulnerable	Late June-July-August-September	Late August
<i>Arachnorchis macroclavia</i> (Large-club Spider-orchid)	EPBC Endangered, State Endangered	Between September - October	Late September
<i>Arachnorchis tensa</i> (Rigid Spider-orchid)	EPBC Endangered	late August-October	Late August
<i>Frankenia plicata</i>	EPBC Endangered, State Vulnerable		July - August
<i>Haloragis eyreana</i> (Prickly Raspwort)	EPBC Endangered, State Endangered		July - August
<i>Olearia pannosa subsp. pannosa</i> (Silver Daisy-bush)	EPBC Vulnerable, State Vulnerable		July - August
<i>Prasophyllum goldsackii</i> (Goldsack's Leek-orchid)	EPBC Endangered, State Endangered	late September-October	Late September
<i>Prostanthera calycina</i> (West Coast Mintbush)	EPBC Vulnerable, State Vulnerable		July - August
<i>Pterostylis</i> sp. <i>Eyre Peninsula</i> (R.Bates 19474)	EPBC Vulnerable, State Vulnerable	late October-early January	late October
<i>Ptilotus beckerianus</i> (Ironstone Mulla Mulla)	EPBC Vulnerable, State Vulnerable		July - August

Species	Status	Flowering Time (annuals)	Targeted Survey timing
<i>Pultenaea trichophylla</i> (Tufted Bush-pea)	EPBC Endangered, State Rare		July - August
<i>Swainsona pyrophila</i> (Yellow Swainson-pea)	EPBC Vulnerable, State Rare		July - August
<i>Thelymitra epipactoides</i> (Metallic Sun-orchid)	EPBC Endangered, State Endangered	August-December	Late September

SOUTHERN EMU-WREN

An initial desktop analysis of the Southern Emu-wren, review of current knowledge and records in the project region was undertaken as well as a review of vegetation mapping to identify all potential habitat areas. Suitable habitat for the species was then targeted within known historically ranges. The use of call play back and active searching of the areas were employed for 20 minutes by two observers, during two morning periods.

The areas where data was collected were then targeted specifically for potential sightings of the species. The following data was recorded for any sightings:

- Number of individuals
- Distance from observer (m)
- Behaviour:
 - Flying in a single direction – FLM
 - Flying (hovering or circling) over or around a single point (FLH)
 - Foraging (feeding) on ground – FOG
 - Foraging (feeding) on Tree/Shrub- FOT/FOS
 - Perching/resting/walking on ground – ROG
 - Perching/resting/climbing on trees or shrubs – ROT
- Advertising (any loud, breeding territorial/breeding/alarm call) - ADV.

SANDHILL DUNNART

(Information sourced from *Sandhill Dunnart Habitat Assessment Proposed ElectraNet Transmission Line Corridor - Eastern Eyre Peninsula, Ecological Horizons Pty. Ltd., 2014* (Appendix 3))

A desktop habitat assessment was conducted for the likelihood of Sandhill Dunnart occurrence along the proposed transmission line based on fire and vegetation characteristics. Information collected from more than 70 previous Sandhill Dunnart survey sites were also analysed to provide underlying models to predict likely habitat utilisation by the Sandhill Dunnart. The assessment of likely habitat suitability was considered more valuable than trapping for Sandhill Dunnarts for a number of reasons (see Appendix 3) including the changing nature of its suitable habitat and the elusiveness of the species.

Habitat modelling

Previous site surveys

Data were taken from 77 survey sites trapped between April 2009 and May 2013 within the extent of occurrence of the Sandhill Dunnart in South Australia. Survey sites also included previously known capture locations of the species recorded between 1980 and 2007. All sites were in suitable habitat and were in sand plain or sand dune habitat in *Triodia* vegetation associations with mallee overstorey. Each survey site was trapped for a standard four nights, however the methodology used at the survey sites varied, including pitfall trapping (deep and short pits) and Elliot trapping (further details in Appendix 3). Some of the dataset was omitted from the analysis due to the inconsistency of methods.

Habitat and Site Variables

At each site the following measurements were taken; *Triodia* height, separation, cover and length. For details of methods see Ward (2009). Fire history data was derived from the DEWNR 2014 Fire History Dataset (GDA 1994) containing fire history data from 1956 until present. A number of site and habitat variables were compared with Sandhill Dunnart presence and abundance using generalised linear models. These included seral age, distance from edge of burn, *Triodia* height, *Triodia* cover, 90th percentile *Triodia* height, *Triodia* separation and *Triodia* length.

Data Analysis

Sandhill Dunnart trapping parameters were compared with habitat and site variables using generalised linear models. The dependent variables included Sandhill Dunnart presence/absence, adult presence/absence, total pitfall trap success and adult pitfall trap success. For each response variable, ten models were compared (refer to Appendix 3 for details) in relation to the habitat's fire age and *Triodia* characteristics (e.g. *Triodia* height, cover, separation).

The relationship between the important non-fire habitat variables (as determined from the analyses above) and fire age were also investigated. As it was not possible to determine the fire age for sites that were greater than 50 years post fire, these sites were excluded from these analyses. As with the analyses above, generalised linear models were used to determine the relationships between fire age and habitat variables.

Transmission Line

Sandhill Dunnart habitat was identified by only selecting native vegetation associations from the survey which included *Triodia* species. Previous Sandhill Dunnart trapping locations were overlaid with the identified Sandhill Dunnart habitat.

To identify currently optimal Sandhill Dunnart habitat, all *Triodia* spp. vegetation associations and areas of 10 – 50 years post fire (1974 – 2004) were selected and then classified as optimum Sandhill Dunnart habitat. Future optimal Sandhill Dunnart habitat was classified based on areas including *Triodia* spp. vegetation associations and less than 10 year post fire history (<2004 until present). Areas with no known fire history were classified as Sandhill Dunnart habitat but would require ground-truthing to determine if the *Triodia* characteristics are currently suitable for Sandhill Dunnarts.

Ground-truthing

Twenty four sites in the five *Triodia* vegetation associations were randomly selected and recommended for ground-truthing. Although ground-truthing was outside of the scope of the brief, an additional five sites were visited in Sheoak Hill Conservation Park where targeted surveys for Sandhill Dunnarts have not

occurred. At these sites, the maximum height of 30 random *Triodia* hummocks was measured using a range pole. The average height and 90th percentile height were calculated.

MALLEEFOWL

(Information sourced from *Malleefowl Targeted Survey Report, Ecological Horizons Pty. Ltd., 2014* (Appendix 4).

The proposed transmission line traverses various areas of intact mallee habitat, with much of this being suitable for the Malleefowl. The species has been monitored in these sections since 2008, with mounds being identified throughout the area by opportunistic surveys, strategic surveys and in 2013 a grid search undertaken by helicopter. These surveys successfully located over 100 Malleefowl mounds, however many of these are located away from the proposed transmission line. Further survey work was undertaken in late 2013 and early 2014 focusing primarily on the current and proposed transmission line, as well as a control line approximately 2500 m west of the other transect. This survey utilised LiDAR technology which allowed for a uniform survey approach across the desired study. The LiDAR assessed ground features, isolating anomalies that could be Malleefowl mounds with most of these anomalies being subsequently ground truthed after the search in an attempt to confirm the mounds. This technique also allowed for analysis of Malleefowl mounds in close proximity to the line as well as further away in a less disturbed area of Mallee, allowing a comparison of densities to be established.

Previous site surveys

Surveys across the study area have focused primarily on opportunistic discovery of mounds, or by strategic ground based surveys and smaller 1 km² helicopter grid searches. These have been undertaken for approximately six years and resulted in over 100 mounds being identified on Ironstone Hill CP and Secret Rocks Nature Reserve. All sites were in suitable habitat and were in sand plain or sand dune habitat in mallee overstorey with dense middle storey of various vegetation types.

2013 LiDAR surveys

The use of LiDAR is a relatively new technique of remote sensing and provides the opportunity to cover large tracts of ground with relative ease and provide very fine details of certain desired ground aspects. LiDAR is acronym of both light and radar, both of which are used in the technique to measure distances by illuminating a target with a laser and analysing the reflected light. This can then be transferred to visualisation programs and a detailed three dimensional map can be created.

The LiDAR was deployed by AAM, Geospatial Services company who used a helicopter (Bell Longranger L3 (C30 Turbine) flown at a height of 400 m AGL and at a speed of 60 knots. Two separate transects were undertaken, a 60 km transect along the proposed / current transmission line, as well as a 30 km transect located 2500 m west of the proposed / current transmission line to act as a control line for further analysis. Both transects had a buffer of 500 m.

The equipment used was ALTM 3100 LiDAR Sensor which utilizes a DiMAC 51 mm image sensor, using nominal point density of 20+ points / m² provided a resolution of 10 cm pixel size with relative system accuracy of 2 cm on both horizontal and vertical scales.

Data analysis was then undertaken by exaggerating the vertical scale of the surface created by the LiDAR ground points. This then enabled most mounds to become clearly visible and a 3D point manually placed

by operators in the centre of objects of similar size and shape to Malleefowl mounds. Cross-checking with orthorectified photos then allowed for a percentage of these objects identified to be excluded as Malleefowl mounds due to shape or size. To assist in eliminating most of these false positives an algorithm was created to reduce all objects with an arbitrary height lower than 25 cm above the surrounding plain, which eliminated a number of the identified objects.

Ground-truthing of mounds identified by LiDAR

Ground truthing of potential mounds was then undertaken for approximately 80% of all mounds identified on both transects. Dimensions and characteristics of the mounds were scored using standard national Malleefowl mound monitoring sheets. Distance from current transmission was then determined via Google Earth image that was generated by AAM. 'Historic' mounds were distinguished from more recently active mounds by the presence of moss or lichen growing on the mounds or depressions.

4.3.4 Bird survey

Dedicated bird surveys were undertaken along the entirety of the easement from Cultana sub-station to Port Lincoln across three survey periods: December 2012, January 2013 and March 2013. This involved replicated point count surveys spaced at 2 kilometre intervals along the easement in remnant vegetation, or within remnant patches of vegetation, when the existing line traversed cleared cropping lands in central/south Eyre Peninsula. Each point count was undertaken by a single observer, however two vehicles were present and would 'leap frog' along due to the large distance involved. Each point count was of a twenty minute duration, commencing after a five minute acclimatisation period. Surveys were undertaken during the morning and late afternoon period. These periods were chosen as birds tend to be more active, and as such easier to detect. During the middle of the day (between 12-3pm) no counts were undertaken if temperatures were extreme. Point count sites were only surveyed once. Data collected for each point count observation were as follows:

- Species observed
- Number of individuals
- Distance from observer (m)
- Behaviour:
 - Flying in a single direction – FLM
 - Flying (hovering or circling) over or around a single point (FLH)
 - Foraging (feeding) on ground – FOG
 - Foraging (feeding) on Tree/Shrub- FOT/FOS
 - Perching/resting/walking on ground – ROG
 - Perching/resting/climbing on trees or shrubs – ROT
- Advertising (any loud, breeding territorial/breeding/alarm call) - ADV.

Southern Emu-wren habitat was targeted within known historically ranges, as well as areas that exhibited preferred habitat types that were within 1 km of the line. The use of call play back and active searching of the areas were employed for 20 minutes by two observes, during one morning period.

4.3.5 Bat survey

AnaBat detectors were set up within four main habitat types (over 6 nights) along the transmission line corridor to determine the diversity of species. At each location, the AnaBat recorded bat calls from late afternoon until early the following morning to determine bat species present within the area. For best results, the AnaBats were placed in areas thought to be of suitable habitat for bats or that bats may frequent when feeding. Woodland areas seen to contain hollows for roosting and ‘fly-way’ tunnels through the canopy were targeted for bat call activity. Bat calls recorded on the AnaBat detectors were analysed and interpreted by Dennis Matthews in line with the reporting standards for echolocation call analysis developed by the Australasian Bat Society. The bat identifications made were based on a combination of manual and automated methods using either reference calls from the region or from species calls recorded outside the region that are likely to represent the calls from species in the survey region. A species inventory was tabulated for each detector night and the number of calls for each species was recorded. Species identifications were only made if certain of the call identification.

Details of bat density and diversity on the Eyre Peninsula were also obtained by accessing previous studies, with numerous records existing throughout the study area. Brandle (2010) undertook a large scale biodiversity survey of the Eyre Peninsula during 2001 to 2005 that contained 37 dedicated bat surveys, with both Harp traps and AnaBats used. The method of utilising both techniques allows greater accuracy in identifying species, due to AnaBats being an imprecise technique due to similarities in vocalization between species making identifying calls very difficult to positively identify. These records combined with the spring 2013 AnaBat records were deemed as adequate to provide a snapshot of the species present. See Table 32 in Results. Table 9 shows the locations where AnaBats were established during the targeted surveys.

Table 9. AnaBat site details.

AnaBat Unit	Date/Time Start	Date/Time Stop	General Habitat	Weather	Regional location
4	27/8/2013 1745hrs	28/9/2013 0800hrs	<i>Eucalyptus cladocalyx</i> Woodland	Cool	Draypole Road
2	27/8/2013 1800hrs	28/9/2013 0815hrs	<i>Eucalyptus cladocalyx</i> Woodland	Cool	The Bratten Way
2	30/09/2013	1/10/2013	<i>Eucalyptus incrassata</i> Mallee patch	Windy Stormy	Approx 16kms east of Hincks CP
4	30/09/2013	1/10/2013	<i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside	Windy Stormy	Approx 16kms east of Hincks CP amongst cleared cropping land
2	1/10/2013	2/10/2013	<i>Eucalyptus calycogona</i> / <i>E. dumosa</i> Mallee patch on roadside	Clear / cool	Directly north-west of the Plug Range CP
4	1/10/2013	2/10/2013	<i>Melaleuca uncinata</i> / Mallee association	Clear / cool	Approximate 8km north-west of Cleve
1	5/11/13 1733hrs	6/11/13 0615hrs	Dense mallee vegetation	Sunny warm and mildly windy	Sheoak Hill CP
4	5/11/13 1750hrs	6/11/13 0620hrs	Dense mallee vegetation	Sunny warm and mildly windy	North of Sheoak Hill CP southern boundary of Ecological Horizons Heritage Agreement
1	6/11/13 1733hrs	7/11/13 0615hrs	Dense mallee vegetation	Sunny warm and mildly windy, rained overnight	North of Sheoak Hill CP
4	6/11/13 1750hrs	7/11/13 0620hrs	Dense mallee vegetation	Sunny warm and mildly windy, rained overnight	North of Sheoak Hill CP

4.4 Limitations

Flora and fauna records were sourced from the BDBSA (DENR 2012) for a 10 kilometres buffer search area along the proposed transmission line corridor. The BDBSA only includes verified flora and fauna records submitted to DEWNR or partner organisations. It is recognised that knowledge is poorly captured and it is possible that significant species occur that are not reflected by database records. The reliability of the BDBSA data ranges from 100 metres to over 100 kilometres. Fauna species, in particular birds, have the ability to traverse distances in excess of 10 kilometres. Hence the BDBSA records provided may not adequately highlight all threatened flora and fauna species that may occur in the area. Similarly, without carrying out intensive trapping or spot lighting, it is not possible to detect all terrestrial animals that may use the site. However, the assessment of habitats together with the site observations made and the database records are considered adequate to make a reasonable assessment of potential impacts of the proposed project on the site's fauna.

AnaBat recordings alone may only represent a proportion of species that are actually present onsite or visiting the area. The recording of calls on any one night may be influenced by many factors including temperature, humidity, insect activity, wind and associated vegetation movement.

Some bat species are readily identified via AnaBat recordings, but many are not able to be distinguished to species level by a call recording alone because there is not enough information available on bat reference calls to make definitive identifications. AnaBat call analysis is affected by many factors, these include the suite of species present, the quality of calls recorded (equipment settings, microphone quality, background noise from wind, insects, echoes), the quality of the reference call database for the region and the experience of the analyst. The time taken to identify calls depends on the above and the needs of the client. Deriving an inventory of species for each detector night is much quicker than attempting to identify every call for each detector night. Often only a low proportion of all calls recorded may be of sufficient quality to allow identification.

One of the primary objectives of the baseline study was to determine the necessity of targeted surveys which were subsequently undertaken in 2013. Survey of other fauna groups was limited to opportunistic observations, including tracks and traces. Additional reptile, mammal and frog species may be present that would only be detected through targeted survey.

Targeted surveys were undertaken during the spring which aimed to capture annual species such as native orchids and lilies. Given that some of these species are only visibly present for several weeks at a time, it is possible that some species were not detected.

The findings and conclusions expressed by EBS Ecology are based solely upon information in existence at the time of the assessment. Field data collected during the December 2012, January and February 2013 and spring 2013 targeted surveys, combined with database records and background research, is considered to provide an adequately detailed assessment of the flora and fauna that occur and are likely to occur within the project area.

Table 10. Vegetation condition ratios used to assess the condition of vegetation communities.

Condition	SEB Ratio	% total indigenous cover	Native Vegetation Council SEB Ratio Interim Policy	Understorey condition description	Indicators
Very Poor	0:1	<10%	Any potential clearance consists of lopping of overhanging limbs only &/or no indigenous understorey present.	Complete or almost complete destruction of understorey (by grazing &/or introduced plants). The understorey* consists mainly of alien species.	Vegetation structure no longer intact (e.g. removal of one or more vegetation strata). Scope for regeneration, but not to a State approaching good condition without intensive management. Dominated by very aggressive weeds. Partial or extensive clearing (> 50% of area). Evidence of heavy grazing (tracks, browse lines, species changes, no evidence of soil surface crust).
	1:1	10-19%	Areas are dominated by introduced species. Native vegetation is largely reduced to scattered trees, indigenous understorey flora reduced to scattered clumps and individual plants.		
	2:1	20-29%	Weeds dominate, scattered trees with indigenous understorey reduced to scattered clumps and individual plants.		
Poor	3:1	30-39%	Mostly intact overstorey vegetation but there is still considerable weed infestation amongst the understorey flora.	Heavy loss of plant species. The understorey* consists predominately of alien species, although a small number of natives persist.	Vegetation structure substantially altered (e.g. one or more vegetation strata depleted). Retains basic vegetation structure or the ability to regenerate it. Very obvious signs of long-term or severe disturbance. Weed dominated with some very aggressive weeds. Partial clearing (10 – 50% of area). Evidence of moderate grazing (tracks, browse lines, soil surface crust extensively broken).
	4:1	40-49%	Mostly intact overstorey vegetation but there is still considerable weed infestation amongst the understorey flora.		
Moderate	5:1	50-59%	Mostly intact, weed-free areas small, indigenous vegetation dominant.	Moderate loss of plant species. Substantial invasion of aliens resulting in significant competition, but native understorey* persists; for example, may be a low proportion of native species and a high native cover, or a high proportion of native species and low native cover.	Vegetation structure altered (e.g. one or more vegetation strata depleted). Most seed sources available to regenerate original structure. Obvious signs of disturbance (e.g. tracks, bare ground). Minor clearing (<10% of area). Considerable weed infestation with some aggressive weeds. Evidence of some grazing (tracks, soil surface crust patchy).
	6:1	60-69%	Mostly intact overstorey vegetation with moderate but not severe weed infestation amongst the understorey flora.		
Good	7:1	70-79%	Mostly intact overstorey and understorey vegetation, weed infestation is moderate to low, but the original vegetation is still dominant.	Understorey only slightly modified. High proportion of native species and native cover in the understorey*; reasonable representation of probable pre-European vegetation.	Vegetation structure intact (e.g. all strata intact). Disturbance minor, only affecting individual species. Only non-aggressive weeds present. Some litter build-up.
	8:1	80-89%			
Excellent	9:1	> 89%	Diverse vegetation with very little weed infestation.	Understorey largely undisturbed, minimal loss of plant species diversity. Very little or no sign of alien vegetation in the understorey*; resembles probable pre-European condition.	All strata intact and botanical composition close to original. Little or no signs of disturbance. Little or no weed infestation. Soil surface crust intact. Substantial litter cover.
	10:1		Diverse vegetation with no weed infestation.		

*Or all strata if the upper and lower strata are difficult to distinguish.


Adapted from *Guide to Roadside Vegetation Survey Methodology for South Australia* (Stokes et al. 1998) and *Guidelines for a Native Vegetation Significant Environmental Benefit Interim Policy* (DWLBC 2005)

5 RESULTS

5.1 Matters of national environmental significance protected under the EPBC Act

The EPBC Act Protected Matters Search highlighted a number matters of national environmental significance protected under the EPBC Act that may be relevant for the project area (Table 11). One threatened ecological community, 50 threatened species and 32 migratory species were highlighted in the report, and these are discussed below. It should be noted that marine species were excluded from the discussion.

Table 11. Summary of the results of the EPBC Protected Matters search.

Search area (10 km buffer)	Matters of National significance under the EPBC Act 1999	Identified within the search area
	World Heritage Properties	None
	National Heritage Properties	None
	Wetlands of International Significance	None
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Areas	None
	Threatened Ecological Communities	1
	Threatened Species	50
	Migratory Species	32
	Commonwealth Lands	5
	Commonwealth Heritage Places	None
	Listed Marine Species	57
	Whales and other Cetaceans	12
	Critical Habitats	None
	Commonwealth Reserves	None
	Places on the Register of the National Estate	22
	State and Territory Reserves	48
	Regional Forest Agreements	None
Invasive Species	31	
Nationally Important Wetlands	2	

5.1.1 Wetlands and watercourses

Wetlands are identified as ‘special habitats’ on *Eyre Peninsula in the Biodiversity Plan for Eyre Peninsula* (DEH 2002), due to such areas having not been cleared or being remnants of the pre-existing vegetation. No wetlands on Eyre Peninsula have been identified as international importance under the Ramsar Convention. There are two wetlands within the Protected Matters Search area that have been identified as

of national importance by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). Those that are in close proximity to the project area are the Tod River Wetland System and Tumby Bay.

The Tod River itself is the only permanent flowing drainage line on Eyre Peninsula, and is therefore an important habitat and refuge for many wetland organisms (Lloyd and Balla 1986, as cited in DEH 2002). The Tod River and Tod River Reservoir are the terminal water bodies of the catchment, which is fed by rainfall and water runoff. This reservoir supplies most of the reticulated water for the whole of the Eyre Peninsula. Tod Reservoir is under the control of SA Water.

Tumby Bay is recognised as a wetland of National Significance in the Directory of Important Wetlands in Australia. The wetlands cover an area of approximately 1,000 ha around the Tumby Bay Township (DEH 2002). They consist of marine waters, seagrass meadows, sandbars, estuarine waters, intertidal mud and sand flats, intertidal marshes and mangrove swamps. The Tumby Bay CP has been identified an area of international importance for shorebirds (Watkins 1993, as cited in DEH 2002).

5.1.2 Nationally threatened flora species

Twenty-two nationally listed flora species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 12). Twenty of these species were recorded within the BDBSA search area, however sixteen were considered either possible or likely to occur on site (Figure 9, Figure 10 and Figure 11). The two species not included in the BDBSA search were *Frankenia plicata*, Nationally Endangered and considered possible and *Pterostylis* sp. Eyre Peninsula (R.Bates 19474), Nationally Vulnerable and considered as likely to occur within the project area. An additional two nationally vulnerable flora species not highlighted in the EPBC Protected Matters Search were highlighted in the BDBSA search; *Limosella granitica* (Granite Mudwort) which is considered unlikely to occur within the project area and *Pterostylis xerophila* (Desert Greenhood), considered possible.

Following targeted survey, some of these species were detected within the 120m wide assessment corridor. The final column in Table 12 indicates whether the species was recorded during the surveys.

Table 12. Nationally threatened flora species identified by EPBC Protected Matters Search Tool as possibly occurring within the project area.

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Acacia cretacea</i>	Chalky Wattle	EN	E	6/12/2005	Highly likely	A spindly, straggly, single-stemmed shrub or tree, growing 4-5 m high with lemon yellow to golden yellow, very fragrant flower heads. Flowers are born July-February. Occurs in an extremely restricted area about 30 km north to north-west of Cowell and north-east of Coolanie on the north-eastern EP. Total population consists of between a few hundred and 5000 plants. Found along roadsides and in adjacent leasehold farming land. Occurs in low shrubland and mallee scrub, on deep red sand in gently undulating country, with low sand ridges.	N
<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	7/12/2004	Highly likely	A dense, rounded, sprawling, prickly shrub to 1.5 m high. Flowering occurs May-October. Occupies disjunct sub-populations on EP. Sub-populations known from roadsides and rail reserves and amongst vegetation corridors along SA Water pipelines. Grows in association with a wide range of vegetation communities. Known to grow in association with various Mallee species in northern EP (Pobke 2007).	Y
<i>Acacia pinguifolia</i>	Fat-leaved Wattle	EN	E	7/12/2004	Highly likely	A dense spreading shrub, to 2 m high and 3 m across, with globular golden yellow flower heads. Flowers are mostly borne August-September. Considered endangered and declining in Eyre Hills IBRA subregion (Gillam and Urban 2009). Known from disjunct sub-populations on EP, where it grows in association with a range of Mallee species and <i>Melaleuca uncinata</i> shrubland. On northern EP, sub-populations are known to occur near Cockaleechee, Ungarra and Bulter. Many sub-populations are located on roadsides managed by the District Council of Tumby Bay. The species is also known from rail reserves. Flowering usually occurs between July and October.	Y

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Acacia praemorsa</i>	Senna Wattle	VU	E	22/11/2007	Likely	An erect, suckering, hairless shrub, 1–3 m high with smooth, green, angled branchlets and long, linear, soft phyllodes. Endemic to South Australia. Confined to the Eyre Peninsula where it occurs in localised populations in the ranges north-east of Cleve. Occurs in mallee woodlands, open scrubs and open heath scrubs. Has been found on the lower slopes of small gullies in low, rocky ranges, on exposed north-facing slopes in thick, low scrub and in shady, sheltered sites in open mallee woodlands at the base of steep gullies.	N
<i>Acacia rheticarpa</i>	Neat Wattle, Resin Wattle (SA)	VU	V	6/09/2006	Highly likely	An erect, perennial, compact, rounded, resinous, spreading shrub that grows 0.5-1.5 m tall. Flowers are mainly borne August-October. Grows in association with <i>Eucalyptus</i> mallee, in areas often classified as dune crest and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Grows in disjunct sub-populations on EP, encompassing an area from Kimba to just north of Arno Bay, Cleve and Lock. Sub-populations are known to survive within roadside vegetation. Considered vulnerable and declining in Eyre Hills and Eyre Mallee subregions (Gillam and Urban 2009).	N
<i>Acacia whibleyana</i>	Whibley Wattle	EN	E	5/09/2004	Highly likely	A dense shrub growing to 2.5 m high and spreading to 4 m in diameter, with globular flower heads. Flowers are borne August-October. Endemic to EP, the species is restricted to near-coastal areas near Tumby Bay on the EP. Grows on limestone and loam, sometimes near salt swamps.	N
<i>Arachnorchis brumalis</i>	Winter Spider-orchid	VU	V	07/09/1985	Possible	A creamy coloured spider-orchid to 20 cm tall. Leaf to 8 cm long, soft green, red based, with dense short hairs. Flower stem is tall, rigid, with close short hairs. Flower single, rarely two, to 70 mm across, creamy with darker markings on many flowers. Flowering: Late June-July-August-September. Endemic to South Australia, mostly on Yorke Peninsula but likely to occur in the southern Eyre Peninsula, however the 4 BDBSA records are all post 1985. Found mostly on terra rossa soils or fertile sands over limestone, in mallee broom-bush associations, light woodland or sedge dominated grasslands.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Arachnorchis conferta</i>	Coast Spider-orchid	EN	E	7/10/1968	Unlikely	A small terrestrial orchid. During the growth period, a single dull-green, hairy leaf occurs at the base of the plant. Flowers usually solitary or pairs, greenish and crimson, to 3 cm across. Flowering occurs July-September. Endemic to SA. Currently known from two distinct localities in the upper south-east of SA and on Yorke Peninsula. There is one record from 1968 from Hincks WA, but this sub-population is now considered extinct. Another collection, from Carrappee Hill, may not be <i>Caladenia conferta</i> and is possibly a subspecies of <i>C. toxochila</i> (R. Bates 2005, pers. comm., cited in DSEWPAC (2012c).	N
<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	26/11/2008	Possible	Spider-orchid to 30 cm high flowering: in September to October. Stem reddish and slightly hairy. Leaf to 10 cm long, rigid, shortly hairy, red based. Flower usually single about 5 cm across, yellow-green and maroon with brown osmophores. Endemic to South Australia. Rare on central Eyre Peninsula with few records from Stamford Hill in Pt Lincoln. Also known from about 5 locations on Yorke Peninsula and one location at Telowie Gorge, SA. Favours fertile shallow loams in mallee broom-bush associations, usually where other orchids are numerous.	N
<i>Arachnorchis tensa</i>	Greencomb Spider-orchid, Rigid Spider-orchid	EN		1/10/2005	Likely	Flowers usually single, green, white and red, to 50 mm across. Flowering occurs late August-October. Not evaluated for EP regions as there are taxonomic issues (some are <i>C. interanea</i>) (Gillam and Urban 2009). Distribution unsure in SA, probably not on EP (Bates 2009). Generally found in Heathy Woodland or Mallee on sands and sandy loams. Broadly considered secure but some forms may prove to be distinct species.	N
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU	V	31/08/1986	Unlikely	Small, prostrate shrub, growing to about 1.5 m diameter and 20 cm tall. The tiny solitary or paired flowers appear in spring and summer. Endemic to south-eastern Australia. In SA, it occurs near Port Lincoln in the EYB bioregion, as well as other localities outside of the EP. Grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Frankenia plicata</i>		EN	V	None	Possible	Small, densely branched, hairy shrub. Flowering occurs between September and October. Occurs in SA, from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Marree. Likely that the species has been under reported due to difficulty of identification of <i>Frankenia</i> spp. No records in Eyre Hills or Eyre Mallee subregions (Gillam and Urban 2009). Grows in a range of habitats, including on small hillside channels, which take the first run-off after rain and from swales of loamy sands to clay. Found in a wide range of vegetation communities that have good drainage.	N
<i>Haloragis eyreana</i>	Prickly Raspwort	EN	E	25/01/1969	Possible	Prickly Raspwort is a perennial, herb growing to 10-30 cm tall. Flowering occurs between October and November. The species is endemic to Lower Eyre Peninsula, found in the district councils of Lower Eyre Peninsula, Tumby Bay and Franklin Harbour on predominantly poorly drained mottled-yellow duplex soils and hard pedal red-duplex soils in historically grassland areas that have been cleared for agriculture. Now only exists in roadsides and rail reserves.	N
<i>Olearia pannosa</i> subsp. <i>pannosa</i>	Silver Daisy-bush	VU	V	22/11/2007	Highly likely	<ul style="list-style-type: none"> A perennial, low spreading shrub, which can grow up to 1.5 m tall. Mature leaves are shiny on the top and have a distinct white/cream/pale rusty-brown coloured, soft, velvet texture on the underside of leaves. Flowers are typically white and have a typical daisy appearance. Flowering occurs from August-October. Occurs in the understorey of mallee, woodland and forest communities. 	• Y
<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	E	26/11/2008	Possible	A small, slender terrestrial orchid that grows 10-30 cm high. Flowers are green with dark purple edges and tips, and arranged in loose groups of 5-12 flowers. Flowering occurs late September-October. Endemic to SA, found only on Yorke Peninsula and lower EP. Two of the four known general locations are on the EP; in the south-western to central area, and within 50 km of Port Lincoln. Considered endangered and probably declining in Eyre Hills subregion (Gillam and Urban 2009). Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in mallee and scrub.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Prostanthera calycina</i>	West Coast Mintbush, Limestone Mintbush, Red Mintbush	VU	V	28/10/2002	Possible	A perennial shrub that grows to half a metre tall and spreads across the ground. The leaves smell like mint when crushed. Flowers are red and tube shaped. Flowering occurs from September-December. Endemic to the EP. Sub-populations are distributed from Buckleboo to Coorabie. Commonly associated with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. oleosa</i> (Red Mallee), <i>E. socialis</i> (Beaked Red Mallee) and <i>Santalum acuminatum</i> (Quandong), along with <i>Melaleuca</i> , <i>Pittosporum</i> , <i>Grevillea</i> , <i>Hakea</i> and <i>Spyridium</i> sp.	N
<i>Pterostylis</i> sp. Eyre Peninsula (R.Bates 19474)		VU	V		Likely	A small herb with 5-12 overlapping leaves forming a basal rosette. Flowers are greenish-white and number from 1-7 (sometimes 10), produced on pedicels bent at right angles to the stem. Flowers late October-early January. Endemic to the EP, where it is known from about 12 localities. Grows mostly in scrublands of <i>Melaleuca uncinata</i> , but also in woodland of <i>Callitris</i> spp. (Native Pine) and <i>Eucalyptus</i> spp., particularly in stony brown loams.	N
<i>Ptilotus beckerianus</i>		VU	V	29/09/2007	Possible	A small, perennial herb growing 10-25 cm tall. Flowers are hairy, with 20-40 spiky looking flowers per stem. Flowering occurs between August-January. Endemic to SA, and grows in disjunct populations on Kangaroo Island and the EP. Grows on roadside verges and private property within the District Council of Lower EP. Often grows in association with <i>Eucalyptus cladocalyx</i> (Sugar Gum) and <i>Xanthorrhoea</i> sp. (Yacca) in low open forest or low open woodland along roadsides.	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	11/01/2005	Highly Likely	<p>Endemic to southern EP. Only occurs in Eyre Hills IBRA subregion, where it is considered rare but stable (Gillam and Urban 2009, Pobke 2007). In relation to the project area, records only exist from in the southern half of Tumby Bay District Council near the coast.</p> <p>Recorded growing in a range of soil types including acidic, sandy or clay loam over ironstone in gullies, hillcrests and undulating plains, lateritic soils on hill slopes with outcropping quartzite. Grows in association with Open Woodland scrub on loam with ironstone gravel, overlaying yellow clay. Associated vegetation includes <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i> (Tate's grass-tree), and <i>Melaleuca uncinata</i> (Broombush) and <i>Homoranthus homoranthoides</i> (Port Lincoln Ground-myrtle). Sub-populations grow within roadside vegetation managed by the District Council of Tumby Bay (Pobke 2007).</p>	Y
<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	R	25/11/2010	Likely	<p>Considered vulnerable and probably declining in Eyre Hills and Eyre Mallee subregions. Populations fluctuate (Gillam and Urban 2009). Known from SA, NSW and Vic. On EP, Southern extent is Hambidge CP, where it has been recorded growing in claypans and ashes. Sub-populations grow in the district councils of Ceduna, Elliston and Franklin Harbour (Pobke 2007). Found in Mallee vegetation communities on a variety of soil types including well-drained sands, sandy loams and heavier clay loams. It is usually found after fire.</p> <p>Associated vegetation communities on EP include <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee), <i>E. brachycalyx</i> (Gilja), <i>E. gracilis</i> (Yorrell), and <i>E. oleosa</i> (Red Mallee) mid mallee woodland over <i>Melaleuca uncinata</i> (Broombush) tall shrubland. <i>Swainsona pyrophila</i> has been found growing amongst young vegetation structures with open canopy post fire. Was recorded growing 2 years post-fire in low mallee (less than 3 m tall) in Munyeroo CP with a range of low shrubs and ground covers (Pobke 2007).</p>	N

Species name	Common name	Conservation status		Most recent record*	Likelihood of occurrence within survey area	Description	Detected during targeted surveys (Y or N)
		Aus	SA				
<i>Tecticornia flabelliformis</i>	Bead Glasswort	VU	V	11/04/2007	Unlikely	Considered vulnerable and probably declining in Eyre Mallee subregion (Gillam and Urban 2009). <i>Tecticornia flabelliformis</i> (Bead Glasswort) is found in SA, WA and Vic, with the majority of known sub-populations in SA. On EP, it is known from the district councils of Cleve, Streaky Bay, Elliston, Ceduna, Tumby Bay and Lower Eyre Peninsula. It grows in low lying areas on the margins of salt lakes and coastal salt marshes over gypsum deposits, and is often associated with other <i>Tecticornia</i> species and salt tolerant vegetation communities (Pobke 2007).	N
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	E	26/11/2008	Possible	Robust herb, 6-60 cm high. Has 5-20 flowers per flower cluster, and each flower is 20-25 mm in diameter. Flower colour is highly variable with brown, copper, blue and green the main colour groups, with infusions of red, blue or green, giving a bronzy or metallic appearance. The extent of occurrence on EP is approximately 900 km ² , growing within Edillilie in the north, and Mikkira in the south.	N

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

* Most recent record sourced from BDBSA search (DENR 2012).

Habitat information sourced and adapted from DSEWPAC (2012), Bates (2009), Pobke (2007), (Laut et al. 1977), Jessop et al (2006), DEH (2002), DEH (undated).

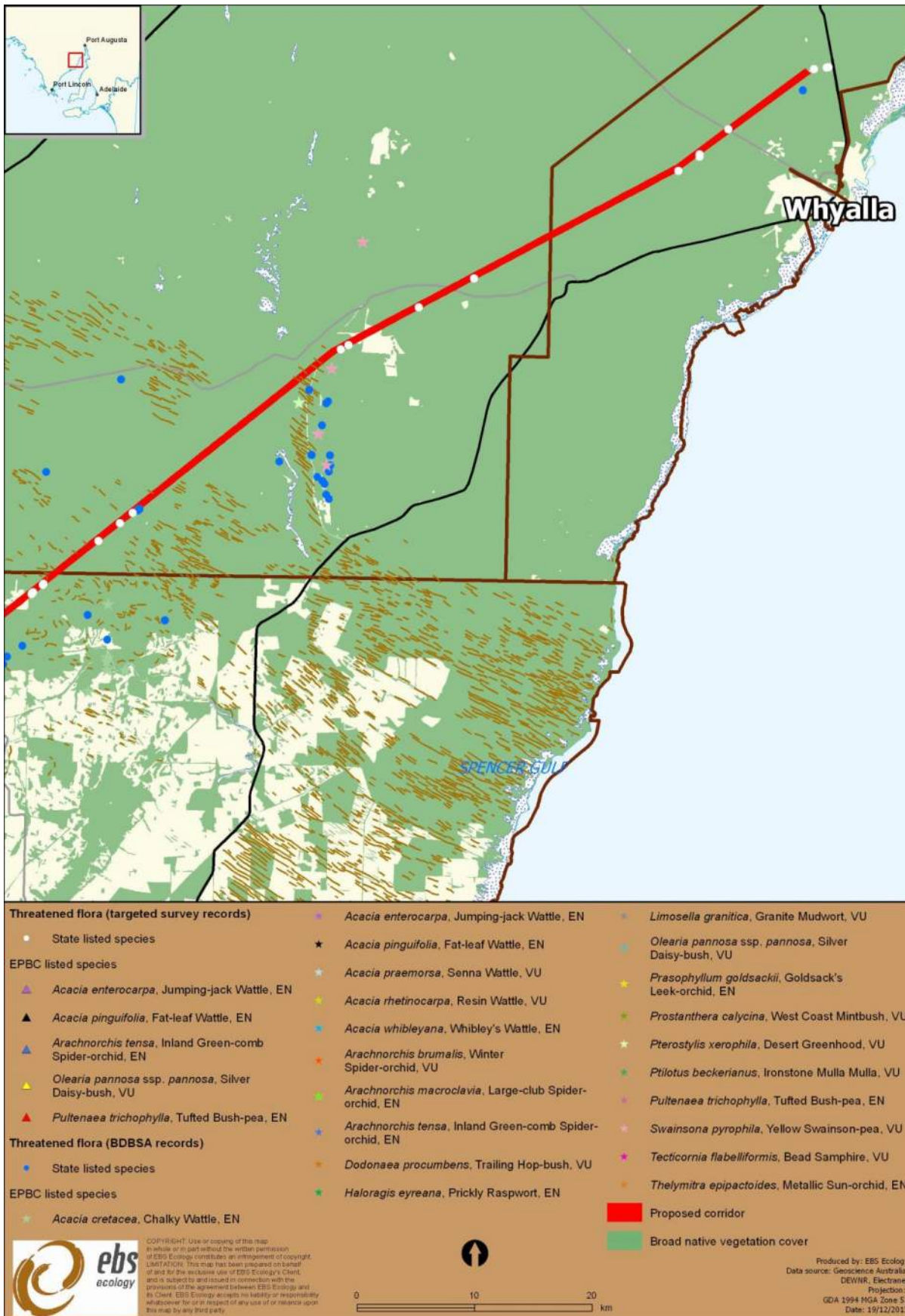


Figure 9. Location threatened flora species in relation to the northern section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

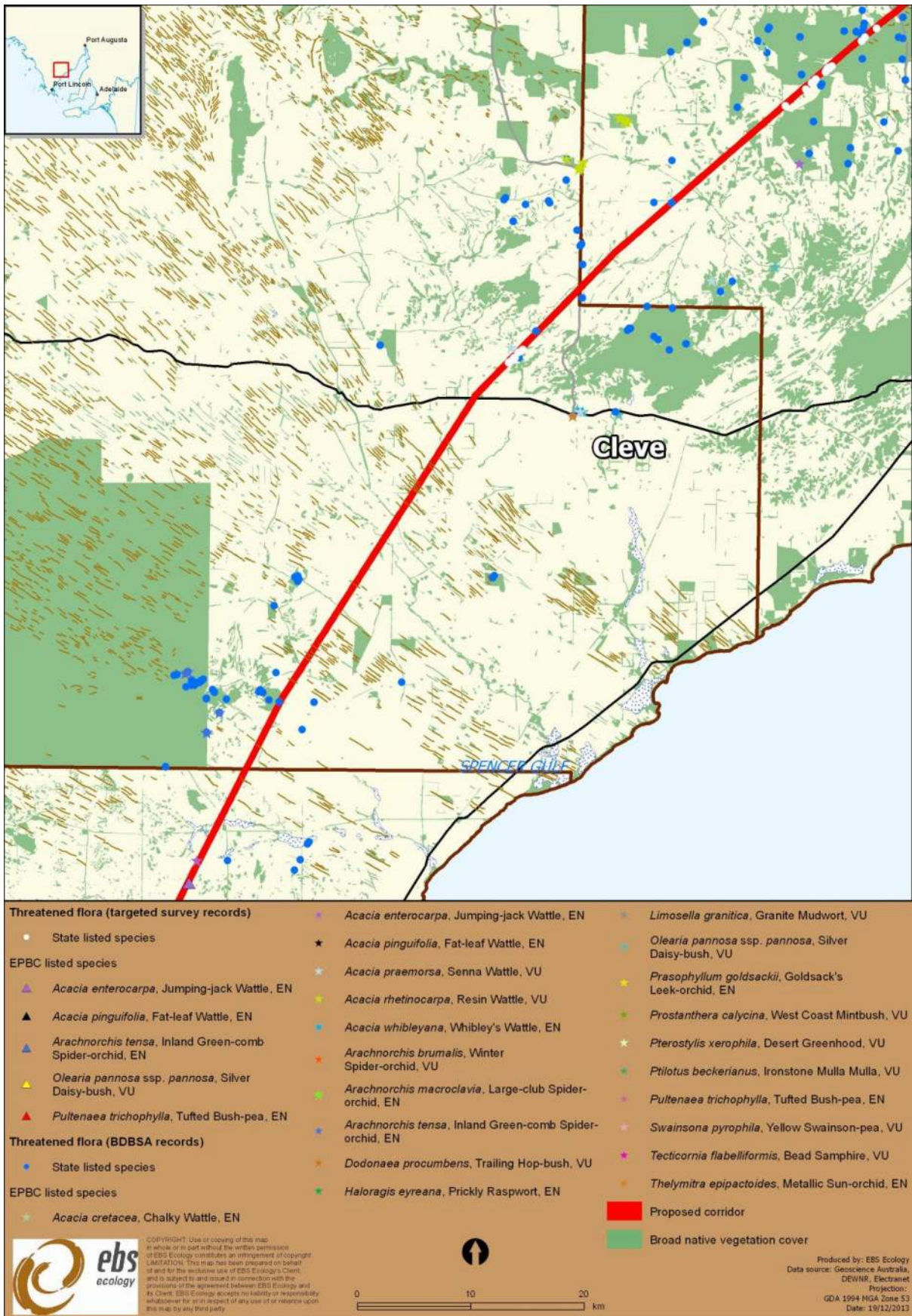


Figure 10. Location of threatened flora species in relation to the central section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

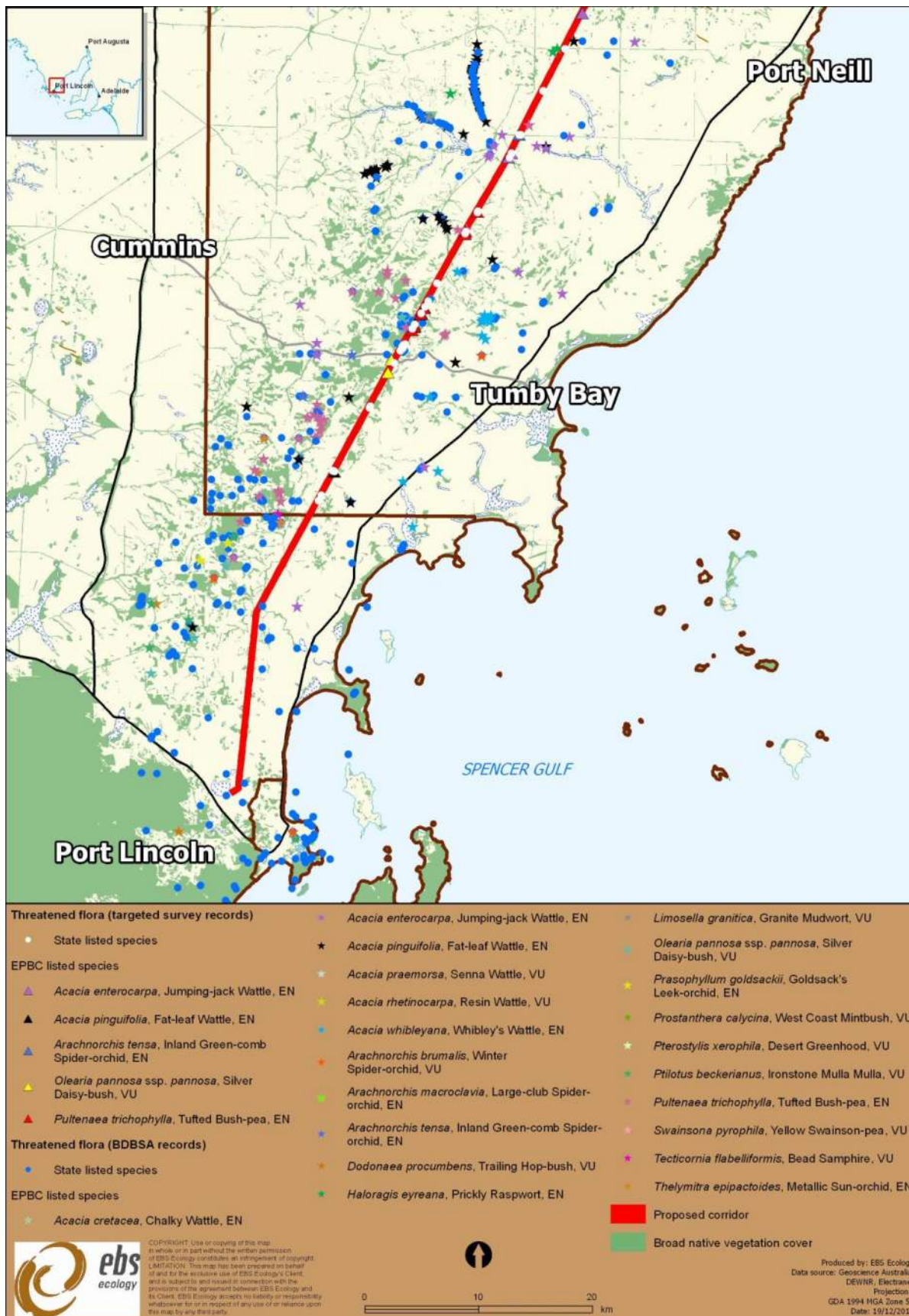


Figure 11. Location of threatened flora species in relation to the southern section of the project area (based on BDBSA records – 10km buffer and spring targeted survey records).

5.1.3 Nationally threatened fauna species

Eight fauna species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 13). Five of these species were highlighted in the BDBSA search and have been mapped with an additional three nationally threatened fauna species not highlighted in the EPBC Protected Matters Search (Figure 12, Figure 13 and Figure 14). One species, Slender-billed Thornbill (*Acanthiza iredalei iredalei*) (western), has since been delisted on 13 December 2013.

Many marine species have been excluded from the report that were identified during database searches. These were captured by the searches due to the transmission line's proximity to the Spencers Gulf, with the buffer extending into a marine environment in some areas. Species excluded were strict coastal and oceanic species, including true oceanic seabirds such as Albatross, Giant Petrel and Shearwaters. Many of the species identified are very rare vagrant visitors to the waters in South Australia and the Eyre Peninsula. These species also rarely cross or utilise land and as such have been excluded from this report. Along with these avian species, migratory whales and other cetaceans, sharks and marine reptiles have also been excluded.

Table 13. Nationally threatened fauna species identified by EPBC Protected Matters Search Tool as possibly occurring within the project area.

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
Birds						
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill	Delisted from EPBC Act	V	18/09/2006	Likely	Distributed across arid and semi-arid southern WA, and western SA. In SA they occur near Port Pirie, Gawler Ranges and upper EP with a stronghold across the Nullarbor. Generally inhabits treeless chenopod shrublands dominated by <i>Maireana</i> spp. (Bluebush) and <i>Atriplex</i> spp. (Saltbush), and saline flats associated with salt lakes, particularly where there is <i>Halosarcia</i> (glasswort). Forages in low shrubs and on the ground seeking insects and other small prey from the foliage of samphire and saltbush shrubs, and from the surrounding ground. Although likely to be present within the project area, this species is unlikely to be greatly affected by the proposed project; given most of the chenopod shrublands (i.e. critical habitat) should be avoided.
<i>Leipoa ocellata</i>	Malleefowl	VU	V	26/03/2008	Likely	The Murray Mallee is the stronghold for the Malleefowl, but it has severely declined throughout its range. It is now found in scattered locations through semi-arid rangelands and dry-land cropping zones in the south east of South Australia, and the Eyre Peninsula. Principally found in mallee eucalypt woodland and scrub as well as dry forest dominated by other eucalypts, Mulga, and other <i>Acacia</i> sp. They feed on seeds and herbage, and build nest mounds in sandy substrates with leaf litter.
<i>Pachycephala rufogularis</i>	Red-lored Whistler	VU	V	9/02/1993	Unlikely	Occurs in the Murray Mallee east of the Mount Lofty Ranges, and more recently a small population on northern EP. Prefer habitat dominated by mallee-heath, and mallee-Broombush. Tend to be sparsely dispersed throughout the mallee and are capable of long distance movements. Spends a lot of time on the ground or in low shrubs foraging for beetles, grubs and other insects, as well as plant material such as berries.
<i>Psophodes nigrogularis leucogaster</i>	Western Whipbird	VU	V	13/10/2004	Unlikely	The Western Whipbird (eastern) occurs in three isolated regional populations in southern South Australia: the first on the southern Eyre Peninsula; the second on the south-western Yorke Peninsula; and the third in the Murray-Mallee region of south-eastern South Australia (perhaps extending across the border to western Victoria). It inhabits

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
						mallee and thicket vegetation in coastal and inland areas of southern South Australia, on sand flats, dunes and limestone country.
<i>Rostratula australis</i>	Australian Painted Snipe	VU	R	None	Unlikely	<p>Compared with the Greater Painted Snipe, this species has a longer wing, shorter bill and shorter tarsus; has a chocolate brown, rather than rufous, head and neck in the female; has round, rather than flat and visually barred, spots on the tail (female) and upper wing-coverts (male); and, apparently lacks a call.</p> <p>Is endemic to Australia, though its distribution is patchy and its presence in any particular area is unpredictable. Although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. Usually found in shallow inland wetlands, either freshwater or brackish, that is either permanently or temporarily filled. Prefer sites with a thick cover of low vegetation, and feed on wetland invertebrates such as worms, molluscs, insects and crustaceans; also seeds and other vegetation. During breeding, prefers temporary but recently flooded wetlands, with low cover for shelter, shallow water and exposed mud for feeding, and small islands on which to nest. Nests in ground scrapes or on mounds in water, lined with grass, leaves and twigs.</p>
<i>Strenua nereis nereis</i>	Fairy Tern (Australian)	VU	E	25/01/2011	Likely	<p>Found on isolated sandy inlets and along the coast from Dampier Archipelago, WA, southward to Tasmania and Victoria, and is only vagrant to the east coast. It is most common in WA and rare in New South Wales, Northern Territory and Queensland. It is also found in New Zealand and New Caledonia.</p> <p>Found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.</p> <p>Movements are poorly known and the species appears partly migratory and partly non-migratory. In South Australia Fairy Terns appear not to move regularly and are numerous at all times in some areas.</p>

Species name	Common name	Conservation status		Most recent record	Likelihood of occurrence within survey area	Description
		Aus	SA			
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	E	23/10/2009	Likely	Small bird that has an overall length of 17–19 cm. Only occurs in SA where it is confined to the extreme south of the EP. The extent of occurrence is estimated at 2545 km ² . The total population is estimated to be less than 1000 birds. Occurs in three types of habitat: shrubland or heathland, mallee and sedgeland. These habitats are characterised by one or two layers of dense vegetation up to 3 m in height.
Mammals						
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	19/10/2010	Likely	<p>The largest of Australia's 19 dunnart species. Despite extensive survey efforts across western SA and WP, has been recorded in only a few locations. On EP, they occur in semi-arid mallee habitats in the central, east and north west regions. Has recently been recorded in Pinkawillinie and Hincks CPs and west of the Middleback Ranges. Further survey work is required to determine the species' distribution on EP.</p> <p>On EP, prefer habitats characterised by parallel sand dunes with associations of open mallee with a diverse shrub layer and Spinifex (<i>Triodia spp</i>). Mallee associations usually include Yorrell (<i>Eucalyptus gracilis</i>), Ridge-fruited Mallee (<i>E. incrassata</i>), Red Mallee (<i>E. oleosa</i>) and Beaked Red Mallee (<i>E. socialis</i>) with Scrub Cypress Pine (<i>Callitris verrucosa</i>).</p> <p>Spinifex is a key habitat component, as Sandhill Dunnarts build a nest within the centre of the plant, which is both protected and insulated by the needles of the tussock. The species' preference for large domed Spinifex highlights the potential role of fire in creating suitable habitat.</p>

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

* Most recent record sourced from BDBSA search (DENR 2012a).

Habitat information sourced and adapted from DSEWPAC (2012c) and various other sources

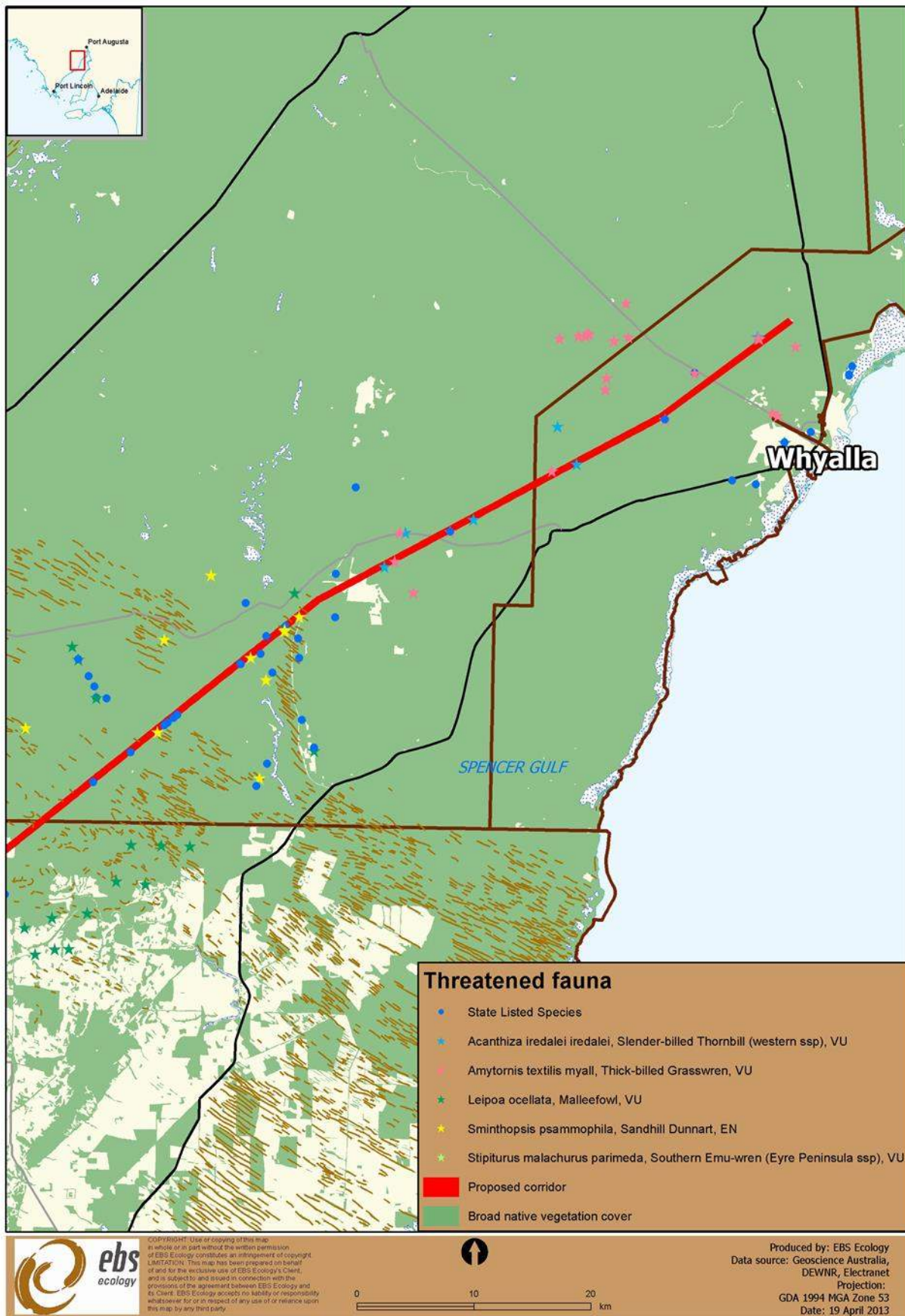


Figure 12. Location of threatened fauna species in relation to the northern section of the project area (based on BDBSA records – 10km buffer).

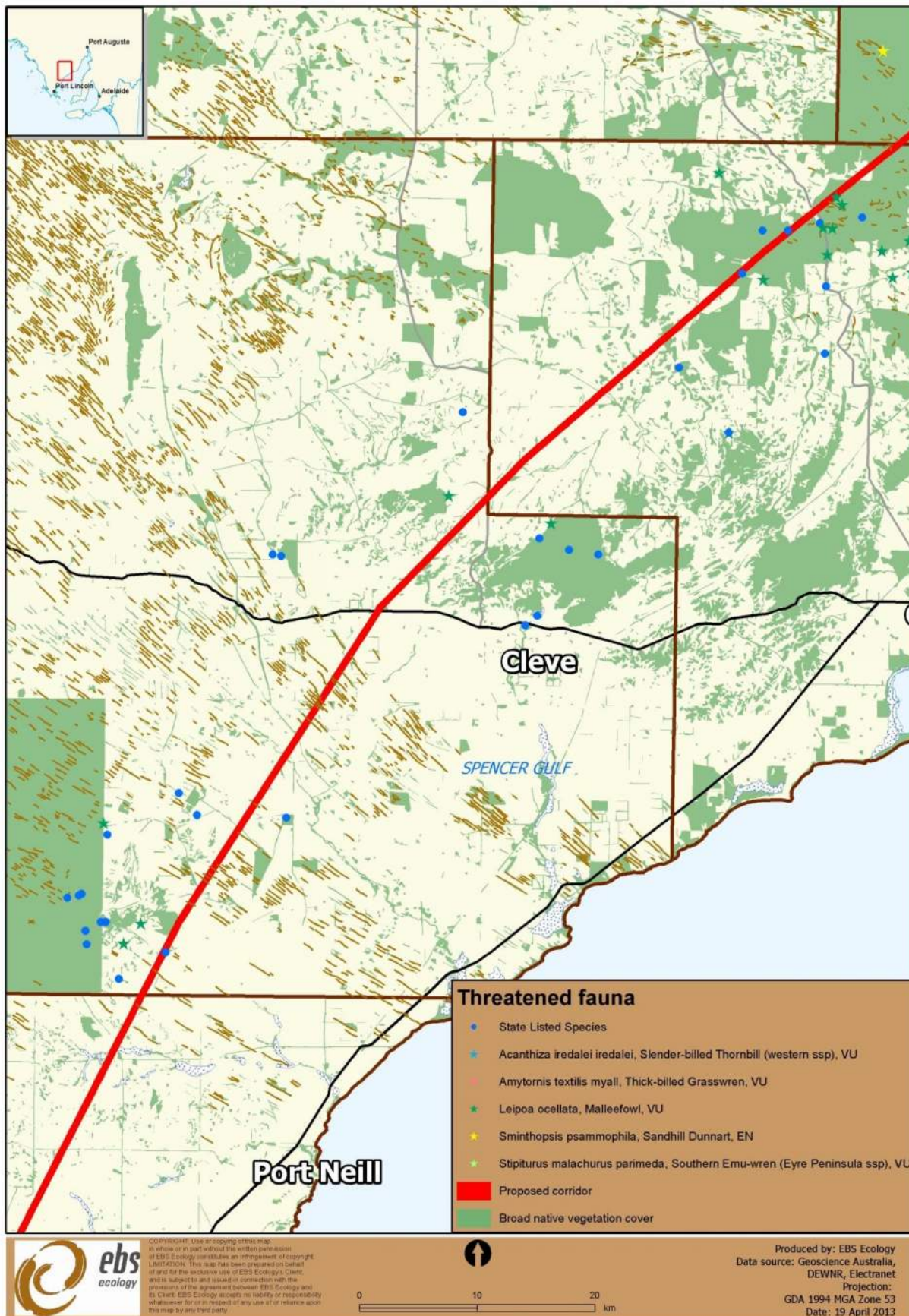


Figure 13. Location of threatened fauna species in relation to the central section of the project area (based on BDBSA records – 10km buffer).

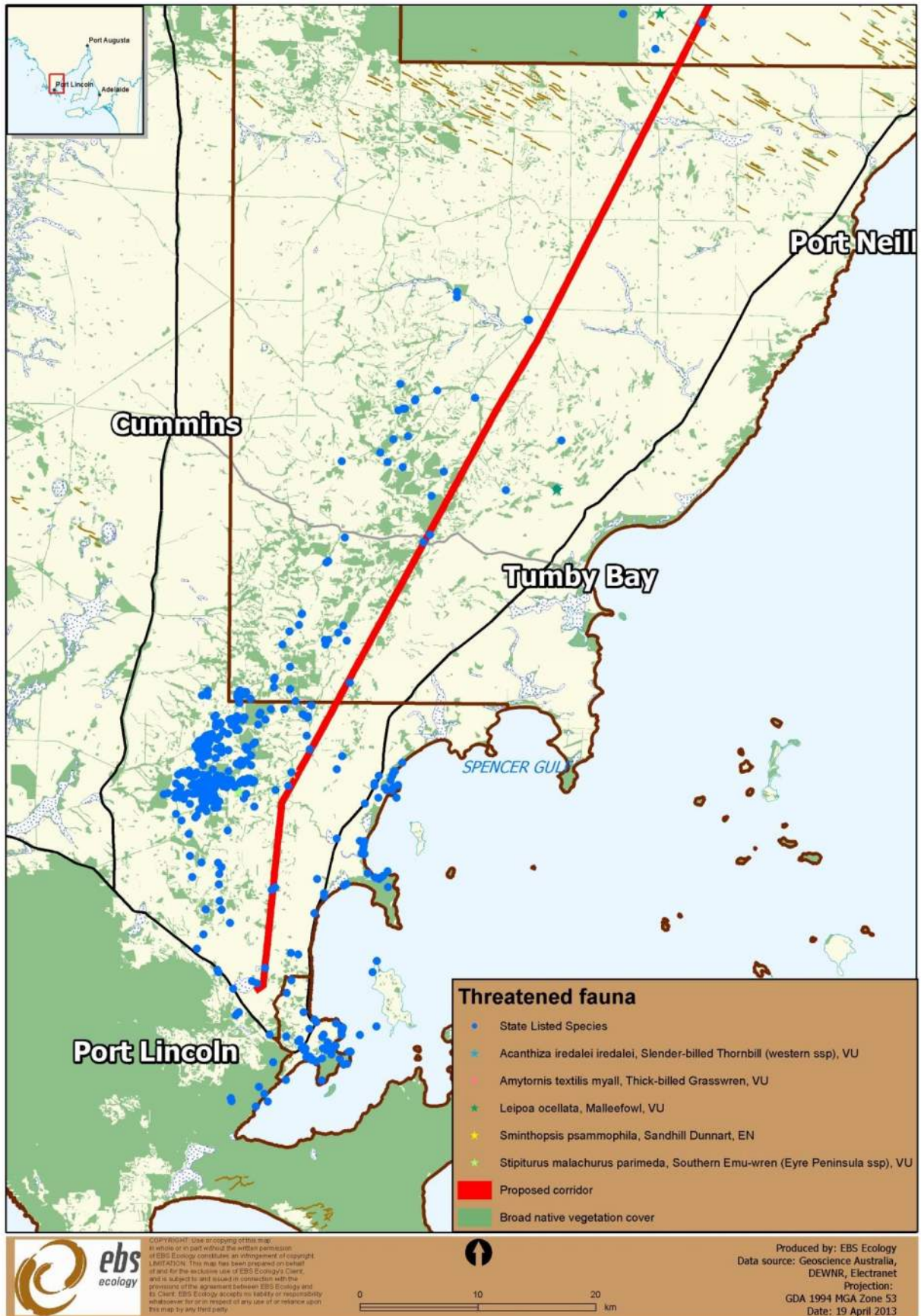


Figure 14. Location of threatened fauna species in relation to the southern section of the project area (based on BDBSA records – 10km buffer).

5.1.4 *Nationally threatened ecological communities*

One threatened ecological community (TEC) was highlighted in the EPBC Protected Matters Search as potentially occurring within the vicinity of the project area:

- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia.

This threatened ecological community extends from the southern Flinders Ranges to Lake Alexandrina. It is mostly found in the Flinders–Lofty Block Bioregion but patches also extend into the Murray–Darling Depression, Kanmantoo, Eyre–Yorke Block and Gawler Bioregions (DEWR 2007). Remaining patches of this ecological community typically occur on gentle to moderate slopes, hilltops and adjacent plains. The soil types range from sandy-loam to clay-loam.

Eucalyptus odorata (Peppermint Box) is the dominant overstorey species within this community. Other tree species that may be present in the overstorey but are not as abundant as *E. odorata* include *E. microcarpa* (Grey Box), *E. leucoxylon* (South Australian Blue Gum), *E. cladocalyx* (Sugar Gum), *E. porosa* (Mallee Box), *Allocasuarina verticillata* (Drooping Sheoak); *Callitris glaucophylla* (White Cypress-pine) and *C. preissii* (Southern Cypress-pine). The ground layer mainly comprises grasses and herbs which can vary from a relatively dense and diverse layer, in more open sites, to a sparse layer under more densely wooded sites.

The key threats to the survival of this ecological community include clearing, grazing and weed invasion. Other threats include road and rail maintenance activities and the effects of fragmentation and edge effects.

Although areas were mapped along the southern portions of the proposed transmission corridor as *Eucalyptus odorata* Woodland, the EPBC listing advice excludes occurrences of Peppermint Box that are a part of mallee *Eucalyptus* woodlands with a shrubby understorey, and grassy woodlands dominated by other eucalypt species, notably *Eucalyptus leucoxylon* (SA Blue Gum), in which Peppermint Box a sub-dominant species. These excluded ecological communities mainly occur in the northern Flinders Ranges, Eyre Peninsula and the south-eastern parts of South Australia (TSSC, 2007).

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland has recently been listed as Endangered at a national level. This vegetation association was not listed at the time of the EPBC Protected Matters Search. See Section 5.3.5 *Threatened Ecological Communities* for description of community.

5.1.5 *Nationally listed migratory species*

Nine nationally listed migratory species were identified in the EPBC Protected Matters Search tool as potentially occurring or having habitat potentially occurring within the vicinity of the project area (Table 14). Many marine species have been excluded from the report that was identified during database searches. These were captured by the searches due to the lines proximity to the Spencers Gulf, with the buffer extending into a marine environment in some areas. Species excluded were strict coastal and oceanic species, including true oceanic seabirds such as Albatross, Giant Petrel and Shearwaters. Many of the species identified are very rare vagrant visitors to the waters in South Australia and the Eyre Peninsula. These species also rarely cross or utilise land and as such have been excluded from this report. Along with these avian species, migratory whales and other cetaceans, sharks and marine reptiles have also been excluded.

Table 14. Migratory species identified by EPBC Protected Matters Search Tool as possibly utilising or flying over the project area.

Species name	Common name	Conservation status		Likelihood of occurrence within survey area
		Aus	SA	
<i>Apus pacificus</i>	Fork-tailed Swift	MiM		Possible
<i>Ardea alba</i>	Great Egret	MiM/MiW		Possible
<i>Ardea ibis</i>	Cattle Egret	MiM/MiW	R	Possible
<i>Calidris ruficollis</i>	Red-necked Stint	MiW		Possible
<i>Charadrius veredus</i>	Oriental Plover	MiW		Unlikely
<i>Gallinago hardwickii</i>	Latham's Snipe	MiW	R	Possible
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	MiT	E	Possible
<i>Leipoa ocellata</i>	Malleefowl	VU/MiT	V	Highly Likely
<i>Merops ornatus</i>	Rainbow Bee-eater	MiT		Highly Likely
<i>Rostratula benghalensis s. lat.</i>	Painted Snipe	VU/MiW		Unlikely

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare. **MiM:** Migratory Marine, **MiW:** Migratory Wetland, **MiT:** Migratory Terrestrial.

5.2 Biological Databases of South Australia (BDBSA)

5.2.1 Flora results

A total of 1606 flora species (1260 native species and 346 exotic species) have previously been recorded within 10 km of the project area, based on the BDBSA search (DENR 2012a). A full list of species is available from EBS Ecology upon request.

5.2.2 State threatened flora species

DEWNR is currently developing an updated regional conservation assessment process based on IBRA subregions which will then be used to provide rated species lists and endemics for the larger biogeographic regions. The West Region has been completed (Gillam and Urban 2009). For the Eyre Hills subregion only 57% of 1060 taxa were considered of least concern with 14% in the vulnerable to endangered categories. Eyre Mallee subregion was 55% and 10% in the vulnerable to endangered categories (Brandle, 2010). The region also contains a high level of endemic flora species (40 species) (DEH, undated).

A total of 119 species are listed as threatened under the NPW Act of which 22 are listed under the EPBC Act, 2003 (Table 12). Following targeted survey, some of these species were detected within the 120m wide assessment corridor and the final column in Table 15 indicates whether the species was recorded during the surveys.

The distribution of threatened species records within 10km of the proposed transmission line corridor is displayed in Figure 9, Figure 10 and Figure 11. Due to the large number of species recorded, no delineation between species is shown. Records have been displayed for a more broad scale representation of key constraint areas or hot spots; for example, where clusters of threatened flora species are present.

Table 15. Threatened flora species identified by the BDBSA search.

Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
LEGUMINOSAE	<i>Acacia alcockii</i>	Alcock's Wattle		R	2005	Unlikely	Found in <i>Eucalyptus gracilis</i> (Yorrell), <i>Melaleuca lanceolata</i> (Dryland Teatree) and <i>M. uncinata</i> (Broombush) scrub defined mainly by sand over limestone. Known populations too far south of project area.	N
LEGUMINOSAE	<i>Acacia cretacea</i>	Chalky Wattle	EN	E	1980	Highly Likely	EP endemic species. Grows in low shrubland and mallee scrub dominated by <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Melaleuca uncinata</i> (Broombush), <i>Triodia irritans</i> (Spinifex), <i>Phebalium bullatum</i> (Silvery Phebalium), on deep red sand in gently undulating country, with low sand ridges.	N
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R	2008	Highly Likely	Usually grows on undulating hills on clay loams or sandy clay loams, in eucalypt woodland and open forest (not in Mallee communities according to P. Lang, pers. comm.). It is tolerant of calcareous soils.	Y
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	2004	Highly Likely	The species occurs as a disjunct population on EP, with other populations occurring on YP, SE and in western Victoria. Recorded from <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. socialis</i> (Beaked Red Mallee) mallee woodland; <i>Eucalyptus calycogona</i> (Square-fruit Mallee), +/- <i>E. phenax</i> ssp. <i>phenax</i> (White Mallee) mallee woodland; <i>Eucalyptus gracilis</i> (Yorrell) +/- <i>E. dumosa</i> (White Mallee) +/- <i>E. brachycalyx</i> (Gilja), +/- <i>E. oleosa</i> (Red Mallee) mallee.	Y
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R	2007	Highly Likely	EP endemic species. Restricted to area between Cowell and Kimba. Grows in gravelly loam and sandy soils dominated by <i>E. dumosa</i> (White Mallee) / <i>Eucalyptus gracilis</i> (Yorrell), <i>M. uncinata</i> (Broombush) over a sclerophyllous shrub understorey.	Y
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R	2007	Highly Likely	EP endemic species. Restricted to areas between Ungarra, Cummins and Wanilla extending southeast into the Koppio Hills. Grows usually in sand in open forest, woodland or open scrub.	Y
LEGUMINOSAE	<i>Acacia lineata</i>	Streaked Wattle		R	1984	Possible	Population located from Qld, through NSW, Vic and through the Upper SE, Murray Mallee, Yorke Peninsula with few records on EP representing the far western extent of its range. Preferred habitat is mainly in eucalypt	N

Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							woodlands, mallee or scrubland on low nutrient and high drainage sandy red earths and gravelly loams.	
LEGUMINOSAE	<i>Acacia montana</i>	Mallee Wattle		R	2010	Likely	North-east EP, as well as Mid-north and Fleurieu Peninsula and the eastern States. Grows in a variety of soils, often in <i>Eucalyptus gracilis</i> (Yorrell) and <i>E. socialis</i> (Beaked Red Mallee) open forests or tall shrublands.	N
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E	2004	Highly Likely	Known from disjunct sub-populations on EP, where it grows in undulating terrain with a westerly aspect in association with a range of Mallee species including <i>Eucalyptus odorata</i> (Peppermint Box) and <i>E. incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (White Mallee), <i>E. foecunda</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. cooperiana</i> (Coopers Mallee), <i>E. flocktoniae</i> (Merrit) and <i>E. pileata</i> (Capped Mallee) and occurs in <i>Melaleuca uncinata</i> (Broombush) shrubland. Sub-populations are known to occur near Cockaleechee, Ungarra and Butler, with many located on roadsides and rail reserves.	Y
LEGUMINOSAE	<i>Acacia praemorsa</i>	Senna Wattle	VU	E	1992	Likely	Endemic to EP where it occurs in localised populations in the ranges north-east of Cleve. Occurs in mallee woodlands, open scrubs and open heath scrubs dominated by <i>Melaleuca uncinata</i> (Broombush), <i>Acacia calamifolia</i> (Wallowa), <i>Eucalyptus odorata</i> (Peppermint Box) and other mallee species. Has been found on the lower slopes of small gullies in low, rocky ranges, on exposed north-facing slopes in thick, low scrub and in shady, sheltered sites in open mallee woodlands at the base of steep gullies.	N
LEGUMINOSAE	<i>Acacia rheticarpa</i>	Resin Wattle	VU	V	2006	Highly Likely	Grows in disjunct sub-populations on EP (also YP southern MLR) on dune crests and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Normally associated with low mallee of <i>Eucalyptus dumosa</i> (White Mallee), <i>E. foecunda</i> (Hooked Mallee), <i>E. calycogona</i> (Square-fruited Mallee), <i>E. incrassata</i> (Ridge-fruited Mallee) and <i>E. brachycalyx</i> (Gilja) mallee associations. Occurs from Kimba to just north of Arno Bay, Cleve and Lock. Sub-populations are known to survive within roadside and rail reserve vegetation.	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R	2002	Highly Likely	Small occurrences on EP (and Murray region) in open scrub associated with <i>Eucalyptus gracilis</i> (Yorrell) and <i>E. socialis</i> (Beaked Red Mallee) open scrub.	Y
LEGUMINOSAE	<i>Acacia whibleyana</i>	Whibley's Wattle	EN	E	2004	Highly Likely	Endemic to EP where it is restricted to near-coastal areas near Tumby Bay. Grows on limestone and loam, sometimes near salt swamps.	N
GRAMINEAE	<i>Amphibromus archeri</i>	Pointed Swamp Wallaby-grass		R	1989	Unlikely	Known from one record north of Cleve and east of Mt Desperate. Grows in temporarily or permanently wet sites in open woodland communities.	N
GRAMINEAE	<i>Amphibromus macrorhinus</i>	Long-nosed Swamp Wallaby-grass		R	1990	Unlikely	Grows in temporarily or permanently wet sites in open woodland communities. Two records from North of Sheoak CP (1990) and east of Hincks WA (1969).	N
ADIANTACEAE	<i>Anogramma leptophylla</i>	Annual Fern		R	1990	Possible	East of Wharminda CP near alignment and around Dark Peake. Found in rocky habitats.	N
ORCHIDACEAE	<i>Arachnorchis bicalliata</i> ssp. <i>bicalliata</i>	Western Daddy-long-legs		R	2008	Possible	Generally coastal although recorded from over 100 km inland on Eyre Peninsula in scrub and mallee woodlands on well-drained sand or loam; in inland areas of SA grows.	N
ORCHIDACEAE	<i>Arachnorchis brumalis</i>	Winter Spider-orchid	VU	V	1985	Possible	Endemic to SA. Found in association with Mallee-Broombush associations, <i>Allocasuarina verticillata</i> (Drooping Sheoak) woodland, <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mallee woodland and <i>Eucalyptus cladocalyx</i> (Sugar Gum) woodlands.	N
ORCHIDACEAE	<i>Arachnorchis conferta</i>	Coast Spider-orchid	EN	E	1968	Unlikely	Endemic to SA. Currently known from two distinct localities in the upper south-east of SA and on YP. There is one record from 1968 from Hincks WA, but this sub-population is now considered extinct. Another collection, from Carrapee Hill, may not be <i>Caladenia conferta</i> and is possibly a subspecies of <i>C. toxochila</i> .	N
ORCHIDACEAE	<i>Arachnorchis dilatata</i>	Late Spider-orchid		E	2001	Unlikely	Most record from Bascombe Well CP.	N
ORCHIDACEAE	<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	2008	Possible	Endemic to SA and rare on EP now. Also occurs on YP and in Victoria. Records from Pt Lincoln and Pt Lincoln NP. Favours fertile shallow loams in mallee-broombush associations, usually where other orchids are numerous.	N
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN		2003	Possible	Widespread in SA from the west coast, throughout EP and adjacent pastoral zone, the FR, rare in the MLR, more common in the Murray and upper South-east. In dry	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							woodland, mallee-heath, low scrub and about rock outcrops in a variety of soil types.	
ASPLENIACEAE	<i>Asplenium trichomanes</i>	Common Spleenwort		R	1970	Unlikely	A widespread species found in a variety of rocky habitats. All records located south of project area.	N
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R	1954	Possible	Widespread mainly in sandy soils dominated by grassland or associated with <i>Callitris</i> or <i>Allocasuarina</i> low woodlands. Also on coastal limestone.	Y
PITTOSPORACEAE	<i>Billardiera</i> sp. Yorke Peninsula (P.C.Heyligers 80164)	Lehmann's Apple-berry		E	1995	Unlikely	One record in coastal scrub near Point Boston.	N
RUTACEAE	<i>Boronia pilosa</i> ssp. <i>torquata</i>	Hairy Boronia		R	1927	Unlikely	One historic record from Pt Lincoln.	N
LEGUMINOSAE	<i>Bossiaea ensata</i>	Sword Bossiaea		V	2008	Possible	Mainly along coast of eastern states with disjunct population on Lower EP north of Cummins. Found on sandy plain with <i>Callitris gracilis</i> (Southern-cypress Pine), <i>Eucalyptus diversifolia</i> (Coastal White Mallee) Low Woodland and growing along roadside with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee and <i>Melaleuca uncinata</i> (Broombush). Also found growing on sandy rises around edge of <i>Melaleuca brevifolia</i> (Mallee Honey-myrtle) and <i>Gahnia</i> (Sword Sedge) brackish (saline) swamp.	N
GRAMINEAE	<i>Bothriochloa macra</i>	Red-leg Grass		R	1997	Possible	Scattered recent records within southern EP. Mainly found in open grassy woodland communities and is often found in disturbed sites.	N
ORCHIDACEAE	<i>Calochilus campestris</i>	Plains Beard-orchid		R	2003	Possible	Several records from Hincks WA. Prefers white sandhills with broombush cover, flowering mostly after fires but never common.	N
ORCHIDACEAE	<i>Calochilus pruinosus</i>	Plains Beard-orchid		R	2003	Possible	Several more recent records within and close to Hincks WA. Prior to settlement the species was widespread across the WA wheat belt and adjacent pastoral country wherever there were white sandhills with broombush cover, flowering mostly after fires but never common. Now more common in SA than WA.	N
CENTROLEPIDACEAE	<i>Centrolepis cephaloformis</i> ssp. <i>cephaloformis</i>	Cushion Centrolepis		R	1968	Possible	Records are widespread from Dark Peak to Louth Bay, however most are historic with more recent records collected from Dark Peak. Species also occurs in southern WA and Victoria. Found in variety of habitats ranging from	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							Swampy area dominated by <i>Acacia sclerophylla</i> var. <i>sclerophylla</i> Tall Shrubland, low hills with <i>Allocasuarina verticillata</i> , <i>Eucalyptus odorata</i> Low Open Woodland and Limestone plains dominated by <i>Eucalyptus diversifolia</i> Mallee.	
CENTROLEPIDACEAE	<i>Centrolepis glabra</i>	Smooth Centrolepis		R	1990	Possible	Three records from within the 1990's, near Wanilla Forest, Edillilie and toward Wangary. Also occurs in, NL, MU, YP, SL, KI and SE regions. The species requires muddy conditions within ephemerally damp and swampy habitats around temporary freshwater pools and stream margins.	N
COMPOSITAE	<i>Ceratogyne obionoides</i>	Wingwort		R	1998	Possible	Numerous records throughout the Cleve Hills from Coolanie to Dark Peak. Populations also in WA, VIC and NSW. Occur in hilly area amongst granite outcropping dominated by <i>Melaleuca uncinata</i> Tall Open Shrubland and also found in <i>Sandy flats</i> supporting <i>Callitris</i> Woodland.	N
SANTALACEAE	<i>Choretrum glomeratum</i> var. <i>chrysanthum</i>	Yellow-flower Sour-bush		R	1993	Likely	Records widespread Cluster around Hincks WA. Preferred habitat <i>Eucalyptus odorata</i> Woodlands on stony ground and other mallee associations.	N
STERCULIACEAE	<i>Commersonia multiloba</i>	<i>Trailing Commersonia</i>		E	2007	Possible	Endemic to EP. Several records from north and south of Cowell. Found on rocky ridge slopes associated with <i>Melaleuca uncinata</i> (Broombush) and in fire regrowth areas with regenerating <i>Acacia</i> sp. (Wattle) and <i>Dodonaea</i> sp. (Hopbush), also hill slopes and crests with red clayey sand and laterite at base of sheet granite with <i>Melaleuca uncinata</i> (Broombush).	N
CRASSULACEAE	<i>Crassula exserta</i>	Large-fruit Crassula		R	1998	Likely	Widespread across Eyre Peninsula throughout variety of habitats including swales in dunefield system supporting <i>Eucalyptus socialis</i> / <i>E. dumosa</i> , <i>E. incrassata</i> Low Mallee, Swamps in alluvial plain systems supporting <i>Acacia sclerophylla</i> var. <i>sclerophylla</i> (hard-leaved wattle) Tall Shrubland and hill crests supporting <i>Melaleuca uncinata</i> (Broombush) Tall Open Shrubland. Also common in granite outcropping and dense granite boulders. Also occurs in Kangaroo Island, South-east, Fleurieu Peninsula, WA and Vic.	N
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R	2006	Highly Likely	Numerous recent records from Hincks WA to The Plug Range CR. Also occurs across Victoria and much of southern SA. Habitat preferences include Mallee	Y

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							associations with <i>Eucalyptus phenax</i> ssp. <i>phenax</i> (White Mallee) Low Mallee over <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), Low Mallee and <i>Eucalyptus oleosa</i> (Red Mallee) / <i>Eucalyptus brachycalyx</i> (Gilja) Mallee.	
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	2007	Highly Likely	Numerous recent records widespread from Pt Lincoln to Heggaton CR. Also occurs across south-eastern Australia near Horsham and on the Fleurieu Peninsula. Habitat includes a variety of Eucalypt communities such as <i>Eucalyptus dumosa</i> (White Mallee), <i>Eucalyptus calycogona</i> (Square-fruited Mallee), low woodland, <i>Eucalyptus dumosa</i> (White Mallee), <i>E. calycogona</i> (Square-fruited Mallee), low woodland over <i>Melaleuca uncinata</i> (Broombush) shrubland, <i>Melaleuca uncinata</i> / <i>Ozothamnus retusus</i> (Notched-bush Everlasting) Shrubland and <i>E. incrassata</i> (Ridge-fruited Mallee), <i>E. calycogona</i> , <i>Melaleuca lanceolata</i> (Dryland Teatree) low woodland.	Y
RESTIONACEAE	<i>Desmocladus diacolpicus</i>	Bundled Cord-rush		V	2001	Possible	Disjunct populations near Albany in Western Australia, EP and KI. EP populations from Wanilla, Edillilie, north of Cummins to Hincks WA. Preferred habitat includes deep sandy soils supporting <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) and <i>E. leptophylla</i> (Narrow-leaf Mallee) open scrub, dunes with <i>Callitris verrucosa</i> (Scrubby Pine) and <i>Melaleuca uncinata</i> (Broombush) tall closed shrublands.	N
SAPINDACEAE	<i>Dodonea procumbens</i>	Trailing Hop-bush	VU	V	1986	Unlikely	Two records on EP from 1986 just west of Pt Lincoln. The species is widely but patchily distributed across south-eastern Australia, where it also occurs in NSW and Victoria. SA populations have been recorded in open <i>Eucalyptus camaldulensis</i> var. <i>camaldulensis</i> (Red Gum), <i>Eucalyptus fasciculosa</i> (Pink Gum) and <i>Eucalyptus leucoxylon</i> (Blue gum) woodlands in low-lying areas.	N
DROSERACEAE	<i>Drosera striaticaulis</i>	Erect Sundew		V	2006	Possible	Records mainly confined to around the southern portion of the project area, with one recent outlying record from Dark Range CP. Also occurs in WA. Occurs within <i>Eucalyptus cretata</i> (Darke Peak Mallee), <i>Eucalyptus odorata</i> (Peppermint Box) Mallee, Granite rock run-off area, In damp clay/sand in water retentive soils, drainage lines in <i>Eucalyptus camaldulensis</i> (River Red Gum) woodlands.	N

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			Aus	SA				
BORAGINACEAE	<i>Embadium johnstonii</i>	Johnston's Slipper-plant		R	1958	Unlikely	Single record from 1958 near Ironstone Hill CP.	N
MYOPORACEAE	<i>Eremophila barbata</i>	Blue Range Emubush		R	2006	Possible	EP endemic species. Populations located around Ungarra and north and east of Hincks WA. Found with <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>Eucalyptus socialis</i> (Beaked Red Mallee) tall shrubland over <i>Melaleuca uncinata</i> (Broombush) shrubland, Growing on rocky slopes and alongside creeklines.	N
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R	2002	Possible	Populations from SA and Vic. SA populations occur in SE, Fleurieu Peninsula and two disjunct populations on EP, in the Koppio and Cleve Hills. Normally associated with mallee associations on stony hills.	Y
MYRTACEAE	<i>Eucalyptus behriana</i>	Broad-leaf Box		R	1923	Possible	Known from three disjunct populations in SA, near Cummins on lower EP, associated with <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>E. peninsularis</i> (Cummins Mallee) and <i>E. odorata</i> (Peppermint Box). Other populations in Vic and NSW.	N
MYRTACEAE	<i>Eucalyptus calycogona</i> ssp. <i>spaffordii</i>	Spafford's Square-fruit Mallee		R	1956	Possible	Restricted to lower central EP from around Yeelanna and south of Cummins. Also occurs in southern WA and scattered along the River Murray. Prefers loamy soils in mallee associations, with species such as <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee), <i>E. peninsularis</i> (Cummins Mallee), <i>E. leptophylla</i> (Narrow-leaf Mallee) and <i>E. diversifolia</i> (Coastal White-mallee).	N
MYRTACEAE	<i>Eucalyptus conglobata</i> ssp. <i>conglobata</i>	Port Lincoln Mallee		R	2008	Unlikely	Occurs in dense mallee scrub on the southern tip of EP and on adjacent Taylor and Boston Islands. Also occurs on the southern coast of WA, KI and the scattered occurrences on the southern Fleurieu Peninsula.	N
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R	1988	Highly Likely	EP endemic species. Numerous records across upper EP from Caralue Bluff to Lock and Cowell in the south, but particularly common in Darke Peak and Carapee Hill. Mainly associated with <i>Eucalyptus calycogona</i> (Square-fruited Mallee), <i>E. porosa</i> and also with <i>Eucalyptus brachycalyx</i> (Gilja) Low Mallee over <i>Melaleuca uncinata</i> (Broombush), <i>Melaleuca lanceolata</i> (Dryland Teatree)	Y
MYRTACEAE	<i>Eucalyptus gillenii</i>	Mount Lindsay Mallee		R	1953	Unlikely	Historical records only from near Pt Lincoln.	N

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			Aus	SA				
MYRTACEAE	<i>Eucalyptus viridis</i> ssp. <i>viridis</i>	Green Mallee		R	1996	Possible	Small disjunct populations also in Mid North, Flinders Ranges, western Victoria, NSW and Qld. EP sub-population located in the southern Middleback Ranges near Iron Duchess, on rocky hill slopes and ridges with <i>Eucalyptus oleosa</i> (Red Mallee) and <i>E. gracilis</i> (Yorrell).	N
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R	2002	Highly Likely	Located north of Cowell and Cleve and additional subpopulations north of Kimba and also in VIC. Associated with Associated with <i>Eucalyptus calycogona</i> (Square-fruited Mallee) / <i>Eucalyptus oleosa</i> (Red Mallee) open scrub. Also found on limestone outcropping and growing near <i>Melaleuca uncinata</i> (Broombush) shrubland and in <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) / <i>Melaleuca uncinata</i> (Broombush) shrubland - <i>Leptospermum coriaceum</i> (Dune Teatree) Mallee.	Y
PROTEACEAE	<i>Grevillea halmaturina</i> ssp. <i>halmaturina</i>	Prickly Grevillea		R	1883	Unlikely	Most records from Kangaroo Island. One historic record from Pt Lincoln.	N
PROTEACEAE	<i>Grevillea halmaturina</i> ssp. <i>laevis</i>	Prickly Grevillea		R	1909	Unlikely	Mainly confined to Lower Eyre Peninsula. Mostly historic records with more recent ones along the Tod Highway between Edillilie and Wanilla.	N
COMPOSITAE	<i>Haeckeria cassiniiformis</i>	Dogwood Haeckeria		R	2008	Possible	Populations scattered across EP. Small sub-populations near Gladstone and north of Dutchman's Stern CP. Associated with sandy mallee associations.	N
HALORAGACEAE	<i>Haloragis eyreana</i>	Prickly Raspwort	EN	E	1970	Possible	Endemic to EP. Nearly entirely restricted to roadsides and rail reserves. Mainly found in disturbed open grassland areas and only occasionally found growing in more intact habitat, where it is associated with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>E. dumosa</i> (Dumosa Mallee) or <i>Melaleuca decussata</i> (Totem-poles).	N
CAMPANULACEAE	<i>Isotoma scapigera</i>	Salt Isotome		R	1883	Unlikely	Historical records mainly associated with coastal areas along the west coast of EP, south-west WA and YP.	N
JUNCACEAE	<i>Juncus radula</i>	Hoary Rush		V	1960	Unlikely	Historical record from along the Tod River	N
MALVACEAE	<i>Lawrencina berthae</i>	Showy Lawrencina		R	2000	Possible	Populations from southern WA, NT, Yorke Peninsula, Eyre Peninsula and the Murray Mallee. EP sub-population located across Upper EP from Minnipa along both sides of the Eyre Highway to north of Pt Augusta. Preferred habitat confined to limestone-rich and clay-loam soils, and disturbances such as fire or mechanical clearances.	N

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			Aus	SA				
CYPERACEAE	<i>Lepidosperma gahnioides</i>			R	1998	Possible	Small sub-population growing in Verran Tanks CP. Other population in WA. Known from red clay loam with ironstone gravel growing near <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee) and <i>Lepidosperma viscidum</i> (Sticky Sword-sedge)	N
COMPOSITAE	<i>Leptorhynchus elongatus</i>	Lanky Buttons		R	1989	Possible	Single record from EP very close to project area (1989) west of Mangalo. Found in Steep rich soil slope not grazed along the roadside associated with mallee-broombush associations.	N
EPACRIDACEAE	<i>Leucopogon clelandii</i>	Cleland's Beard-heath		R	2007	Likely	Populations found in the southern parts of SA and western Victoria. EP sub-populations located near Wanilla and south of and in Hincks WA. Found growing in sandy soil associated with mallee communities.	N
STYLIDIACEAE	<i>Levenhookia stipitata</i>			R	2007	Likely	Main population in southern WA. The only other sub-population located on EP from east of Hincks WA to north-east of Darke Peak and Wanilla in the south. Prefers sandy loam soils with <i>Melaleuca uncinata</i> (Broombush) Tall Shrubland and rocky mallee hillsides associated Broombush.	N
SCROPHULARIACEAE	<i>Limosella granitica</i>	Granite Mudwort	VU	V	2006	Unlikely	Endemic to EP, the species is confined to seasonally wet rock-pools (gnamma holes) on top of granite inselbergs and outcrops, across northern Eyre Peninsula, however one record from 2006 located in the Moody Tanks CP.	N
CAMPANULACEAE	<i>Lobelia heterophylla</i>	Wing-seeded Lobelia		R	1998	Highly Likely	One recent record from within the project area west of Ironstone Hill CP. Widespread species across NT and WA. SA population confined to northern parts of the State and EP. Habitat includes drainage depressions defined by light clay soils with <i>Eucalyptus oleosa</i> (Red Mallee), <i>Eucalyptus calycogona</i> var. <i>calycogona</i> (Square-fruited mallee) Open Mallee, <i>Melaleuca uncinata</i> (Broombush) Tall Open Shrubland, <i>Melaleuca</i> sp., <i>Acacia</i> and <i>Geijera</i> Shrublands.	N
CHENOPODIACEAE	<i>Maireana rohrlachii</i>	Rohrlach's Bluebush		R	1998	Possible	Species occurs from few locations on EP, but mainly YP, Mid North, Fleurieu Peninsula, Murraylands and western Victoria. Preferred habitat includes Heavy clay and calcareous loams with <i>Geijera linearifolia</i> (Sheep Bush) Very Open Shrubland, <i>Eremophila scoparia</i> (Silvery Emubush) low open shrubland.	N

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			Aus	SA				
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R	2010	Highly Likely	Subpopulation located between Cowell – Kimba and Whyalla. Also throughout WA and the Murray Mallee and the Far West. Associated with Mallee with low shrubs, <i>Senna</i> , <i>Olearia</i> and <i>Lomandra effusa</i> on coarse red sands. Also mallee-chenopod low open woodland and in seasonally damp alluvial heavy clay over calcrete with <i>Eucalyptus gracilis</i> , <i>Disphyma crassifolium</i> and <i>Zygophyllum eremaeum</i> .	Y
MYRTACEAE	<i>Melaleuca armillaris</i> ssp. <i>akineta</i>	Needle-leaf Honey-myrtle		R	1991	Unlikely	Main population located north east of Cleve across upper EP, with two records from Fleurieu Peninsula.	
MYRTACEAE	<i>Melaleuca oxyphylla</i>	Pointed-leaf Honey-myrtle		R	1989	Possible	EP endemic species. Numerous records across upper EP from Sheoak Hill CP to Gawler Ranges NP. Mainly associated with rocky skeletal loams with <i>Melaleuca uncinata</i> (Broombush) Shrubland, <i>Eucalyptus brachycalyx</i> (Gilja), <i>Eucalyptus phenax</i> ssp. <i>phenax</i> (White Mallee) <i>Eucalyptus calycogona</i> (Square-fruited mallee) Open Mallee over <i>Melaleuca uncinata</i> (Broombush).	N
LABIATAE	<i>Mentha satuireioides</i>	Native Pennyroyal		R	1936	Unlikely	Historic records from north of Wangary and in Pt Lincoln.	N
CRUCIFERAE	<i>Microlepidium pilosulum</i>	Hairy Shepherd's-purse		R	1996	Unlikely	Scattered records slightly inland along the west coast on EP. Also along Nullarbor Plain, KI, Murraylands. Found in mainly sandy and loamy soils on plains and consolidated dune field systems. <i>Eucalyptus yalataensis</i> (Yalata Mallee), <i>Callitris verrucosa</i> (Scrubby Pine), <i>Eucalyptus phenax</i> ssp. <i>phenax</i> (White Mallee) Low Mallee.	N
ORCHIDACEAE	<i>Microtis atrata</i>	Yellow Onion-orchid		R	1990	Possible	Two records on EP west of White Flat. Other populations scattered across southern Australia (WA, SA and Vic). Prefers boggy areas and swamps.	N
ORCHIDACEAE	<i>Microtis orbicularis</i>	Swamp Onion-orchid		V	1990	Unlikely	Occurs in areas which are inundated for up to six months of the year, such as waterholes, lake margins and shallow lagoons where very large populations may form. Known only from 5 locations in this State. Also occurs in WA and VIC.	N
MYOPORACEAE	<i>Myoporum parvifolium</i>	Creeping Boobialla		R	1995	Possible	Subpopulations scattered throughout the EP and also throughout southern SA and Vic. Occurs in sandy coastal areas, Red Gum woodlands, <i>Melaleuca halmaturorum</i>	N

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			Aus	SA				
							(Swamp Teatree) Very Low Open Forests and dune swales.	
HALORAGACEAE	<i>Myriophyllum integrifolium</i>	Tiny Milfoil		R	1969	Unlikely	Associated with damp clay flats and wet swampy areas near Edillilie Springs and west of Wanilla.	N
OLACACEAE	<i>Olax obcordata</i>			R	1986	Possible	Several scattered records pre 1986 north of Cleve and around Pt. Lincoln. Has been found in roadside vegetation regenerating after fire. Growing with <i>Acacia rigens</i> (Nealie), <i>Grevillea ilicifolia</i> (Holly-leaf Grevillea), <i>Scaevola</i> sp. (Fan-flower), <i>Melaleuca decussata</i> (Totem Poles), <i>Acacia rupicola</i> (Rock Wattle) in sandy loam.	
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R	2002	Highly Likely	Few individuals recorded along the project areas. Sub-population located from between Cowell and Kimba. Other examples in WA. Found in sandy soil. Associated with <i>Melaleuca acuminata</i> (Mallee Honey-myrtle), <i>Eucalyptus socialis</i> (Beaked Red Mallee) - <i>E. dumosa</i> (White Mallee) open scrub.	Y
COMPOSITAE	<i>Olearia pannosa ssp. cardiophylla</i>	Velvet Daisy-bush		R	1999	Possible	Several recent records from south of Yalunda Flat, Cummins, south of White Flat and a cluster of records from the 1980s around Cowell. Occurs across YP, Mid North, Fleurieu Peninsula, the SE and Victoria. <i>Eucalyptus cladocalyx</i> (Sugar Gum) open forest with rocky outcropping.	N
COMPOSITAE	<i>Olearia pannosa ssp. pannosa</i>	Silver Daisy-bush	VU	V	2005	Highly Likely	A widespread but rare species occurring also on the Fleurieu Peninsula, SE, YP, MN and KI. Two main sub-populations on EP occurring in the Cleve Hills to Coolanie Range area, north-west of Cowell, and in the Koppio Hills and Greenpatch area, Lower Eyre Peninsula. Southern population associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Allocasuarina verticillata</i> (Drooping Sheoak), <i>Melaleuca uncinata</i> (Broombush), and less often with <i>Callitris</i> sp. (Native Pine). Northern population associated with <i>Allocasuarina verticillata</i> (Drooping Sheoak), low woodland <i>Eucalyptus odorata</i> (Peppermint Box), +/- <i>E. phenax</i> ssp. <i>phenax</i> (White Mallee) mid mallee woodland, <i>Eucalyptus porosa</i> (Mallee Box) mid open mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid mallee woodland, <i>Eucalyptus incrassata</i> (Ridge-fruited	Y

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			Aus	SA				
							Mallee), <i>E. socialis</i> (Beaked Red Mallee) mid mallee woodland.	
COMPOSITAE	<i>Olearia picridifolia</i>	Rasp Daisy-bush		R	2003	Unlikely	Historic records mainly except for 2003 record in Hincks WA. Mainly associated with limestone.	N
OROBANCHACEAE	<i>Orobanche cernua</i> var. <i>australiana</i>	Australian Broomrape		R	1995	Unlikely	Widespread across SA, EP records from Port Kenny and Pt Lincoln NP.	N
ORCHIDACEAE	<i>Petalochilus pusillus</i>	Pigmy Caladenia		R	2007	Possible	Mostly in hard clay soils in open patches of woodland and scrub. More frequently seen when bushfires open up the vegetation. Also found in heath and open forest, in sandy soils in the eastern States.	N
RUTACEAE	<i>Philotheca angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R	2007	Highly Likely	Associated with the Cleve Hills and the Koppio Hills Woodland environments.	Y
EUPHORBIACEAE	<i>Phyllanthus calycinus</i>	Snowdrop Spurge		R	1995	Unlikely	Mainly associated with coastal environs from Pt Lincoln almost to Streaky Bay. One record north of Pt Neill.	N
LYCOPODIACEAE	<i>Phylloglossum drummondii</i>	Pigmy Clubmoss		R	2007	Unlikely	One record from Wanilla CP.	N
MARSILEACEAE	<i>Pilularia novae-hollandiae</i>	Austral Pillwort		R	1996	Unlikely	Widespread across southern Western Australia to Victoria with scattered populations across SA. One record from EP located on boggy clay flats north-east of Glen-Forest Tourist Park.	N
THYMELAEACEAE	<i>Pimelea williamsonii</i>	Williamson's Riceflower		R	1998	Possible	Scattered records from Hincks WA and Hambridge WA and Heggaton CR and within Murraylands across the border into Victoria. Prefers recently burnt areas associated with sandy Eucalyptus woodlands and heathlands.	N
GRAMINEAE	<i>Poa drummondiana</i>	Knotted Poa		R	1989	Unlikely	Widespread across southern Australia from Western Australia to Victoria. Scattered records across EP, from north of Lock and north of Cleve to south of Arno Bay and several historic records around Hincks WA, and south from Coffin Bay NP and around Pt Lincoln. Prefers sandy locations with Mallee and/or Triodia communities.	N
GRAMINEAE	<i>Poa fax</i>	Scaly Poa		R	1996	Unlikely	Mainly confined to coastal areas in SA except in NSW and Vic where it is found inland. EP populations mainly associated with the coast preferring sandy environments.	N
ORCHIDACEAE	<i>Prasophyllum constrictum</i>	Tawny Leek-orchid		R	1998	Possible	Records scattered across Victoria and SA with a historic record from WA. On EP found in scattered locations within Hincks WA and Darke Peak CP and Verran Tanks CP.	N

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			Aus	SA				
							Found in <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Open Low Mallee over <i>Melaleuca uncinata</i> (Broombush) and <i>Eucalyptus diversifolia</i> (Coastal White Mallee), <i>Eucalyptus leptophylla</i> (Narrow-leaf Mallee) Open Mallee over <i>Triodia irritans</i> (Spinifex)	
ORCHIDACEAE	<i>Prasophyllum fecundum</i>	Self-pollinating Leek-orchid		R	2007	Possible	Endemic to South Australia where scattered across southern Eyre Peninsula, the leg of Yorke Peninsula and in the Barossa Valley. In mallee heathland and Callitris/ Pink gum woodland or on rock outcrops in the wheat belt in sandy or loamy soils.	N
ORCHIDACEAE	<i>Prasophyllum goldsackii</i>	Goldsack's Leek-orchid	EN	E	2008	Possible	Endemic to SA. Found from 14 small populations on EP and YP not exceeding 500-1000 individuals. Occurs largely on limestone, in shallow soil pockets but also in calcareous sands. Found in <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Melaleuca uncinata</i> (Broombush) tall open shrublands.	N
ORCHIDACEAE	<i>Prasophyllum occultans</i>	Hidden Leek-orchid		R	2001	Possible	Endemic to South Australia where scattered from central Eyre Peninsula, across Yorke Peninsula into the upper South East, very rare on Kangaroo Island and on Fleurieu Peninsula. Especially in shallow soils over rock, including limestone, and usually with other Leek-orchids.	N
LABIATAE	<i>Prostanthera calycina</i>	West Coast Mintbush	VU	V	1984	Possible	Endemic to EP where it is restricted to western coast from Pt Lincoln to Streaky Bay. The southern populations in close proximity to the project area grow in association with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) mid mallee woodland over <i>Melaleuca uncinata</i> (Broombush) and <i>Leptospermum coriaceum</i> (Dune Tea-tree) and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee), +/- <i>Allocasuarina verticillata</i> (Drooping Sheoak) mid mallee woodland over Dryland Tea-tree (<i>Melaleuca lanceolata</i>)	N
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R	2008	Possible	Main populations from KI and southern Lofty Ranges. records from EP mainly around Pt Lincoln and one record from east of Cockaleeche. Found in <i>Melaleuca uncinata</i> heath.	Y
ORCHIDACEAE	<i>Pterostylis</i> sp. <i>Triloba</i> (pl. 191,			E	1970	Unlikely	1 record from 1970	N

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			Aus	SA				
	<i>Bates & Weber 1990)</i>							
ORCHIDACEAE	<i>Pterostylis xerophila</i>	Desert Greenhood	VU	V	1980	Possible	Currently known from only eight populations containing about 150 plants from EP and two locations in Victoria. The closest records to the project area are north of Cowell and Coolanie. Found in areas containing <i>Melaleuca uncinata</i> (Broombush), <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee), <i>Eucalyptus socialis</i> (Beaked Red Mallee) and/or <i>Eucalyptus leptophylla</i> (Narrow-leaf Mallee).	N
AMARANTHACEAE	<i>Ptilotus beckerianus</i>	Ironstone Mulla Mulla	VU	V	2007	Possible	Endemic to SA. Disjunct populations on EP as well as Kangaroo Island. Found in association with <i>Eucalyptus cladocalyx</i> (Sugar Gum) forests, as well as <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodlands and <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) +/- <i>E. incrassata</i> (Ridge-fruited Mallee) +/- <i>E. leptophylla</i> (Narrow-leaf Mallee), +/- <i>Eucalyptus peninsularis</i> (Cummins Mallee) mallee woodland.	N
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	2005	Highly Likely	Endemic to EP. Numerous recent records from 20 subpopulations in the Koppio Hills between Tod River Reservoir to just north of Ungarra, mainly along the western side to the project area. The species is commonly associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum) woodlands, <i>Eucalyptus peninsularis</i> (Cummins Mallee) low woodland/mallee, Drooping Sheoak (<i>Allocasuarina verticillata</i>) low open woodland over <i>E. odorata</i> (Peppermint Box) and <i>E. angulosa</i> (Coast Ridge-fruited Mallee) and <i>E. foecunda</i> (Hooked Mallee), mostly over <i>Melaleuca uncinata</i> (Broombush) understories. Also occurs in tall shrublands dominated by <i>Melaleuca uncinata</i> (Broombush) and <i>Acacia</i> spp.	Y
POLYGONACEAE	<i>Rumex dumosus</i>	Wiry Dock		R	1964	Unlikely	Widespread species from Brisbane south through NSW and Victoria, southern and northern Lofty Ranges, EP and south-western WA. disjunct EP populations located at Iron Knob, north of Tumby Bay and near Ungarra.	N
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V	2004	Highly Likely	Found along the project area within the semi-arid pastoral areas. Occurs in tall acacia woodlands and shrublands over chenopods, <i>Callitris gracilis</i> low woodlands and semi-arid mallee communities.	Y

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
GOODENIACEAE	<i>Scaevola myrtifolia</i>	Myrtle Fanflower		R	1991	Possible	Population confined to southern edge of WA from Albany across the Nullarbor to the EP. Sub-population from south of Cowell to north of Tumbay Bay. Preferred habitat is mallee communities.	N
CYPERACEAE	<i>Schoenus sculptus</i>	Gimlet Bog-rush		R	2007	Possible	Scattered along south-western WA, EP, KI, SE and western Victoria. EP records scattered across upper EP and concentrated around Edillilie and Wanilla on lower EP. Mainly associated with stream channels, granite outcropping, Clay loam and sandy soils with <i>Melaleuca armillaris</i> ssp. <i>akineta</i> (Needle-leaf Honey-myrtle) Low Closed Forest and <i>Melaleuca brevifolia</i> (Mallee Honey-myrtle), <i>Melaleuca decussata</i> (Totem Poles), <i>Melaleuca uncinata</i> (Broombush) shrublands sometimes with <i>Gahnia trifida</i> (Rough Cutting-Grass).	N
LEGUMINOSAE	<i>Sphaerolobium minus</i>	Leafless Globe-pea		R	1995	Possible	EP population represents far western extent of the species range. Also occurs on KI, southern Lofty Ranges, SE and sweeps across Tasmania, southern Victoria, coastal NSW and south-western QLD. Several recent records associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum) Very Low Woodland	N
RHAMNACEAE	<i>Spyridium bifidum</i> var. <i>integrifolium</i>			R	1909	Unlikely	Small disjunct populations located on KI and EP, at Kulliparu CP and around Wanilla.	N
RHAMNACEAE	<i>Spyridium bifidum</i> var. <i>Wanilla</i> (K.Clipstone 88)	Wanilla Spyridium		V	1994	Possible	Endemic to EP. Several records from the 1990's but locate along the coast south of the project area. On record east of Darke Peak located in mallee vegetation.	N
RHAMNACEAE	<i>Spyridium erymnocladum</i>	Cloaked Spyridium		V	2006	Possible	Endemic to EP. Occurs in mallee / Broombush associations, with some populations occurring within roadside vegetation around and within Hincks WA.	Y
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R	2009	Likely	Endemic to EP. Confined to the Lower EP where it is associated with mallee associations including <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Mallee, <i>Eucalyptus odorata</i> (Peppermint Box) Very Open Mallee over <i>Melaleuca uncinata</i> (Broombush), and <i>Eucalyptus dumosa</i> (White Mallee) and <i>E. foecunda</i> (Hooked Mallee).	Y
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R	2004	Possible	Scattered across southern Australia with sub-population located in central Australia. EP population mainly from lower EP, with small sub-populations located north-west of Pt Kenny, Cowell and north-east of Cleve. Associated with	Y

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			Aus	SA				
							clayey sands dominated by <i>Melaleuca uncinata</i> (Broombush) Tall Shrubland with emergent mallee species.	
LEGUMINOSAE	<i>Swainsona pyrophila</i>	Yellow Swainson-pea	VU	R	2010	Highly Likely	Occurs across the EP and also in YP and Murraylands, NSW and VIC. It is known to occur on sandy or loamy soil in mallee scrub and is usually found after fire.	N
CHENOPODIACEAE	<i>Tecticornia flabelliformis</i>	Bead Samphire	VU	V	1969	Unlikely	Mainly confined to coastal habitats. Records from Arno Bay and historically from Todd Reservoir.	N
ORCHIDACEAE	<i>Thelymitra carnea</i>	Small Pink Sun-orchid		R	1990	Possible	Widespread but rare in southern coastal districts, from southern Eyre Peninsula, Kangaroo Island, Mount Lofty Ranges from south of Adelaide and in the lower South-east. More common in the Eastern states and New Zealand and rare in Western Australia. Grows in bare soil around seepage areas on the edge of roads, quarries, or land slips, less often in low scrubs and woodland and often in the company of numerous other <i>Thelymitra</i> spp.	N
ORCHIDACEAE	<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	E	2008	Possible	Occurs on Lower Eyre Peninsula, parts of the Murraylands and South East regions of SA, and parts of Victoria. Approximately half of all known sub-populations, including the largest sub-population, are located on roadsides and rail reserves in Lower Eyre Peninsula. Habitat is mainly confined to <i>Allocasuarina verticillata</i> (Drooping Sheoak) low woodland, <i>Eucalyptus cladocalyx</i> (Sugar Gum) mid woodland, <i>Eucalyptus angulosa</i> (Coast Ridge-fruited Mallee), <i>E. diversifolia</i> ssp. <i>diversifolia</i> (Coastal White Mallee) mid mallee woodland, +/- <i>Melaleuca lanceolata</i> (Dryland Tea-tree), +/- <i>Melaleuca uncinata</i> (Broombush) tall shrubs and <i>Melaleuca uncinata</i> (Broombush) tall open shrubland.	N
ORCHIDACEAE	<i>Thelymitra flexuosa</i>	Twisted Sun-orchid		R	2008	Possible	Widespread but uncommon across the southern, coastal, higher rainfall districts, EP, MU (Kaiser Stuhl only) SL, KI, SE and also in Western Australia and the Eastern states. Mostly in nitrogen deficient soils which are boggy in winter, in low heath and scrub, forest clearings and swamp margins where more obvious after fire or disturbance.	N
LILIACEAE	<i>Thysanotus nudicaulis</i>			E	1967	Unlikely	All historic records south of project area	N
LILIACEAE	<i>Thysanotus wangariensis</i>	Eyre Peninsula Fringe-lily		R	2008	Possible	Mainly confined to the coastal areas of southern Australia, from eastern Victorian border with NSW, Tas, SA and	N

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Family	Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Broad Habitat Requirements and general commentary	Identified during 2012-13 field surveys (Y or N)
			Aus	SA				
							south-western WA. On EP found on Dunes/consolidated dune with <i>Eucalyptus incrassata</i> (Ridge-fruited Mallee) Low Mallee and other open mallee shrublands.	
SCROPHULARIACEAE	<i>Veronica gracilis</i>	Slender Speedwell		V	1983	Unlikely	One record from 1980's south of the project area	N
LILIACEAE	<i>Wurmbea decumbens</i>	Trailing Nancy		R	2007	Possible	While endemic to South Australia, it is widespread and locally common on Eyre Peninsula but rare on Kangaroo Island. Mainly associated with rocky hills on central Eyre Peninsula, mostly on sheltered southern slopes at the base of rocks.	N
LILIACEAE	<i>Wurmbea latifolia</i> ssp. <i>vanessae</i>	Broad-leaf Nancy		R	1994	Possible	Widespread along the coast and offshore islands from Eyre Peninsula, Fleurieu Peninsula, Kangaroo Island, and the South-East of South Australia, extending into Victoria. Occurs in low scrub on exposed sites such as headlands, stabilised sandhills, windswept islands and cliff faces, more rarely up to 20 km inland. EP Records located south of Yalunda Flat associated with <i>Eucalyptus cladocalyx</i> (Sugar Gum), <i>Acacia mearnsii</i> (Black Wattle) woodland in fertile soils.	N
LILIACEAE	<i>Xanthorrhoea semiplana</i> ssp. <i>tateana</i>	Tate's Grass-tree		R	2008	Unlikely	Endemic to SA, records range from the upper SE, KI, Fleurieu Peninsula, YP and EP. EP sub-population confined to southern EP near Wangary and at the entrance to Pt Lincoln NP. Habitat preference is <i>Eucalyptus diversifolia</i> (Coastal White Mallee), <i>Acacia paradoxa</i> (Kangaroo Thorn) on limestone.	N

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Sources of information: Pobke (2007); Whibley and Simon (1992); World Wide Wattle (2013); Jessop, Dashorst & James (2006); Willson and Bignall (2008); Native Orchid Society of South Australia (2008); DSEWPAC (2013); DEWNR (2013); Carter (2010), DEH (undated); (Jusaitis et al. 2000, as cited in Pobke, 2007); Duncan (2010); (Government of SA (2013); D. Duvall pers. comm.

5.2.3 State threatened fauna species

A total of 339 fauna species (323 native species and 15 exotic species) have previously been recorded within 10 km of the project area, based on the BDBSA search (DENR 2012a). This excludes Marine species such as Albatross and Petrels, whales and other cetaceans, sharks and marine reptiles.

Of the 339 fauna species that have been recorded within the BDBSA, 51 species are listed as threatened under the NPW Act and 9 are listed under the EPBC Act. It should be noted that this does not include any species classified as strictly marine, as they will not be affected by the easement change. BDBSA species that have been identified are listed in Table 16, with all species identified being shown in Appendix 2.

The distribution of threatened species records (from the last 20 years) in the vicinity of the proposed transmission line is displayed in Figure 12, Figure 13 and Figure 14. Due to the large number of species recorded, no delineation between species is shown. Records have been displayed for a more broad scale representation of key constraint area; for example, where clusters of threatened flora species are present. Below, is a list of nationally listed species that have been previously recorded within 10km of the project area by the BDBSA search and therefore potentially occur:

Nationally threatened (EPBC Act)

- Sandhill Dunnart (*Sminthopsis psammophila*) – nationally endangered, vulnerable in South Australia
- Australasian Bittern (*Botaurus poiciloptilus*) – nationally endangered, vulnerable in South Australia
- Malleefowl (*Leipoa ocellata*) – nationally vulnerable, vulnerable in South Australia
- Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) – nationally vulnerable, endangered in South Australia
- Fairy Tern (*Sternula nereis*) – nationally vulnerable, endangered in South Australia

Migratory (EPBC Act)

The list of migratory species established under section 209 of the EPBC Act comprises:

- migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II);
- migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA); and
- native migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Seven of the bird species observed have a migratory rating under the EPBC Act, all of which were recorded along the coast, outside of the project area:

- Fork-tailed Swift (*Apus pacificus*) - listed as migratory under JAMBA, CAMBA and ROKAMBA
- Great Egret (*Ardea alba*) - listed as migratory under JAMBA, CAMBA

- Cattle Egret (*Ardea ibis*) - listed as migratory under JAMBA, CAMBA
- Red-necked Stint (*Calidris ruficollis*) - listed as migratory under JAMBA, CAMBA and ROKAMBA
- Oriental Plover (*Charadrius veredus*) - listed as migratory under JAMBA, Bonn and ROKAMBA
- Latham's Snipe (*Gallinago hardwickii*) - listed as migratory under JAMBA, CAMBA, ROKAMBA and Bonn
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*)- listed as migratory under CAMBA
- Rainbow Bee-eater (*Merops ornatus*)- listed as migratory under JAMBA
- Painted Snipe (*Rostratula benghalensis s. lat.*) - listed as migratory under JAMBA, CAMBA.

State threatened

The following 43 fauna species recorded within the BDBSA search have a State conservation rating, with their likelihood of occurrence within the project area described in Table 16:

- | | |
|--|--|
| • Common Brushtail Possum (<i>Trichosurus vulpecula</i>) | • Glossy Ibis (<i>Plegadis falcinellus</i>) |
| • Bardick (<i>Echiopsis curta</i>) | • Great Crested Grebe (<i>Podiceps cristatus</i>) |
| • Carpet Python (<i>Morelia spilota</i>) | • Lesser Sand Plover (<i>Charadrius mongolus</i>) |
| • Dwarf Four-toed Slider (<i>Lerista distinguenda</i>) | • Little Egret (<i>Egretta garzetta</i>) |
| • Heath Goanna (<i>Varanus rosenbergi</i>) | • Musk Duck (<i>Biziura lobata</i>) |
| • Macquarie Tortoise (<i>Emydura macquarii</i>) | • Painted Button-quail (<i>Turnix varius</i>) |
| • Western Three-lined Skink (<i>Bassiana trilineata</i>) | • Peregrine Falcon (<i>Falco peregrinus</i>) |
| • Australasian Shoveler (<i>Anas rhynchos</i>) | • Restless Flycatcher (<i>Myiagra inquieta</i>) |
| • Australian Bustard (<i>Ardeotis australis</i>) | • Rock Parrot (<i>Neophema petrophila</i>) |
| • Banded Stilt (<i>Cladorhynchus leucocephalus</i>) | • Ruddy Turnstone (<i>Arenaria interpres</i>) |
| • Bar-tailed Godwit (<i>Limosa lapponica</i>) | • Ruff (<i>Philomachus pugnax</i>) |
| • Black-tailed Godwit (<i>Limosa limosa</i>) | • Sanderling (<i>Calidris alba</i>) |
| • Blue-billed Duck (<i>Oxyura australis</i>) | • Shy Heathwren (<i>Calamanthus cautus</i>) |
| • Cape Barren Goose (<i>Cereopsis novaehollandiae</i>) | • Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) (western) |
| • Common Sandpiper (<i>Actitis hypoleucos</i>) | • Square-tailed Kite (<i>Lophoictinia isura</i>) |
| • Common Tern (<i>Sterna hirundo</i>) | • Striated Grasswren (<i>Amytornis striatus</i>) |
| • Diamond Firetail (<i>Stagonopleura guttata</i>) | • Terek Sandpiper (<i>Xenus cinereus</i>) |
| • Eastern Curlew (<i>Numenius madagascariensis</i>) | • Western Gerygone (<i>Gerygone fusca</i>) |
| • Eastern Osprey (<i>Pandion cristatus</i>) | • Whimbrel (<i>Numenius phaeopus</i>) |
| • Elegant Parrot (<i>Neophema elegans</i>) | • White-winged Chough (<i>Corcorax melanorhamphos</i>) |
| • Freckled Duck (<i>Stictonetta naevosa</i>) | • Wood Sandpiper (<i>Tringa glareola</i>) |
| • Gilbert's Whistler (<i>Pachycephala inornata</i>) | • Yellow-tailed Black-Cockatoo (<i>Calyptorhynchus funereus</i>) |

Table 16. Threatened fauna species identified by the BDBSA search.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
Birds							
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)	-	R	1/08/2006	Highly Likely	Y	Bluebush plains with sparse trees. Found from Whyalla west into Gawler ranges and then into Nullarbor region. Can inhabit pastoral properties
<i>Actitis hypoleucos</i>	Common Sandpiper	-	R	10/01/2003	Possible	N	Found in a variety of habitats from coastal areas to inland wetlands. Tends to avoid wide open mudflats, but spends time on narrow edges of dams and billabongs
<i>Amytornis striatus</i>	Striated Grasswren	-	R	15/05/2008	Highly Likely	Y	Small Grasswren found in mallee woodlands with well established Spinifex grasses. Most wide spread Grasswren in Australia, with numerous small fragmented populations known in SA. EP population in Middleback ranges and into Pinkawillinie CP
<i>Anas rhynchos</i>	Australasian Shoveler	-	R	4/02/2006	Possible	N	Prefers large permanent lakes or waterholes over wetlands that have suitable cover of <i>Melaleuca sp.</i>
<i>Ardea ibis</i>	Cattle Egret	-	R	22/06/1998	Unlikely	N	Pastures with tall grass being actively used by stock, which it associates with. This is to assist with feeding. Possibly expanding in the south, however is rare throughout this region
<i>Ardeotis australis</i>	Australian Bustard	-	V	26/03/2005	Possible	N	Grasslands, namely tussocky grasslands such as spear grasses etc. Can also be found in open dry woodlands such as mulga or mallee. Wide distribution in Australia however has reduced in numbers in the south and tends to be rare in and around heavily settle areas.
<i>Arenaria interpres</i>	Ruddy Turnstone	-	R	21/02/1981	Unlikely	N	Coastal species that migrate to far northern destinations during Australian winter. As such, may pass through project area, but would not reside there

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Biziura lobata</i>	Musk Duck	-	R	4/02/2006	Possible	N	Deep permanent lakes with dense reedbeds on the fridges, with large open water spaces
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	V	1/02/1965	Unlikely	N	Freshwater estuaries, with heavily vegetation of shrubs and reeds. Spends practically all time in cover. More common in SE South Australia, with only a handful of records from the EP
<i>Calamanthus cautus</i>	Shy Heathwren	-	R	15/05/2008	Highly Likely	Y	Found in heathy areas, and generally dense thickets. Uncommon throughout its range, however has been noted in good numbers by Brandle (2010) on southern Eyre Peninsula, possibly indicating the importance of the area for this species.
<i>Calidris alba</i>	Sanderling	-	R	2/10/2000	Unlikely	N	Beach dweller however may move through the project zone during summer
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	V	27/02/2008	Likely	N	Diverse woodland species. Eyre Peninsula sub-species have distinct migratory pattern, spending summer breeding in Sugar Gums in the Koppio Hills before heading north to Wudinna area. Feeds on variety of seeds and insects. Unfortunately, small population affected by stochastic event, and now few individuals remain
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	19/01/2010	Highly Likely	Y	Breeds on offshore islands such as the Sir Joseph Banks Group of EP, however frequent visitor to the mainland, and will be observed in close proximity with livestock and in pastures
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	R	17/02/1973	Unlikely	N	Inter-tidal mudflats and estuaries- migrates to Australia during summer, but is rare in south
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	-	V	26/04/2006	Likely	N	Salt lakes along the coast as well as inland areas. Congregates in large flocks, and will breed on many usual

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							dry large inland lakes such as Lake Torrens or Lake Eyre. Very dispersive species.
<i>Corcorax melanorhamphos</i>	White-winged Chough	-	R	15/05/2008	Highly Likely	Y	Found in open Eucalyptus woodlands, this species lives in small closely bonded family groups of up to 20 individuals. One of only a number of mud nest builders. Tend to be locally common, but rather fragmented.
<i>Egretta garzetta</i>	Little Egret	-	R	26/01/2000	Possible	N	Wetlands, both fresh and saline, usually foraging within the shallows of these areas. Widespread, and can be classed as nomadic or migratory
<i>Falco peregrinus</i>	Peregrine Falcon	-	R	23/11/2006	Likely	Y	Found throughout a wide variety of habitat types across Australia, however are never classed as common. Nests on cliffs, and has adapted to utilise human structures such as communication towers, mines or buildings. As such, can be found in areas that once were unfavourable.
<i>Gerygone fusca</i>	Western Gerygone	-	R	13/12/2007	Likely	N	Woodland species with a strong musical call. Usually restricted to central arid Australia and areas of Western Australia and Queensland. A small fragmented population persist in and around the Southern Eyre Peninsula, particularly the Tod Reservoir.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Mi	E	26/01/2000	Possible	N	Usually coastal, however can head inland, and may follow rivers or visit flooded lagoons or lakes.
<i>Leipoa ocellata</i>	Malleefowl	VU	V	13/11/2007	Highly Likely	N	Widespread Southern Australian species that needs dense mallee thickets that produce suitable leaf litter, as well as a sandy substrate for nest construction. Have suffered greatly throughout their historical range due to changes in farming practices, and inappropriate fire regimes.
<i>Limosa lapponica</i>	Bar-tailed Godwit	-	R	4/06/2004	Likely	N	Sheltered bays and lagoons, however will also visit sewerage ponds,

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Limosa limosa</i>	Black-tailed Godwit	-	R	5/01/1999	Unlikely	N	Sheltered bays and lagoons, however will also visit sewerage ponds, More common in Northern Australia
<i>Lophoictinia isura</i>	Square-tailed Kite	-	E	20/12/1972	Unlikely	N	Eucalyptus woodlands and heath, Found throughout the East coast, as well as distinct populations in the Perth Hills, they are practically absent from much of South Australia. As such, they are rare.
<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	13/05/2008	Likely	N	Open woodlands, including farms. Can be classed as sedentary throughout its range.
<i>Neophema elegans</i>	Elegant Parrot	-	R	2/08/2006	Highly Likely	N	Woodlands from dry regions though to more heavily woodland and wetter regions. Can be slightly migratory, moving throughout its range during the year
<i>Neophema petrophila</i>	Rock Parrot	-	R	22/10/2008	Possible	N	Coastal species breeding mainly on off-shore islands under limestone ledges. Spends some time on the mainland, however rarely heads far inland
<i>Numenius madagascariensis</i>	Eastern Curlew	-	V	10/02/1985	Unlikely	N	Large wader with exceptionally long bill. Found along tidal mudflats and estuaries or mangroves, rare inland visitor. May migrate through the project, but will not reside,
<i>Numenius phaeopus</i>	Whimbrel	-	R	2/01/1973	Unlikely	N	Mudflats and estuaries, occasionally on inland salt lakes. Migratory species, common in northern Australia, however rare along southern areas
<i>Oxyura australis</i>	Blue-billed Duck	-	R	15/05/2008	Possible	N	Breeds in deep permanently vegetated lakes and dams. Spends winters on more open waters
<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	15/05/2008	Highly Likely	Y	Found in mallee habitats, as well as mulga, with a dense understorey. Loud, repetitive call. Can be nomadic in movements, and uncommon throughout their range.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Pandion cristatus</i>	Eastern Osprey	-	E	10/02/2008	Possible	N	Usual coastal, however will follow rivers many kilometres inland to well established pools and water courses. More common in Northern Australia.
<i>Philomachus pugnax</i>	Ruff	-	R	21/02/1981	Unlikely	N	Mudflats and estuaries however can be found in inland saline lakes and pools. A rare visitor to Australia, however a number of inland records exist for this species.
<i>Plegadis falcinellus</i>	Glossy Ibis	-	R	21/11/1987	Unlikely	N	Swamps, sewage ponds, flooded or irrigated pastures and sheltered marine habitats. Common in Northern Australia, less common in the south and west of the continent.
<i>Podiceps cristatus</i>	Great Crested Grebe	VU	R	16/12/2004	Unlikely	N	Prefers well vegetated margins and reedbeds channels near open waters. These tend to lakes or reservoirs. Strong hold of the species is the far SE of Australia, but can disperse during non-breeding. Rarely seen on small farm stock dams or lakes.
<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	17/11/2008	Highly Likely	Y	Striking Australian finch, habituating open forests with grass understoreys; commonly along the sides of watercourses or roadways. Can be found in pastoral areas or cropping land. Patchy occurrence, including on the Eyre Peninsula.
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	10/01/2003	Possible	N	A large darkly coloured duck found on large freshwater lakes and rivers, however needs dense vegetation consisting of Melaleuca, Casuarina or grasses. Nomadic in movements, following water flows and availability of food
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula)	VU	E	1/07/2004	Likely	N	Small wren with very large tail consisting of few feathers that resemble emu feathers. Three populations in South Australia all fragmented and isolated. EP Southern Emu-wrens are found in heathy areas, especially along

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							creeklines. Population in Koppio Hills decimated by fire in 2005 and may exist along easement.
<i>Tringa glareola</i>	Wood Sandpiper	-	R	16/12/2004	Possible	N	Freshwater lakes, flooded pastures and dams, and less common in saline or brackish areas. Is an uncommon visitor to Australia, spending the summer before departing from northern destination in winter
<i>Turnix varius</i>	Painted Button-quail	-	R	14/12/2004	Possible	N	Open forest that may contain Banksia or Brigalow. Have been found on stony ridges with abundant leaf litter but limited grass. More common east of the Eyre Peninsula.
<i>Xenus cinereus</i>	Terek Sandpiper	-	R	6/12/1981	Unlikely	N	Sheltered bays and lagoons, however will also visit sewerage ponds and salt fields. Common in northern areas, rare in the south. Migrates to Australia during summer, leaves over winter.
Mammals							
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	19/10/2010	Highly Likely	N	The largest of Australia's 19 dunnart species. On EP, prefer habitats characterised by parallel sand dunes with associations of open mallee with a diverse shrub layer and Spinifex (<i>Triodia irritans</i>). Mallee Cypress Pine (<i>Callitris verrucosa</i>). Spinifex is a key habitat component, as Sandhill Dunnarts build a nest within the centre of the plant, which is both protected and insulated by the needles of the tussock. Numerous records from Middleback ranges and Hincks Conservation Park
<i>Trichosurus vulpecula</i>	Common Brush-tailed Possum		R	12/12/2007	Possible	N	The Common Brushtail Possum is a solitary, nocturnal and arboreal marsupial, endemic to Australia. In Australia, they are found in five disjunct groups: northern, eastern, central, and south western mainland

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
							<p>Australia, as well as Tasmania. Brushtail Possums prefer to make a nest in a tree-hole, but in their absence will make a nest in hollow logs, abandoned burrows and roof spaces. Most young are born in Autumn.</p> <p>Although named 'common' they are rare in South Australia, having disappeared from most regions apart from urban centres.</p> <p>Small population exists on Eyre Peninsula, including the Koppio Hills.</p>
Reptiles							
<i>Bassiana trilineata</i>	Western Three-lined Skink		R	11/12/1985	Unlikely	N	This species is found in dense vegetation in the edge of wetland margins. They are confined to the southern tips of the Eyre Peninsula, mainly in Port Lincoln National Park or Coffin Bay National Park..
<i>Echiopsis curta</i>	Bardick		R	2/12/2002	Possible	N	Tending to habitats in mallee or heath with Spinifex understoreys, this species is found in numerous locations across the Eyre Peninsula. Records exist from both the Middleback Ranges and Hincks CP, with the easement passing through or close to both. As such, Bardick maybe encountered along the current and proposed easement
<i>Emydura macquarii</i>	Macquarie Tortoise		V	1/01/1950	Unlikely	N	Possible introduction from pet stock (Brandle 2010). Unlikely, however populations may establish in permanent water sources
<i>Lerista distinguenda</i>	Dwarf Four-toed Slider		R	6/12/2003	Possible	N	Found within Sandy mallee margins in the central and northern areas of Eyre Peninsula. This species has numerous records from in and around the study area, and is a possible species within the easement.

Species name	Common name	Conservation status		Most recent BDBSA record (within 10kms)	Likelihood of occurrence within survey area	Identified during 2012-13 field surveys (Y or N)	Preferred habitat and species description
		Aus	SA				
<i>Morelia spilota</i>	Carpet Python		R	1/09/2000	Possible	N	Found throughout Australia in a variety of habitats, this species is found on the Northern Eyre Peninsula mainly within unburnt mallee vegetation, with a number of records from in and around the Middleback Ranges and Ironstone Hill CP
<i>Varanus rosenbergi</i>	Heath Goanna		R	1/01/1950	Unlikely	N	The Heath Goanna is the most southerly distributed of the Varanus genus, being found in southern Western Australia, and South Australia. They are moderately common on Kangaroo Island, however are rare on the mainland; including Eyre Peninsula. Majority of records exists within Port Lincoln National Park, and as such this species is unlikely to be encountered by this project
Amphibians							
<i>Pseudophryne bibronii</i>	Brown Toadlet	-	R	17/09/2001	Likely	N	Found in damp areas containing logs and pebbles, common in East coast States and Kangaroo Island and SE SA, rare in Mount Lofty ranges. Few records exist on Eyre Peninsula, one 15 km NNW of Port Lincoln, and one potential call recorded in Koppio Hills (Brandle 2010)

Source: Atlas of Living Australia 2012; Debus 1998; DSEWPaC 2011b; Geering et al. 2008; Graham et al. 2001; Maguire 2008; Reader's Digest 1997; Simpson and Day 2009; Brandle (2010) and Morecombe (2000).

5.3 Field survey

5.3.1 Weather

During the baseline surveys, weather conditions were generally warm to hot, with extreme heat experienced in all survey months (Table 17 to Table 20). These conditions tended to cause birds to be very active in the early mornings or late afternoons, as they tend to shelter and attempt to avoid the heat during the middle parts of the day. The only rainfall recorded was in December, with a steady rain falling throughout the morning. March was dominated by extreme humidity and large storms across much of the Eyre Peninsula.

Table 17. Weather data Whyalla Aero in December 2012.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
10/12/2012	14.8	25.8	0	9am	19.6	48	ESE	19
				3pm	25.0	30	SSW	35
11/12/2012	15.6	32.8	0	9am	21.4	49	SSE	20
				3pm	31.5	20	S	30
12/12/2012	19.6	38.7	0	9am	25.9	50	S	15
				3pm	37.5	25	SE	20
13/12/2012	24.6	40.7	0	9am	34.6	26	N	26
				3pm	25.2	27.4	S	33
14/12/2012	21.6	27.3	0.4	9am	24.3	68	SSE	9
				3pm	22.6	88	NE	13

Table 18. Weather data Cleve Aero in January 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
22/01/2013	13.9	26.0	0	9am	19.6	64	ESE	22
				3pm	25.6	36	SE	28
23/01/2013	15.6	32.8	0	9am	19.8	66	ESE	26
				3pm	25.4	43	SE	22
24/01/2013	19.6	38.7	0	9am	27.6	26	NNE	24
				3pm	38.2	9	N	28

Table 19. Weather data Cummins in February 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
20/02/2013	15.2	25.7	0	9am	19.4	62	SE	35
				3pm	25.1	44	SSE	22
21/02/2013	12.9	28.0	0	9am	18.1	72	SSW	13
				3pm	26.5	39	SSE	19
22/02/2013	17.5	34.2	0	9am	21.7	75	E	17
				3pm	33.1	29	SE	6

Table 20. Weather data from Cummins March 2013.

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
06/03/2013	17.5	36.2	0	9am	26.5	51	NNE	7
				3pm	33.3	30	ESE	15
11/12/2013	23.0	35.7	0	9am	27.5	56	NNE	15
				3pm	30.1	54	SSW	26

During the targeted surveys, weather conditions were generally cool to mild with extreme heat experienced on a single day November which was categorised as 'Catastrophic' on Eyre Peninsula (Table 21 to Table 24). The cooler conditions during the spring provided ideal temperatures for annual flowering plants, many of which were visible. Rainfall was recorded during all surveys with associated large storms which affected much of the Eyre Peninsula. The cooler conditions also favoured birds which enable foraging during the day, as opposed to only early morning and evening.

Table 21. Weather data from Cummins August 12th 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C				°C	%		km/h
12/08/2013	2.6	15.9	0.2	9am	10.7	93	NNW	7
				3pm	15.1	62	WNW	39
13/08/2013	5.2	17.9	8.0	9am	-	-	NNW	20
				3pm	17.7	48	NW	30
14/08/2013	0.4	14.6	2.8	9am	12.0	77	WSW	24
				3pm	13.8	62	WSW	28
15/08/2013	1.1	16.2	0	9am	7.5	100	NNE	13
				3pm	15.9	58	N	24
16/08/2013	6.9	12.9	0	9am	12.8	58	N	33
				3pm	10.5	100	W	33

Table 22. Weather data from Cummins August 27th 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
27/08/2013	9.5	21.7	0	9am	14.3	68	NNE	19
				3pm	19.4	65		W
28/08/2013	7.6	21.3	0	9am	-	-	N	9
				3pm	21.2	62		N
29/08/2013	11.7	16.6	18.2	9am	12.6	100	NW	22
				3pm	16.3	89		W

Table 23. Weather data Cleve Aero in September 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
30/09/2013	15.3	29.4	0	9am	27.2	24	NNW	39
				3pm	28.8	29		NNW
01/10/2013	7.8	17.1	1.0	9am	13.3	52	WSW	31
				3pm	15.6	43		W
02/10/2013	9.7	19.6	0	9am	14.9	64	WNW	39
				3pm	16.7	49		WSW

Table 24. Weather data from Cleve Aero in November 2013

Date	Min temp.	Max temp.	Rain	Time	Temp.	Rel. humid.	Wind direction	Wind speed
	°C		mm		°C	%		km/h
05/11/2013	8.1	32.7	0	9am			Calm	
				3pm	30.6	8		N
06/11/2013	21.0	37.5	0	9am	28.0	11	N	37
				3pm	35.8	7		NNW
07/11/2013	15.4	17.3	0	9am	16.2	81	SE	26
				3pm	16.2	79		S

5.3.2 Flora

A total of 352 native species and 24 exotic flora species were recorded for the project area across numerous vegetation associations and landforms. It is expected that additional species are present within inaccessible areas as well as some annual species which were inconspicuous at the time of the survey. Refer to Appendix 1 for the list of those species recorded during the 2012 -13 field surveys.

5.3.3 Threatened flora

Five nationally threatened species were recorded within the 120m wide transmission line corridor. An additional 19 state threatened flora species were also recorded. Table 25 lists the species and conservation ratings. Most of these individuals were found in moderate to high value large vegetation blocks, whilst others were contained within reasonable roadside remnants. Figure 27 to Figure 32 show records within the identified biodiversity hot spot areas discussed in Section 6.3 Biodiversity hot spots.

Table 25 Threatened flora species recorded during 2013 targeted surveys

Family	Species name	Common name	Cons. status	
			AUS	SA
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN	
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R
COMPOSITAE	<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R
GRAMINEAE	<i>Austrostipa breviglumis</i>	Cane Spear-grass		R
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R
ORCHIDACEAE	<i>Microtis</i> sp. <i>Nash</i> (R. Bates 44740)	Nash's onion orchid		R
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R
RUTACEAE	<i>Philotheca angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R

5.3.4 Vegetation associations

The Eyre Peninsula has significant areas of remnant native vegetation and contains important habitats dominated by mallee and woodland communities, with shrublands, grasslands and sedgeland. The vegetation communities across the project area varied greatly given the distance from the northern extremity near Whyalla to the southern extent at Pt Lincoln. The northern semi-arid regions were largely dominated by *Acacia* and *Casuarina* woodlands with scattered patches of Bullock Bush low woodlands and chenopod shrublands grading into tall shrublands dominating the rocky hills associated with the Middleback range. On the lower slopes of the ranges mallee and chenopod communities became more prominent. These areas were frequently interspersed with large dune complexes characterized by mixed mallee communities over Spinifex understories, *Melaleuca uncinata* (Broombush), *Senna* spp. (Cassia) and *Dodonaea* spp. (Hopbush) tall shrublands. The southern sections of the corridor were much more fragmented with remnant patches dominated by stands of mature *Eucalyptus cladocalyx* (Sugar Gum), the mallee form *Eucalyptus odorata* (Peppermint Box) woodlands and scattered patches of *Acacia* tall shrubland. Creeklines were frequently dominated by the nationally Endangered *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodlands and *Melaleuca* tall shrublands, sometimes over *Gahnia* spp. (Cutting

Grass) Sedgeland. A total of seventy-five vegetation associations have been described and mapped across the project area (Table 26). Some associations have been broadly grouped together where dominant overstories were similar but where understorey assemblages differ. Each association has been assigned a condition rating (or range of conditions) which primarily reflects indigenous cover and weed invasion levels in the understorey. See Table 10 for description of ratings. See attachment for mapped vegetation associations across the project area.

Table 26. Vegetation Association Descriptions.

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
Woodlands						
<i>Acacia papyrocarpa</i> Woodland	Two vegetation associations typified by the presence of <i>Acacia papyrocarpa</i> (Western Myall). These range from the stereotypical large procumbent trees over a dense ground layer of bluebush and saltbush widespread in the area west of Whyalla and continuing south to the Middleback Range. The level of dominance of this species defines the associations where it will form co-dominance with species such as <i>Myoporum platycarpum</i> (Sugarwood).	1	<i>Acacia papyrocarpa</i> Low Open Woodland over <i>Maireana sedifolia</i> / <i>Atriplex vesicaria</i> / <i>Maireana pyramidata</i>			9:1
		7	<i>Acacia papyrocarpa</i> +/- <i>Alectryon oleifolius</i> ssp. <i>canescens</i> +/- <i>Myoporum platycarpum</i> mixed Low Open Woodland over <i>Atriplex vesicaria</i> / <i>Austrostipa</i> spp.			9:1
<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland	Exclusively recorded north of the Middleback Range where this association forms relatively large tracts on the alluvial soils and plains where soil depth and ephemeral runoff enable this species to outcompete other larger tree species. Threatened due to lack of regeneration as this species is preferentially grazed as juveniles by domestic and native herbivores.	4	<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland over <i>Atriplex vesicaria</i> / <i>Maireana sedifolia</i>		V	9:1
<i>Allocasuarina verticillata</i> Woodland	Primarily recorded on stony outcropping country and rises where exposure to the elements is highest. Can often contain a high diversity of understorey species and provide valuable food and nesting habitat for bird species.	40	<i>Allocasuarina verticillata</i> Low Woodland		V	2:1 – 8:1
<i>Casuarina pauper</i> Woodland	Recorded as scattered patches in similar habitats to <i>Alectryon oleifolius</i> (Bullock Bush) woodlands and <i>Acacia papyrocarpa</i> (Western Myall). Often found on the foot slopes of ranges and sites with shallow soil profiles.	5	<i>Casuarina pauper</i> Low Woodland over <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i>			9:1
<i>Callitris gracilis</i> Woodland	Recorded as variable levels of dominance dependent on soil profiles. Prefers well drained soil profiles and the soil type can dictate largely what grows in association with it. Not typically a high habitat value associated with this association however there are communities which exhibit an aged stratum that have been largely cleared and fragmented, leaving remaining patches at a high risk of further degradation.	23	<i>Callitris gracilis</i> Low Woodland over <i>Alyxia buxifolia</i> and <i>Beyeria lechenaultii</i> +/- <i>Alectryon oleifolius</i> ssp. <i>canescens</i> +/- <i>Dodonaea viscosa</i> ssp. <i>angustissima</i>			10:1
		33	<i>Callitris gracilis</i> Very Open Woodland over <i>Austrostipa</i> spp.			6:1
		41	<i>Callitris gracilis</i> Low Woodland over <i>Geijera linearifolia</i> +/- <i>Allocasuarina verticillata</i> +/- <i>Pittosporum angustifolium</i>			3:1 – 6:1
<i>Callitris verrucosa</i> Woodland	Small patch identified within large intact patches of mallee vegetation within the Sheoak Hill CP.	73	<i>Callitris verrucosa</i> / <i>Eucalyptus leptophylla</i> Low Woodland			10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Eucalyptus cladocalyx</i> Woodland	Large remnant patches of this association are present throughout the southern half of the alignment and provide some of the highest conservation significant patches recorded.	57	<i>Eucalyptus cladocalyx</i> Woodland / Open Woodland			4:1 – 9:1
		60	<i>Eucalyptus cladocalyx</i> Very Open Woodland over scattered native shrubs and exotics			3:1 – 6:1
<i>Eucalyptus petiolaris</i> Woodland	Mostly recorded as small remnant patches bordering creeks and in road reserves. High value association, providing habitat resources for a number of fauna species. Forms a large tree stratum in places. Threatened at national and State level.	58	<i>Eucalyptus petiolaris</i> +/- <i>Eucalyptus odorata</i> +/- <i>Allocasuarina verticillata</i> Open Grassy Woodland	EN	E	2:1 – 5:1
		70	<i>Eucalyptus petiolaris</i> Woodland over <i>Acacia pycnantha</i>	EN	E	3:1
Mallee						
<i>Eucalyptus oleosa</i> Mallee	Recorded near the Middleback range as an overstorey to the bluebush and as a mixed mallee stratum. Typically recorded in the sandy low rainfall areas.	14	<i>Eucalyptus oleosa</i> +/- <i>Eucalyptus</i> spp. Mallee over <i>Maireana sedifolia</i>			9:1
		16	<i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> Mallee			9:1 – 10:1
		71	<i>Eucalyptus oleosa</i> / <i>Eucalyptus gracilis</i> / <i>Eucalyptus phenax</i> Mallee			10:1
		74	<i>Eucalyptus oleosa</i> +/- <i>Callitris gracilis</i> over <i>Beyeria lechenaultii</i> / <i>Alyxia buxifolia</i> Mallee			10:1
<i>Eucalyptus socialis</i> / <i>E. brachycalyx</i> Mallee	The most widespread and largest vegetation association recorded along the alignment this covers much of the available mallee habitat. Prefers the deeper sand profile areas and is very commonly recorded with <i>Triodia</i> species in the understorey. The variation in associations is primarily due to the density and understorey structures recorded. Due to the very homogenous nature of the mallee there are areas hard to distinguish and transition rapidly across the landscape. Slight changes in elevation can give rise to abrupt change in understorey structures. Buckshot or ironstone outcrops give rise to largely <i>Melaleuca</i> dominant communities and can change in the space of 50 metres.	17	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>			4:1 – 10:1
		30	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca lanceolata</i> and <i>Melaleuca acuminata</i>			2:1- 10:1
		32	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Atriplex stipitata</i> , <i>Nitraria billardierii</i> , <i>Maireana</i> spp. and <i>Disphyma</i> sp.			4:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		34	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over Exotic Grasses +/- Chenopod spp.			3:1 – 5:1
		35	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp., <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>			4:1 – 5:1
		39	<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> +/- <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> +/- <i>Melaleuca acuminata</i>			2:1 – 5:1
		72	<i>Eucalyptus socialis</i> / <i>Eucalyptus phenax</i> Mallee over <i>Melaleuca lanceolata</i> , <i>Olearia floribunda</i> , <i>Melaleuca uncinata</i>			10:1
<i>Eucalyptus leptophylla</i> Mallee	Only very small patches of this association existed where <i>E. leptophylla</i> (Narrow-leaf Mallee) provided the dominant cover. Mostly recorded as being sometimes present in other associations.	20	<i>Eucalyptus leptophylla</i> +/- <i>Eucalyptus oleosa</i> +/- <i>Melaleuca lanceolata</i> mixed Mallee over <i>Cratystylis conocephala</i> and <i>Atriplex vesicaria</i>			10:1
<i>Eucalyptus porosa</i> Mallee	Recorded in the sandier areas often in association with <i>Callitris</i> woodlands and <i>Melaleuca</i> dominant patches. More likely to contain hollows than other mallee stratum.	25	<i>Eucalyptus porosa</i> Mallee over <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> , <i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Acacia wilhelmiana</i>			10:1
		36	<i>Eucalyptus porosa</i> Open Woodland +/- <i>Acacia notabilis</i>			4:1 – 8:1
<i>Eucalyptus incrassata</i> Mallee	Primarily dominant on the dune ridgelines south of the Middleback range. These are mostly remnant from areas not cleared for cropping due to the poor soil quality for cereals. Many highly degraded due to the fragmented nature of the remnant patches. Some higher quality patches exist in association with conservation parks.	26	<i>Eucalyptus incrassata</i> +/- <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>			10:1
		27	<i>Eucalyptus incrassata</i> +/- <i>Callitris verrucosa</i> Mallee over <i>Melaleuca uncinata</i> and <i>Calytrix tetragona</i>			4:1 – 10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		44	<i>Eucalyptus incrassata</i> +/- <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> Mallee over <i>Ehrharta calycina</i>			2:1
		53	<i>Eucalyptus incrassata</i> +/- <i>Melaleuca uncinata</i> +/- <i>Melaleuca lanceolata</i> Mallee			9:1
<i>Eucalyptus incrassata</i> var. <i>angulosa</i> Mallee	Small patch in southern area of alignment.	59	<i>Eucalyptus incrassata</i> var. <i>angulosa</i> Mallee over <i>Melaleuca uncinata</i>			6:1 – 9:1
<i>Eucalyptus brachycalyx</i> Mallee	<i>E. brachycalyx</i> (Gilja) dominant patch in high value mallee stratum.	29	<i>Eucalyptus brachycalyx</i> +/- <i>Callitrix verrucosa</i> Mallee over <i>Calytrix involucreta</i> and <i>Phebalium bullatum</i>			10:1
<i>Eucalyptus calycogona</i> ssp. <i>calycogona</i> Mallee	Remnant patch along ephemeral drainage channel with degraded understorey due to grazing. Low quantity recorded within alignment and may be poorly represented in region.	43	<i>Eucalyptus calycogona</i> ssp. <i>calycogona</i> +/- <i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee over <i>Maireana brevifolia</i> and other exotics			4:1 – 5:1
<i>Eucalyptus diversifolia</i> Mallee	In similar habitat types to <i>E. incrassata</i> (Ridge-fruited Mallee), this is found as remnant on remaining uncleared dune ridges in cropping country. Condition varies due to amount of grazing allowed and quality of understorey vegetation.	45	<i>Eucalyptus diversifolia</i> +/- <i>Eucalyptus incrassata</i> Mallee over exotics and <i>Enchylaena tomentosa</i>			2:1
		69	<i>Eucalyptus diversifolia</i> Mallee			4:1
<i>Eucalyptus peninsularis</i> Mallee	Remnant vegetation patches in cropped areas, primarily found in shallow soils underlain by limestone. High value understorey mostly as scattered shrubs and tussocks due to high cover of canopy.	46	<i>Eucalyptus peninsularis</i> +/- <i>Eucalyptus dumosa</i> Mallee over <i>Enchylaena tomentosa</i> and emergents		E	2:1 – 6:1
		47	<i>Eucalyptus peninsularis</i> +/- <i>Eucalyptus dumosa</i> Mallee over <i>Gahnia deusta</i> and herbaceous annual spp.		E	4:1 – 9:1
<i>Eucalyptus odorata</i> Mallee	Very variable in habit but always found as small remnants along creek lines and road reserves. Due to the high quality soil profile this association is found, it is almost entirely cleared and very small linear patches are left. Understorey very often contains nationally threatened species in association. This mallee variety of the association is not regarded as the Nationally Threatened Community (TSSC), 2007).	48	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus incrassata</i> Mallee over <i>Melaleuca uncinata</i>			4:1
		49	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus pileata</i> Mallee over <i>Acacia imbricata</i> and <i>Melaleuca uncinata</i>			8:1
		56	<i>Eucalyptus odorata</i> +/- <i>Eucalyptus pileata</i> / <i>Eucalyptus leptophylla</i> Mallee over <i>Melaleuca uncinata</i>			4:1 – 9:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
		61	<i>Eucalyptus odorata</i> Woodland			2:1 – 4:1
		38	<i>Eucalyptus odorata</i> Woodland over <i>Leptospermum coriaceum</i> +/- <i>Callistemon rugulosus</i>			4:1 – 5:1
<i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee	Typical mallee stratum found in small patches in association with <i>Allocasuarina</i> populations in some cases.	55	<i>Eucalyptus phenax</i> ssp. <i>phenax</i> Mallee over exotic grasses, <i>Austrodanthonia</i> spp., <i>Austrostipa</i> sp.			5:1
Shrublands						
<i>Acacia</i> spp. mixed Shrubland	Found in mallee habitats as low shrublands on stony outcropping areas	24	<i>Acacia wilhelmiana</i> +/- <i>Senna artemisioides</i> ssp. <i>coriacea</i> +/- <i>Eucalyptus gracilis</i> +/- <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp. +/- <i>Eucalyptus incrassata</i> +/- <i>Eucalyptus brachycalyx</i>			10:1
<i>Acacia burkittii</i> Shrubland	Recorded on rocky hill slope on northern side of Middleback range. Forms a transition from the Western Myall dominant plains to the north and he ranges associations. Primary <i>Santalum spicatum</i> (Sandalwood) habitat.	6	<i>Acacia burkittii</i> / <i>Acacia oswaldii</i> Tall Shrubland over <i>Dodonaea lobulata</i> / <i>Senna artemisioides</i> ssp. <i>artemisioides</i>			9:1
<i>Acacia dodonaeifolia</i> Shrubland	Small remnant patches on open hillsides heavily suckering with little to no understorey due to density. Most likely response from Wangary fires.	65	<i>Acacia dodonaeifolia</i> Tall Shrubland			2:1 – 3:1
<i>Acacia paradoxa</i> Shrubland	Common species forming large patches of thick scrub in association with sugar gum woodlands. Responds favourable to disturbance, such as fire.	63	<i>Acacia paradoxa</i> Shrubland +/- <i>Eucalyptus</i> spp.			2:1 – 4:1
<i>Callistemon rugulosus</i> Shrubland	Small patches forming dense stands mostly in creek line areas.	68	<i>Callistemon rugulosus</i> Tall Shrubland			2:1
<i>Eremophila</i> spp. Shrubland	Most commonly recorded in the Middleback range areas on low hills and rocky outcrops. Often mixed with chenopod shrubs in the understorey at low densities.	11	<i>Eremophila alternifolia</i> Tall Shrubland over <i>Aristida contorta</i> , <i>Austrostipa nitida</i> , <i>Maireana sedifolia</i> and <i>Ptilotus incanus/obovatus</i>			10:1
		13	<i>Eremophila oppositifolia</i> , <i>Eremophila alternifolia</i> , <i>Dodonaea lobulata</i> , <i>Acacia</i>			10:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
			<i>nyssophylla</i> Open Shrubland over <i>Maireana sedifolia</i> and <i>Rhagodia ulicina</i>			
<i>Geijera linearifolia</i> Shrubland	Association most prolific on the southern edge of the Middleback Range. Forms a transition from the stonier rises to the sandy mallee country.	21	<i>Geijera linearifolia</i> +/- <i>Senna artemisioides</i> ssp. <i>coriacea</i> +/- <i>Callitris gracilis</i> +/- <i>Acacia notabilis</i> +/- <i>Alyxia buxifolia</i> Shrubland			10:1
<i>Melaleuca lanceolata</i> Shrubland	This species most often occurs as a mix in mallee and coastal areas however in some places forms large stands of dominance. In association 42 occurs as remnant on linear dune rises.	42	<i>Melaleuca lanceolata</i> +/- <i>Eucalyptus phenax</i> ssp. <i>phenax</i> Tall Shrubland over exotic grasses			2:1 – 3:1
		19	<i>Melaleuca lanceolata</i> Tall Shrubland over <i>Atriplex stipitata</i> and <i>Dodonaea viscosa</i> ssp. <i>angustissima</i>			10:1
<i>Melaleuca halmaturorum</i> Shrubland	Recorded in the permanent creek lines in the southern section of the alignment. Often saline low lying areas and providing valuable habitat for waterfowl.	66	<i>Melaleuca halmaturorum</i> Tall Open Shrubland over <i>Juncus kraussii</i> and <i>Juncus pallidus</i>			2:1 – 6:1
<i>Melaleuca uncinata</i> Shrubland	Recorded on the ironstone outcrops present in the mallee areas south of the Middleback Range.	22	<i>Melaleuca uncinata</i> Tall Shrubland +/- <i>Eucalyptus incrassata</i> and <i>Eucalyptus brachycalyx</i>			4:1 – 10:1
		28	<i>Melaleuca uncinata</i> Tall Shrubland			4:1 – 10:1
		75	<i>Melaleuca uncinata</i> +/- <i>Eucalyptus brachycalyx</i> +/- <i>Callitris gracilis</i> +/- <i>Eucalyptus oleosa</i>			10:1
<i>Senna artemisioides</i> ssp. Shrubland	Dominant on the rocky hills of the Middleback Range this occupies a small overall area of the alignment.	18	<i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Dodonaea lobulata</i> Tall Shrubland +/- <i>Myoporum platycarpum</i> , <i>Dodonaea viscosa</i> ssp. <i>angustissima</i> and <i>Acacia oswaldii</i>			10:1
Chenopod Shrublands						
<i>Atriplex vesicaria</i> Shrubland	Important stabilising species recorded in the arid zone north of the Middleback range. Widely known as an indicator species where high abundance correlates with good condition of the landscape.	10	<i>Atriplex vesicaria</i> Low Shrubland			9:1
<i>Maireana pyramidata</i> /		3	<i>Maireana pyramidata</i> / <i>Atriplex vesicaria</i> +/- <i>Maireana sedifolia</i> Low Open Shrubland			9:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Atriplex vesicaria</i> Shrubland	Low priority vegetation stratum where degraded condition and some weed infestation has occurred. Usually associated with heavy grazing impacts from sheep.	9	<i>Maireana pyramidata</i> Low Shrubland +/- <i>Myoporum platycarpum</i> , <i>Acacia papyrocarpa</i> , <i>Alectryon oleifolius</i> ssp. <i>canescens</i>			9:1
<i>Maireana sedifolia</i> Shrubland	Very long lived species that requires specific condition to germinate and establish. Very difficult to rehabilitate and should be avoided where possible.	12	<i>Maireana sedifolia</i> Low Shrubland +/- <i>Myoporum platycarpum</i> , <i>Acacia papyrocarpa</i> , <i>Eucalyptus gracilis</i> , <i>Alectryon oleifolius</i> ssp. <i>canescens</i>			9:1
		2	<i>Maireana sedifolia</i> Low Shrubland +/- <i>Acacia papyrocarpa</i> over <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>			9:1
<i>Tecticornia</i> sp. Shrubland	Occurs in saline habitats where few other species can survive. Samphire provides food resources for a number of threatened species.	37	<i>Tecticornia</i> sp. Low Open Shrubland			3:1 – 8:1
		50	<i>Tecticornia</i> sp. +/- <i>Melaleuca halmaturorum</i> shrubland over exotic grasses and emergent's			3:1
Grasslands / Sedgeland						
<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. Grassland	Remnant patches of native grassland mostly recorded in road reserves and rough terrain unsuitable for traversing by machinery and subsequent application of phosphates.	31	<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. +/- <i>Themeda triandra</i> Tussock Grassland		E	2:1 – 7:1
		51	<i>Austrostipa</i> sp. Tussock Grassland +/- <i>Eucalyptus</i> spp.			5:1
<i>Triodia</i> spp. Hummock Grassland	Common association recorded on steep rocky hills and dunes. High habitat value for small fauna species	8	<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i> , <i>Sida petrophila</i>			9:1
<i>Ficinia nodosa</i> Sedgeland	Very common association recorded on sands where temporary inundation occurs periodically. Infestation of <i>Ehrharta</i> sp (Veldt Grass) reduces the value.	54	<i>Ficinia nodosa</i> Sedgeland over <i>Ehrharta calycina</i>			3:1
<i>Gahnia</i> spp. / <i>Juncus kraussii</i> Sedgeland	Recorded on flood plains and adjacent to creeks and rivers where water pools for extended period following periods of flooding. Largely cleared due to location on high quality soils and availability through drainage.	62	<i>Gahnia</i> spp. / <i>Juncus kraussii</i> Sedgeland +/- <i>Eucalyptus petiolaris</i>		E	2:1 – 6:1
<i>Juncus</i> spp Sedgeland	Sedgeland recorded in the vicinity of Tod river. Common and widespread.	64	<i>Juncus</i> spp Sedgeland			1:1 – 3:1

Broad Floristic Description	Comments	Veg Assoc #	Vegetation Association Description	Comm. Listed Tec ¹	State Listed TEC ²	Condition Ratio ³
<i>Juncus acutus</i> Sedgeland	Weed dominated Sedgeland.	67	<i>Juncus acutus</i> Sedgeland			0:1
Miscellaneous						
Grassland	Contains the odd scattered native shrub throughout.	15	Agricultural land (cropping / grazing)			1:1
Shrubland / woodland	Revegetation area	52	Planted			0:1

1 = Environment Protection and Biodiversity Conservation Act 1999)

2 = Provisional List of Threatened Ecosystems of South Australia (DEH in progress)

3 = Vegetation condition ratio, determined using criteria adopted by the Native Vegetation Council to calculate SEB offset requirements for native vegetation clearance (Table 10).

5.3.5 Threatened Ecological Communities

Eucalyptus petiolaris (Eyre Peninsula Blue Gum) Woodland has recently been listed as Endangered at a national level. The community is endemic to Eyre Peninsula. Some of the main threatening processes which have led to the decline in extent by approximately 91% and degradation of the remaining remnants include clearance and fragmentation, overgrazing, weed species such as perennial Veldt Grass (*Ehrharta longiflora*) and Bridal Creeper (*Asparagus asparagoides*), increasing salinisation through rising water tables, dieback and inappropriate fire regimes (TSSC, 2013). The examples mapped along the transmission line corridor were mostly degraded with only a few remnants in moderate condition. All have been compromised by exotic species in the understorey and some by inappropriate grazing levels and therefore some of these may not qualify as the TEC under the Approved Conservation Advice (TSSC, 2013).

DEWNR's *Provisional List of Threatened Ecosystems of South Australia* (DEH in progress), includes a number of plant communities mapped along the transmission line corridor which are considered threatened in South Australia. Descriptions and ratings of TEC's are provided in Table 27.

Table 27. State threatened plant communities within project area.

Veg Assoc #	Plant association	AUS Status	SA Status	Comments
58, 70	<i>Eucalyptus petiolaris</i> Woodland	EN	E	Mostly recorded as small remnant patches associated with creeks, drainage areas and in road reserves. High value association, providing habitat resources for a number of fauna species. Forms a large tree stratum in places. All examples are generally degraded (Moderate (5:1) – Very Poor (2:1)).
40	<i>Allocasuarina verticillata</i> Low Woodland		V	Occurs on clay loams of low hills. Formally extensive, but much has been extensively cleared and very little remains. Some good patches remain but most is highly modified by clearance, weeds and grazing. Approximately only 11 % of the mapped community is protected in reserves or Heritage Agreements. Examples within project area vary in condition from very poor (2:1) to very good (8:1).
4	<i>Alectryon oleifolius</i> ssp. <i>canescens</i> Low Woodland over <i>Atriplex vesicaria</i> / <i>Maireana sedifolia</i>		V	Occurs mainly north of the Middleback Ranges where it forms relatively large tracts on the alluvial soils and plains where soil depth and ephemeral runoff enable this species to outcompete other larger tree species. Threatened due to lack of regeneration as this species is preferentially grazed as juveniles by domestic and native herbivores. Approximately 5.3% of remaining association protected in Heritage Agreements and reserves.
46, 47	<i>Eucalyptus peninsularis</i> , <i>E. dumosa</i> complex Woodland		E	Occurs on flat or rarely hilly areas characterised by loams or clay-loams. Most remaining examples are small and/or degraded and/or atypical. Considered to have a limited range with only small areas occurring in

Veg Assoc #	Plant association	AUS Status	SA Status	Comments
				reserves. <i>Eucalyptus peninsularis</i> (Cummins Mallee) is endemic to the EP and occurs within the Eyre Hills IBRA Sub-region and is distributed between Cummins and Yeelanna and also through the Koppio Hills. Reserves and Heritage Agreements protect some areas of the community (DEH, 2002).
58, 70	<i>Eucalyptus petiolaris</i> (Eyre Peninsula Blue Gum) Grassy Woodland		E	Endemic community to the EP, the association has a limited distribution along watercourses, often with a dense understorey of <i>Callistemon rugulosus</i> (Scarlet Bottlebrush). Occurs on heavy, fertile soils on plains. Mostly confined to the Eyre Hills IBRA Subregion and is mainly distributed throughout the central and northern parts of the Koppio Hills. 11% of the mapped community is protected. Most mapped examples within the project area in moderately poor condition, compromised by weeds and grazing.
62	<i>Gahnia trifida</i> (Cutting Grass) Sedgeland		E	<i>Gahnia trifida</i> Sedgeland covers a very small area and is restricted to low lying swampy areas and some creeklines predominantly in the Lower Eyre Peninsula. Climate change projections indicate that these habitats are likely to be impacted further in the future (Brandle, 2010). On the EP it is confined to the Eyre Hills IBRA Sub-region.
31	<i>Austrodanthonia</i> spp. / <i>Austrostipa</i> ssp. +/- <i>Themeda triandra</i> Tussock Grassland		E	Small remnant examples of tussock grasslands occur in patches scattered throughout all IBRA Subregions on heavy fertile soils of plains and hill slopes. Most are highly modified by grazing and weed invasion.

5.3.6 Threatened Habitat Areas

Five threatened habitat areas across the Eyre Peninsula were identified based on a number of factors including regionally threatened ecosystems, low remnancy and highly fragmented and isolated vegetation blocks, low representation within the reserve system and large numbers of threatened species, many at a national level. Two of the threatened habitat areas are intersected by the proposed transmission line corridor; Cleve Hills (322,000ha) and Koppio Hills (96,000ha) (DEH, 2002).

Cleve Hills Threatened Habitat Area lies within the northern part of the Eyre Hills IBRA Subregion. The area is known to possess a high number of national and State threatened flora species, the State Endangered *Eucalyptus cretata* (Darke Peak Mallee) Mallee and *Eucalyptus petiolaris* (Eyre Peninsula Blue gum) Low Woodland vegetation associations, both endemic to the Eyre Peninsula. A number of regionally threatened communities also occur within the area. Nationally threatened flora species include *Acacia cretacea* (Chalky Wattle), *Swainsona pyrophila* (Yellow Swainson-pea), *Acacia enterocarpa* (Jumping-jack wattle), *Limosella granitica* (Granite Mudwort), *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), *Acacia rheticocarpa* (Neat Wattle), *Pterostylis aff despectans* (Lowly Greenhood), *Pterostylis xerophila* (Desert Greenhood) and *Arachnorchis brumalis* (Winter Spider-orchid). At the time the Threatened Habitat Areas were identified, approximately 34% of Cleve Hills was

protected in government reserves (DEH, 2002), however the 2012 proclamation of Ironstone Hill CP has increased the total proportion protected. Reserves intersected by the proposed transmission line corridor include Ironstone Hill CP, Sheoak Hill CP and Sheoak Hill CR.

The nutrient and water poor mallee communities within this area, particularly the larger continuous tracts of high quality mallee also provide important refuge areas to a large number of fauna species. They include nationally threatened species such as the Malleefowl and the Sandhill Dunnart. The communities are known to support a more diverse suite of native mammals and reptiles than other vegetation types including Southern Ningauai, Grey-bellied Dunnart, Crested Dragon and a range of other geckoes, snake-lizards, dragon lizards and snakes (DEH, 2002).

The Koppio Hills Threatened Habitat Area occupies an area of approximately 96,000ha and is located within the Eyre Hills IBRA Subregion. Approximately 18,000ha of remaining vegetation has been mapped across the area (DEH, 2002). The area contains highly significant, but highly fragmented vegetation, including the nationally Endangered *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland and *Eucalyptus peninsularis*, *E. dumosa* complex Woodland. A number of regionally threatened communities also occur within the area, including *Eucalyptus cladocalyx* (Sugar Gum) Woodland which is regarded as a regionally threatened vegetation community (DEH, 2002) and covers approximately 13,000 hectares (Brandle, 2010). The community offers valuable habitat for native fauna in the abundant hollows which form in the mature trees, and the fallen branches and litter in the understorey. An ample provision of nectar is also available in late summer to large numbers of lorikeets and honeyeaters (Brandle, 2010). It is considered to support a large number of fauna species, including the State listed Brush-tailed Possum, Shining Bronze-Cuckoo, Scarlet Robin, Western Gerygone, Painted Button-quail and Yellow-tail Black Cockatoo, Diamond Firetail, Restless Flycatcher, Jacky Winter and Carpet Python. Approximately half of the vegetation association was burnt in January 2005, resulting in severe impacts on the fauna, however it has since been reported that most of the species have reinhabited the area and their populations recovering. The 2010 Biological Survey of Eyre Peninsula (Brandle, 2010) showed through habitat analyses that many of the woodland communities supported the highest numbers of species per site, providing further evidence of the importance of Sugar Gum woodland as a unique bird habitat in South Australia (Carpenter 1995 as cited in Brandle, 2010).

A large number of nationally threatened flora species have been recorded from the Koppio Hills including *Acacia enterocarpa* (Jumping-jack wattle), *Acacia whibleyana* (Whibley Wattle), *Acacia pinguifolia* (Fat-leaved Wattle), *Pultenaea trichophylla* (Tufted Bush-pea), *Haloragis eyreana* (Prickly Raspwort), *Olearia pannosa subsp. pannosa* (Silver Daisy-bush), *Arachnorchis tensa* (Rigid Spider-orchid), *Arachnorchis brumalis* (Winter Spider-orchid), *Ptilotus beckerianus* (Ironstone Mulla Mulla), *Thelymitra epipactoides* (Metallic Sun-orchid), *Prasophyllum goldsackii* Goldsack's (Leek-orchid). In addition a large number of State listed flora species have also been recorded.

5.3.7 Invasive weeds

The weed species listed in Table 28 were recorded during the field surveys. It is possible more species are present within inaccessible areas. Five of these species are declared across the State under the *Natural Resources Management Act 2004*, however Onion Weed is not regarded as Declared within the District Councils of Whyalla, Franklin Harbour, Tumby Bay, Cleve and Lower Eyre Peninsula. Cane Cactus (*Austrocyllindropuntia cylindrica*) is not specifically listed as declared, however it is listed as a WONS (Weed of National Significance). Horehound was scattered but widespread throughout the project area and broader region, but was not observed within the larger more intact blocks of pristine mallee and woodland blocks. Onion Weed, Silver-leaf Nightshade and African Boxthorn only appeared to be associated with disturbances and mainly present along the margins of cleared and cultivated land. Both Silver-leaf Nightshade and African Boxthorn are also WONS (Thorp and Wilson, 1998 onwards). Individual landowners and managers are ultimately responsible for managing WoNS and the State government is responsible for overall legislation and administration. Under the NRM Act, landholders are obliged to control declared weeds on their property, as they are known to cause significant economic, social and environmental impacts.

A range of environmental weeds were also recorded, some having significant potential for further spread, particularly across property boundaries if unregulated. Most of these species were associated with disturbed edges of remnant vegetation, access tracks and across grazing and cropping land, particularly Bearded Oat, Wild Turnip, Perennial Veldt Grass, Coastal Galenia, Wild Sage and Apple of Sodom. Wards Weed was only widespread throughout the pastoral country north of the Middleback Ranges.

Control works should be undertaken in line with regional priorities, and co-ordinated with surrounding land managers. Control is considered most feasible for species of a limited occurrence and patchy distribution, to prevent their spread to non-affected areas.

Table 28. Key invasive weeds identified during the EBS field surveys.

Scientific name	Common name	Status
* <i>Aira sp.</i>	Hair-grass	
* <i>Asphodelus fistulosus</i>	Onion Weed	D+
* <i>Austrocyllindropuntia cylindrica</i>	Cane Cactus	D++
* <i>Avena barbata</i>	Bearded Oat	E
* <i>Brassica tournefortii</i>	Wild Turnip	E
* <i>Bromus madritensis</i>	Compact Brome	
* <i>Carrichtera annua</i>	Ward's Weed	E
* <i>Carthamus lanatus</i>	Saffron Thistle	E
* <i>Chamaecytisus palmensis</i>	Tree Lucerne	E
* <i>Citrullus lanatus</i>	Bitter Melon	
* <i>Cucumis myriocarpus</i>	Paddy Melon	
* <i>Ehrharta calycina</i>	Perennial Veldt Grass	E

Scientific name	Common name	Status
* <i>Galenia pubescens</i> var. <i>pubescens</i>	Coastal Galenia	E
* <i>Geranium dissectum</i>	Cut-leaf Geranium	
* <i>Limonium lobatum</i>	Winged Sea-lavender	E
* <i>Lycium ferocissimum</i>	African Boxthorn	D
* <i>Marrubium vulgare</i>	Horehound	D
* <i>Mesembryanthemum</i> sp.	Iceplant	E
* <i>Onopordum acaulon</i>	Horse Thistle	
* <i>Petrorhagia dubia</i>	Velvet Pink	
* <i>Reichardia tingitana</i>	False Sowthistle	
* <i>Salvia verbenaca</i> var.	Wild Sage	E
* <i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade	D
* <i>Solanum linnaeanum</i>	Apple Of Sodom	E

D = Declared plant under the *Natural Resources Management Act 2004*

E = Environmental weed (DPTI Environmental Weeds List)

*Denotes exotic species

+Not declared in these local council areas

++ The genus *Opuntia* is Declared and *Austrocylindropuntia* listed as a WON (Weed of National Significance)

5.3.8 Sandhill Dunnart

(Information sourced from Ecological Horizons Pty. Ltd. (Appendix 3) - commissioned to undertake this targeted assessment).

Habitat modelling

Using the 77 survey sites previously sampled, the strongest explanatory variable for the presence or absence of Sandhill Dunnarts at a site was the 90th percentile *Triodia* height. The 90th percentile height was also the strongest variable explaining variation in the probability of capture of Sandhill Dunnarts. The model suggests that the probability of capturing a Sandhill Dunnart increases significantly when the 90th percentile of *Triodia* heights exceeds 400mm and peaks at 600mm (see Appendix 3 for graphs).

When the relationship between fire age and 90th percentile *Triodia* height was investigated, 90th percentile height peaked between 20 and 40 years post fire. However, sites older than 50 years could not be included in this model as their fire age was unknown. Fire mapping is only available for areas from the 1960's onwards. Sandhill Dunnarts were also recorded at many older fire age sites that also contained tall *Triodia*, suggesting that a minimum fire age is more important for predicting Sandhill Dunnart presence than maximum fire age. Sandhill Dunnarts were not captured at sites less than 10 years post fire.

Results suggest that the presence of at least some tall *Triodia* hummocks are important for Sandhill Dunnarts, supporting observations of Churchill (2001) who found adult females selected tall *Triodia* hummocks for nest sites. Sites on the Eyre Peninsula containing *Triodia* between 10 and 50 years post-fire are considered currently optimal for Sandhill Dunnarts, with sites > 50 years post fire requiring ground-truthing to measure *Triodia* height.

Transmission Line

Vegetation mapping within the transmission line corridor revealed a total of 1236.4 hectares of native vegetation contained *Triodia* habitat. Of this, 1213.3 hectares was considered suitable *Triodia* habitat for Sandhill Dunnarts. This equates to nearly 17% of the total native vegetation along the assessed portion of the corridor and includes four of the five *Triodia* vegetation associations identified (Table 29). The small isolated patch of the vegetation association "*Triodia* spp. Hummock Grassland over *Austrostipa* spp., *Aristida contorta*, *Sida petrophila*" located near Whyalla was not considered suitable for Sandhill Dunnarts due to the absence of mallee species and isolated location within chenopod clay swales. The main area of Sandhill Dunnart habitat was located between the Middleback Range and Sheoak Hill Conservation Park (Figure 15 and Figure 16). Patches of suitable *Triodia* habitat were interspersed with other habitat types which would likely be used by Sandhill Dunnarts for dispersal and feeding.

Table 29. Flora composition of *Triodia* vegetation associations within the proposed corridor. Vegetation association in bold is not considered suitable for Sandhill Dunnarts.

Detailed flora species composition of <i>Triodia</i> vegetation associations	ha	%*	SHD sites
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>	892.4	12.17%	7
<i>Eucalyptus incrassate</i> , <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>	186.7	2.55%	1
<i>Acacia wilhelmiana</i> , <i>Senna artemisioides</i> ssp. <i>coriacea</i> , <i>Eucalyptus gracilis</i> , <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp.	125.0	1.70%	
<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i> , <i>Sida petrophila</i>	22.7	0.31%	
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp. , <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>	9.6	0.13%	

*Note: percentage calculation is based on total area of native vegetation.

The majority of the Sandhill Dunnart habitat was recorded in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements. Only small isolated patches of *Triodia* habitat were recorded in other areas which are unlikely to support Sandhill Dunnart populations due to their small size and isolation.

Although all *Triodia* habitat is likely to be suitable for Sandhill Dunnarts, the fire history of the transmission line corridor was overlaid over the *Triodia* vegetation associations to determine current and future optimal habitat based on fire age (Figure 15 to Figure 19). Modelling suggests that habitat between 10 and 50 years post fire contains *Triodia* of suitable height for nesting Sandhill Dunnarts. These areas currently comprise 35% of the suitable *Triodia* habitat within the proposed corridor (Table 30). Approximately 11% of suitable *Triodia* habitat is currently < 10 years post burn and will likely be suitable for Sandhill Dunnarts within 10 years. More than half of the mapped *Triodia* habitat in the corridor is of unknown fire age and would require ground-truthing to determine whether it is currently suitable habitat. However, Sandhill Dunnarts have been recorded from some of these unknown fire age sites and even if these areas do not contain *Triodia* of sufficient height for nesting they would be considered future optimal habitat depending on fire regimes in the future. Importantly, all *Triodia* habitat between the Middleback Range and Sheoak Hill Conservation Park is likely to be important for Sandhill Dunnarts as it allows a mosaic of fire ages to be sustained over large areas.

Table 30. Sandhill Dunnart habitat.

Sandhill Dunnart habitat classification	Ha	%
Total area of unclassified SHD habitat (<i>Triodia</i> spp, no fire history)	664.04	54%
Total area of optimal SHD habitat (<i>Triodia</i> spp + 10-50 years post fire)	433.95	35%
Total area of future optimal SHD habitat (<i>Triodia</i> spp + < 10 years post fire)	138.42	11%

Ground-truthing

Twenty four sites within the five *Triodia* vegetation associations were randomly selected and recommended for future ground-truthing, should greater certainty about Sandhill Dunnart suitability be required (details in Moseby 2014). An additional five sites were visited in Sheoak Hill Conservation Park in unknown fire age *Triodia* habitat. The 90th percentile *Triodia* height at these sites ranged from 57-87cm with average *Triodia* height from 35-58cm. These measurements, along with visual appraisal, suggest that the *Triodia* in Sheoak Hill, although of unknown fire age, is also currently optimal for Sandhill Dunnarts.

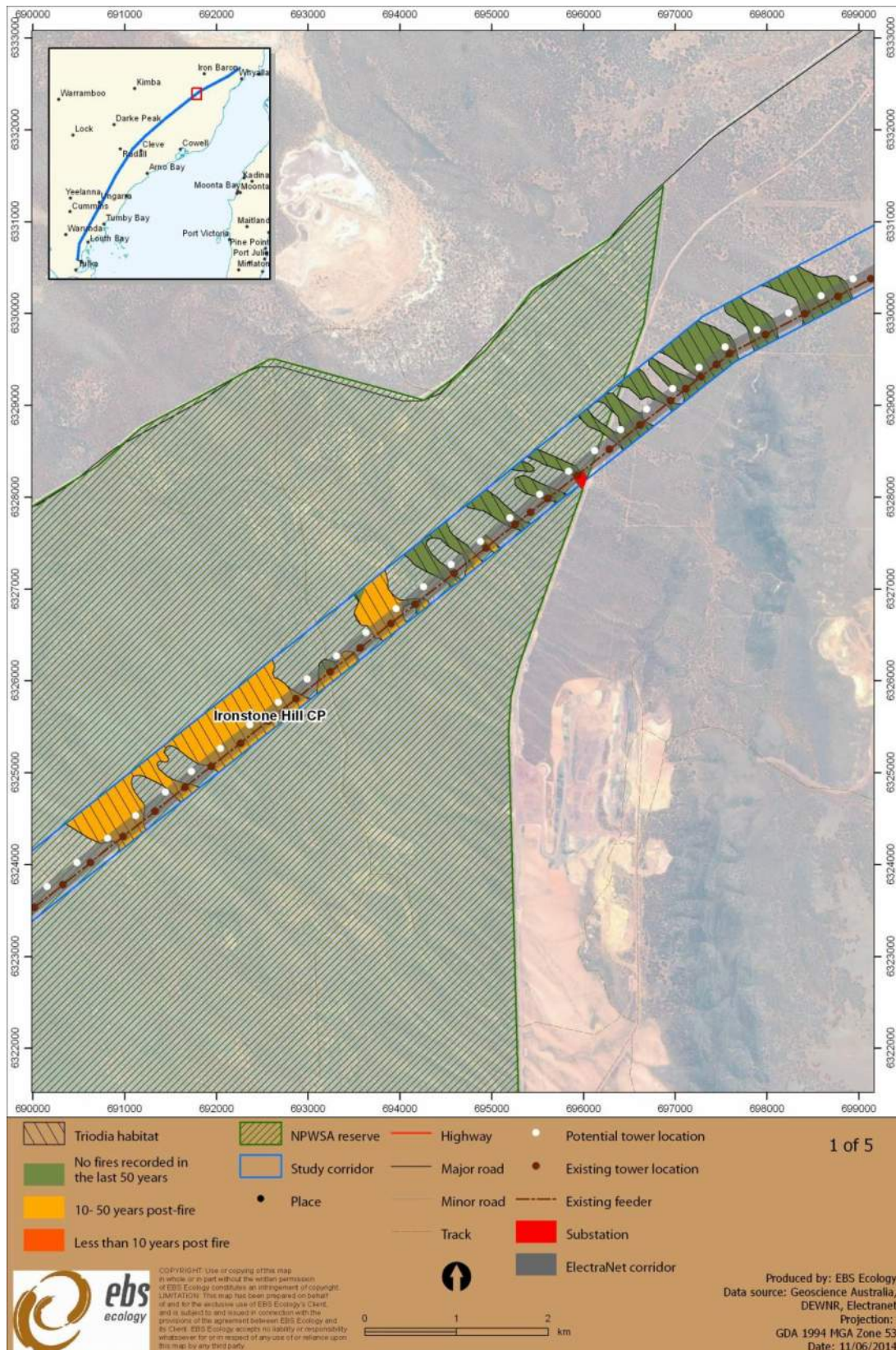


Figure 15. Sandhill Dunnart habitat classified according to fire age. Known optimal habitat is between 10 and 50 years post burn, future optimal habitat is less than 10 years post burn and green is unclassified habitat (unknown fire age, ground truthing required). Map 1 of 5.

Note: All *Triodia* habitat between Middleback Range and Sheoak Hill on sandy soils is suitable for sandhill dunnarts at some stage in its post-fire trajectory and large areas are required to support habitat mosaics of different fire age to ensure long term dunnart survival in the region.

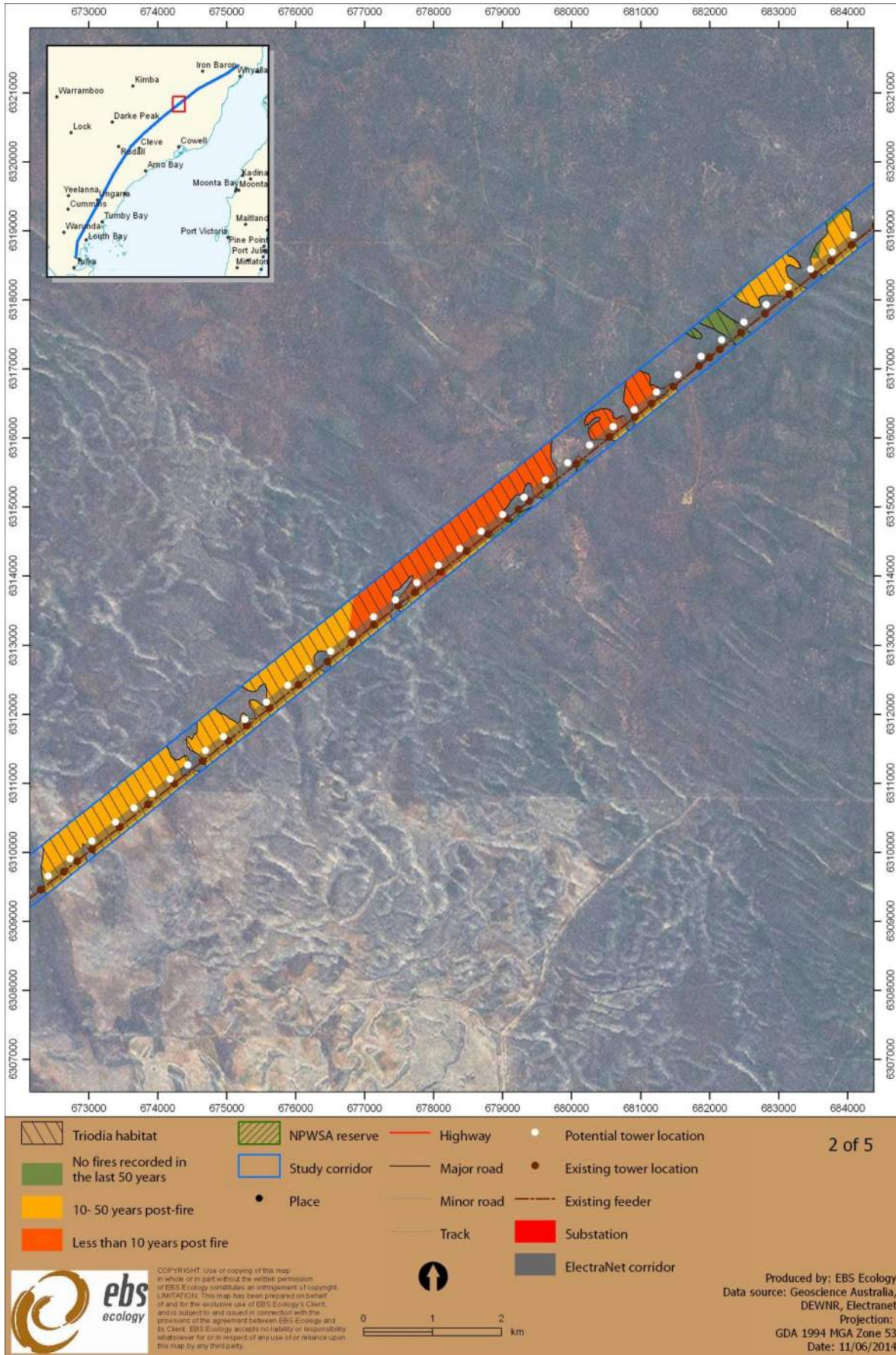


Figure 16. Sandhill Dunnart habitat classified according to fire age. Map 2 of 5.

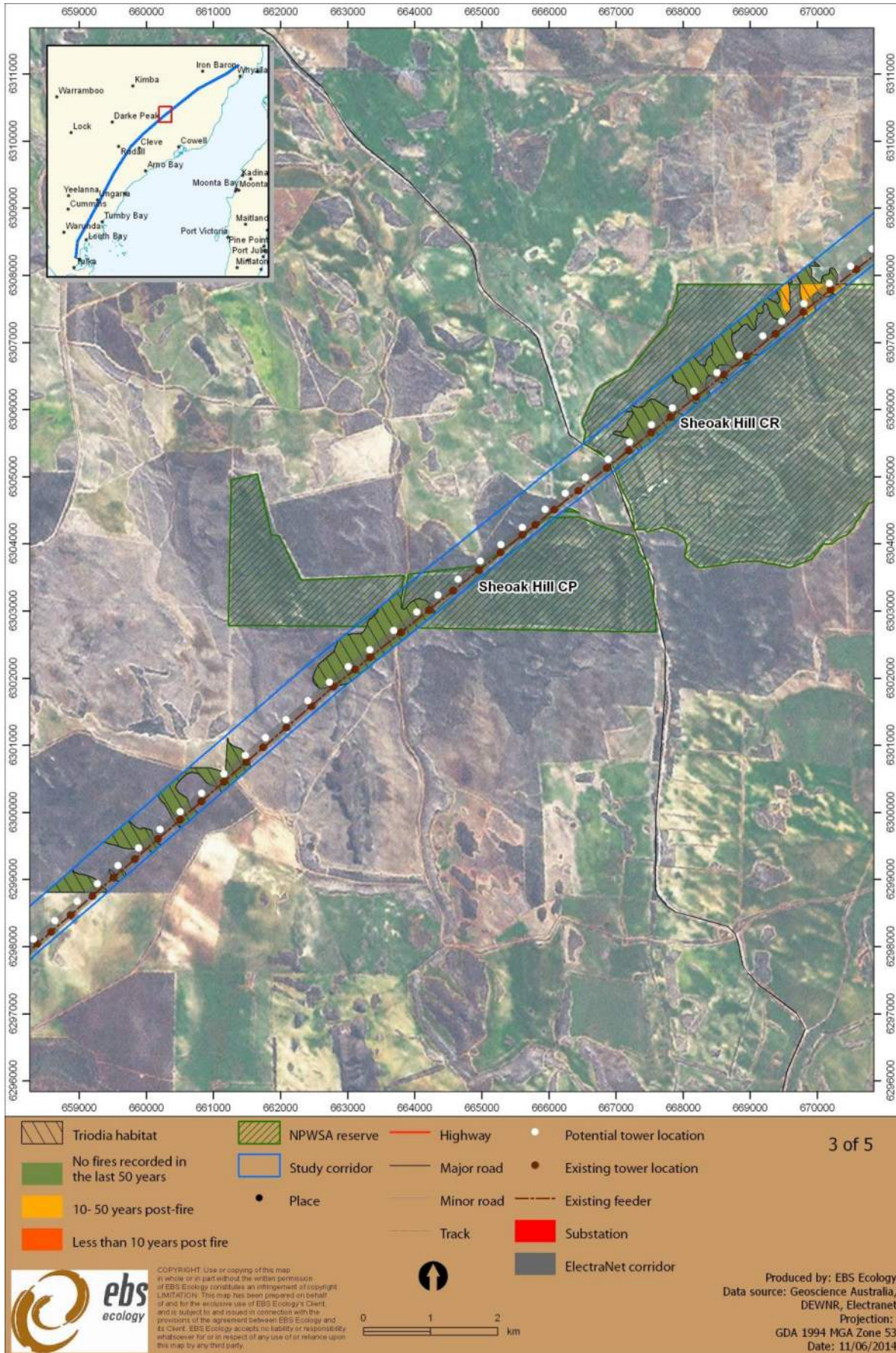


Figure 17. Sandhill Dunnart habitat classified according to fire age. Map 3 of 5.

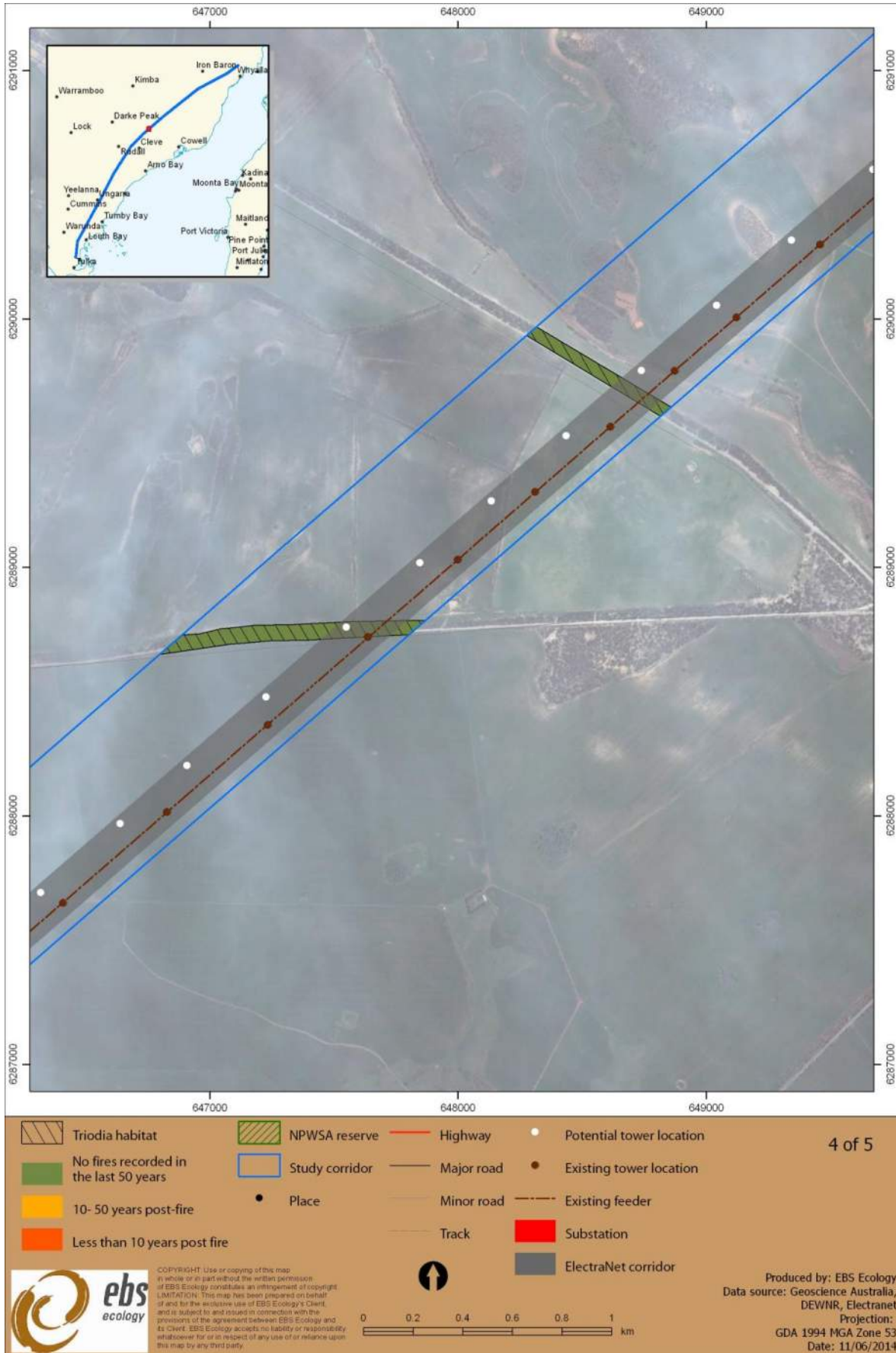


Figure 18. Sandhill Dunnart habitat classified according to fire age. Map 4 of 5.

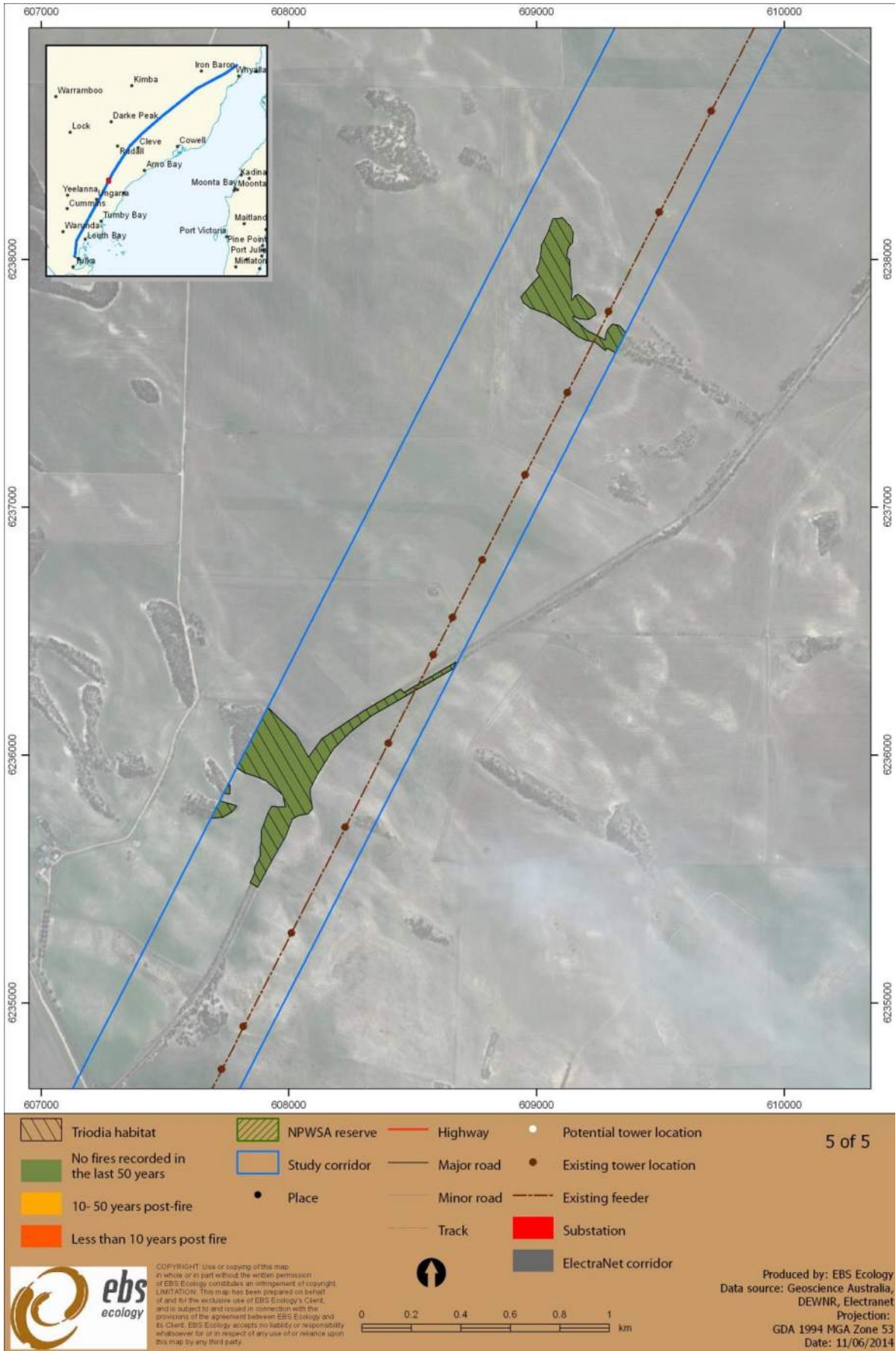


Figure 19. Sandhill Dunnart habitat classified according to fire age. Map 5 of 5.

5.3.9 Malleefowl

(Information sourced from Ecological Horizons Pty. Ltd. - commissioned to undertake this targeted assessment).

A total of 253 objects were identified using the airborne LiDAR survey. However, many of these were proven to be either mounds of dirt, large elevated lignotubers or other object rather than mounds. As such, 80 objects were removed simply from analysis by their height, shape and cross checking with the orthophotos. This resulted in 173 potential mounds being identified and was either 'confirmed' mounds (81) with a concave shape or 'possible' mounds (92) which were flat or domed. Of these 137 mounds (80% of the total) were ground truthed, consisting of 67 of the 81 'confirmed' (representing 83%) and 70 of the 92 'possible' (representing 76%). This was to confirm the mounds as being Malleefowl nest as well as establishing if the mound was either current or historical in its use.

Of these ground truthed mounds, 95% (64 of 67) of the 'confirmed' objects identified by LiDAR were found to be Malleefowl and only 8.5% (6 of 70) 'possible' objects were confirmed to be Malleefowl mounds. If the same percentage accuracy is assumed for the 14 'confirmed' objects and for the 22 'possible' which were not visited on the ground, we can assume another 13 'confirmed' and 2 'possible' objects would be mounds within the study area.

Comparison of transmission line and control transect

38 mounds were confirmed on 24.1 km of transmission line transect ground truthed (density of 3.2 mounds per km²), compared with 37 on 16.6 km (density of 4.4 mounds per km²) of the control transect (Figure 20 to Figure 25). These data suggest that Malleefowl mound density along the transmission line was 73% of that in areas remote from the transmission line.

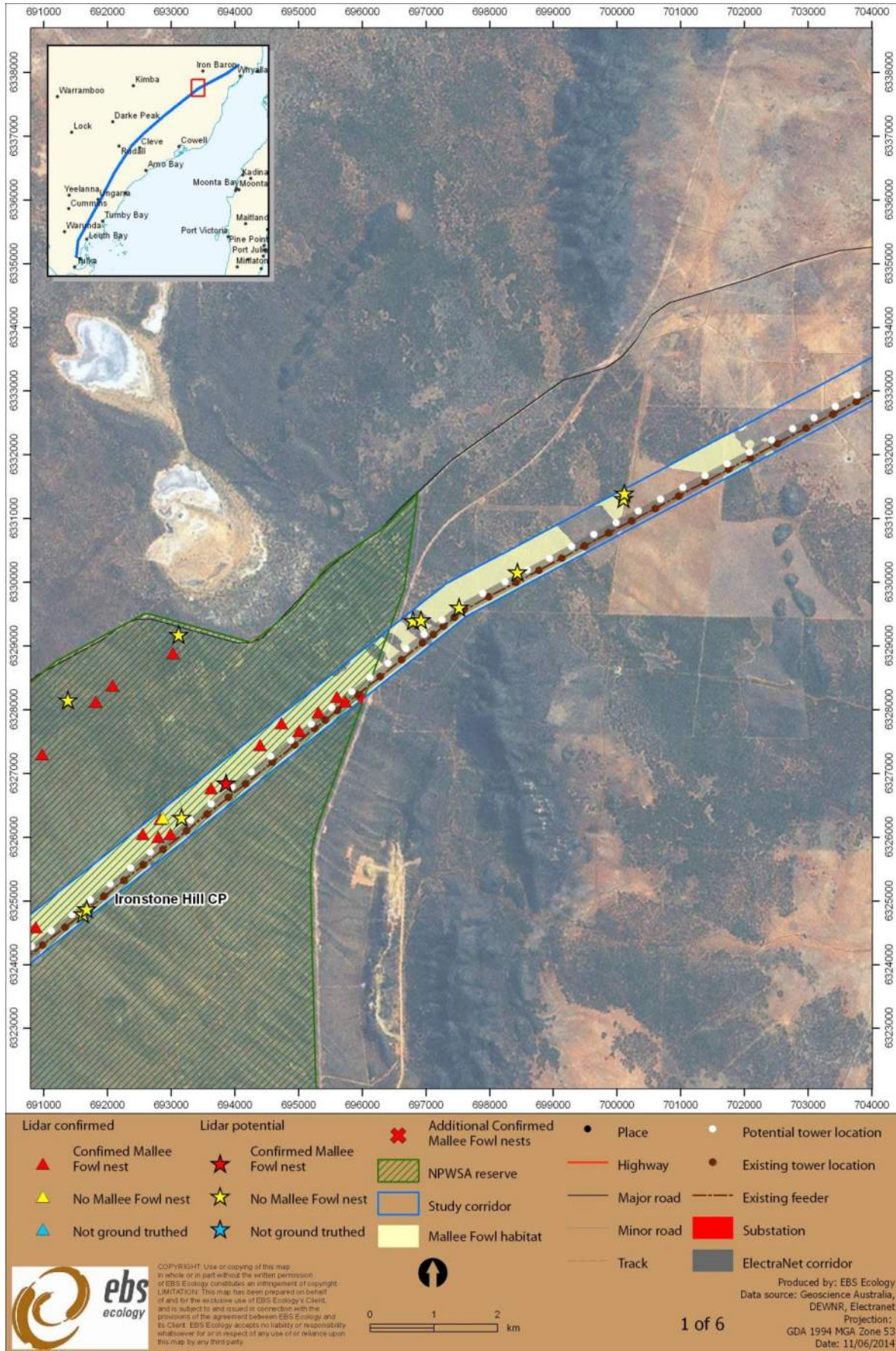


Figure 20. Location of Malleefowl mounds, confirmed and unconfirmed – Map 1 of 6.

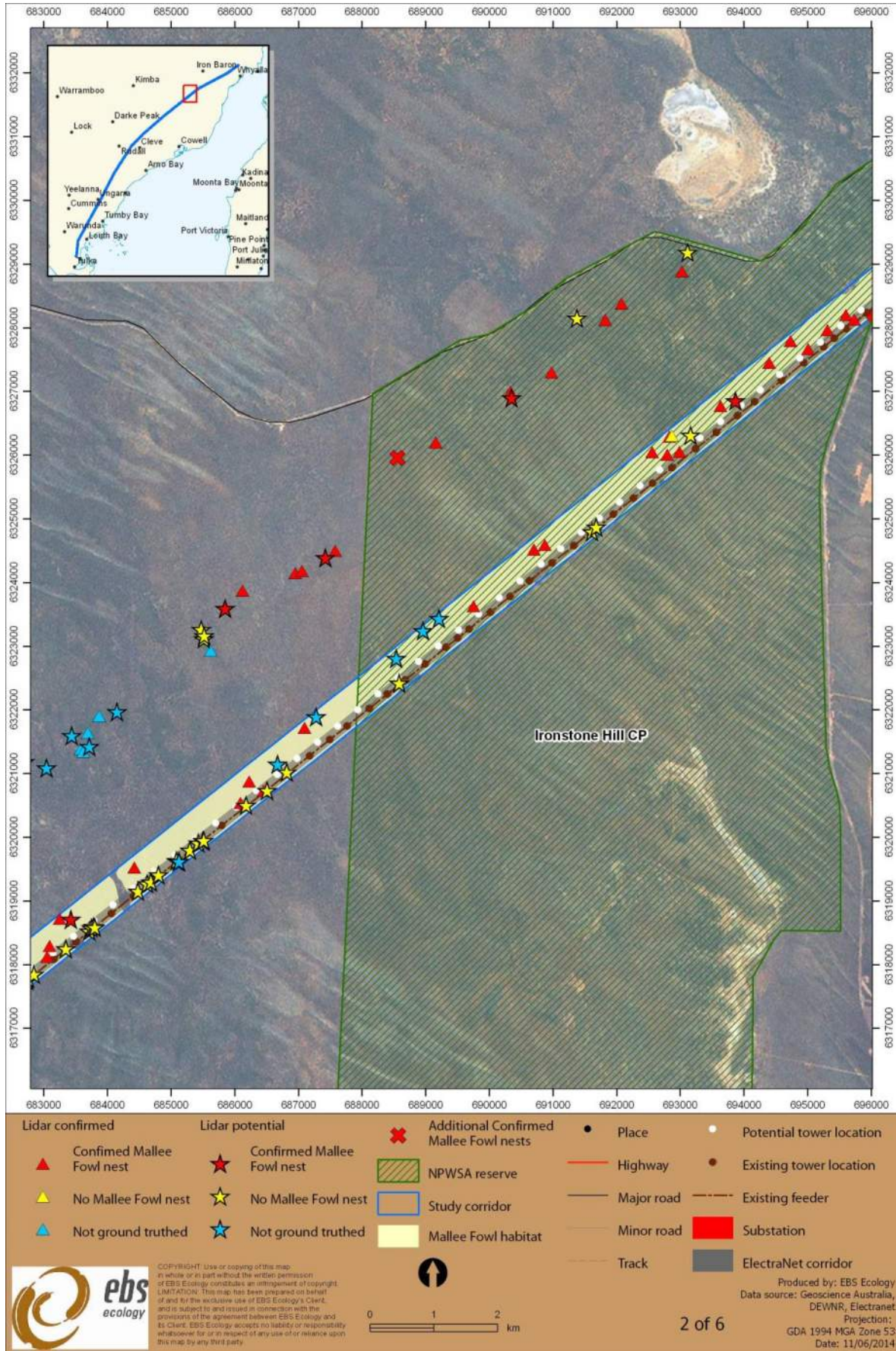


Figure 21. Location of Malleefowl mounds, confirmed and unconfirmed – Map 2 of 6.

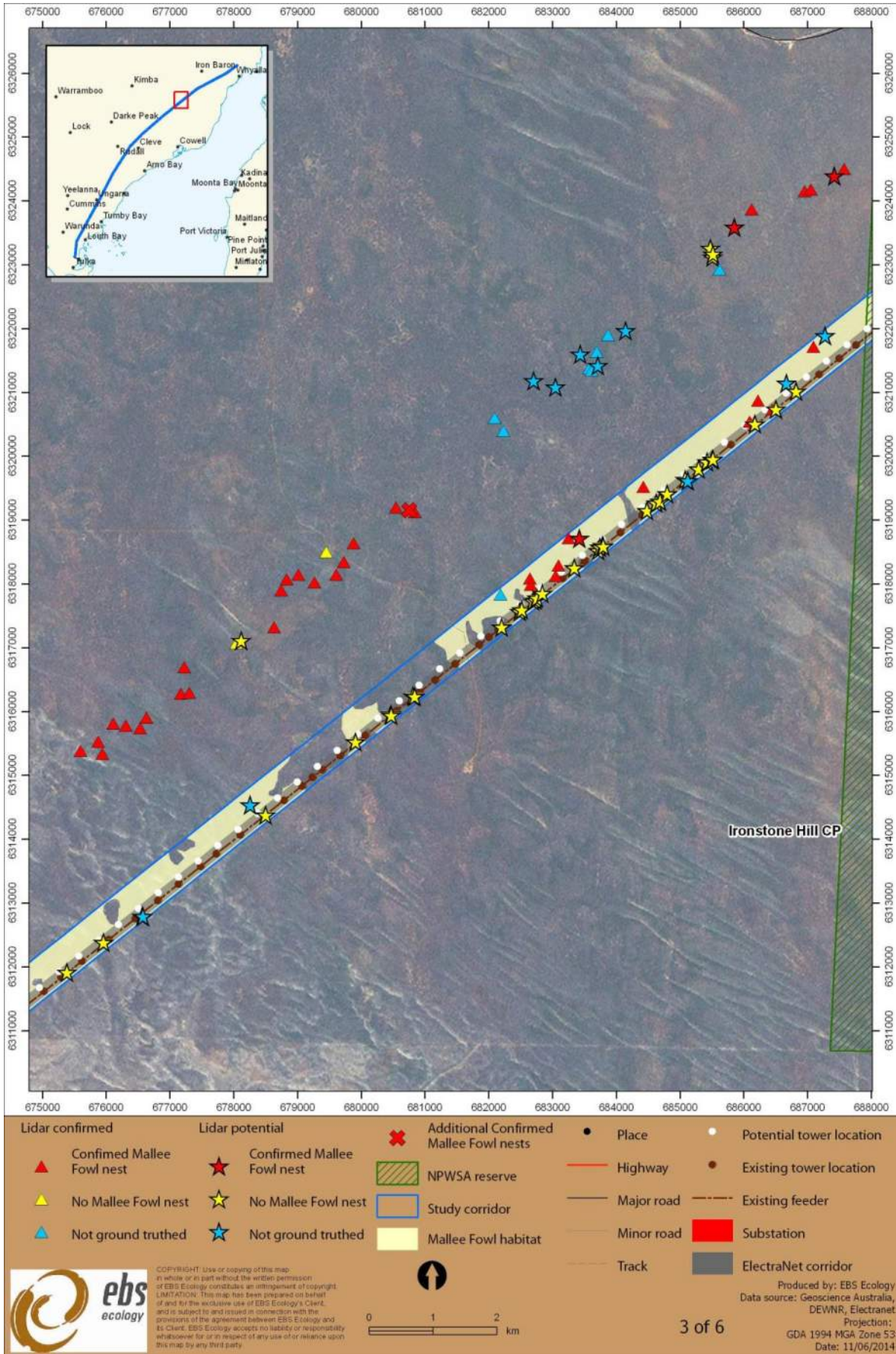


Figure 22. Location of Malleefowl mounds, confirmed and unconfirmed – Map 3 of 6.

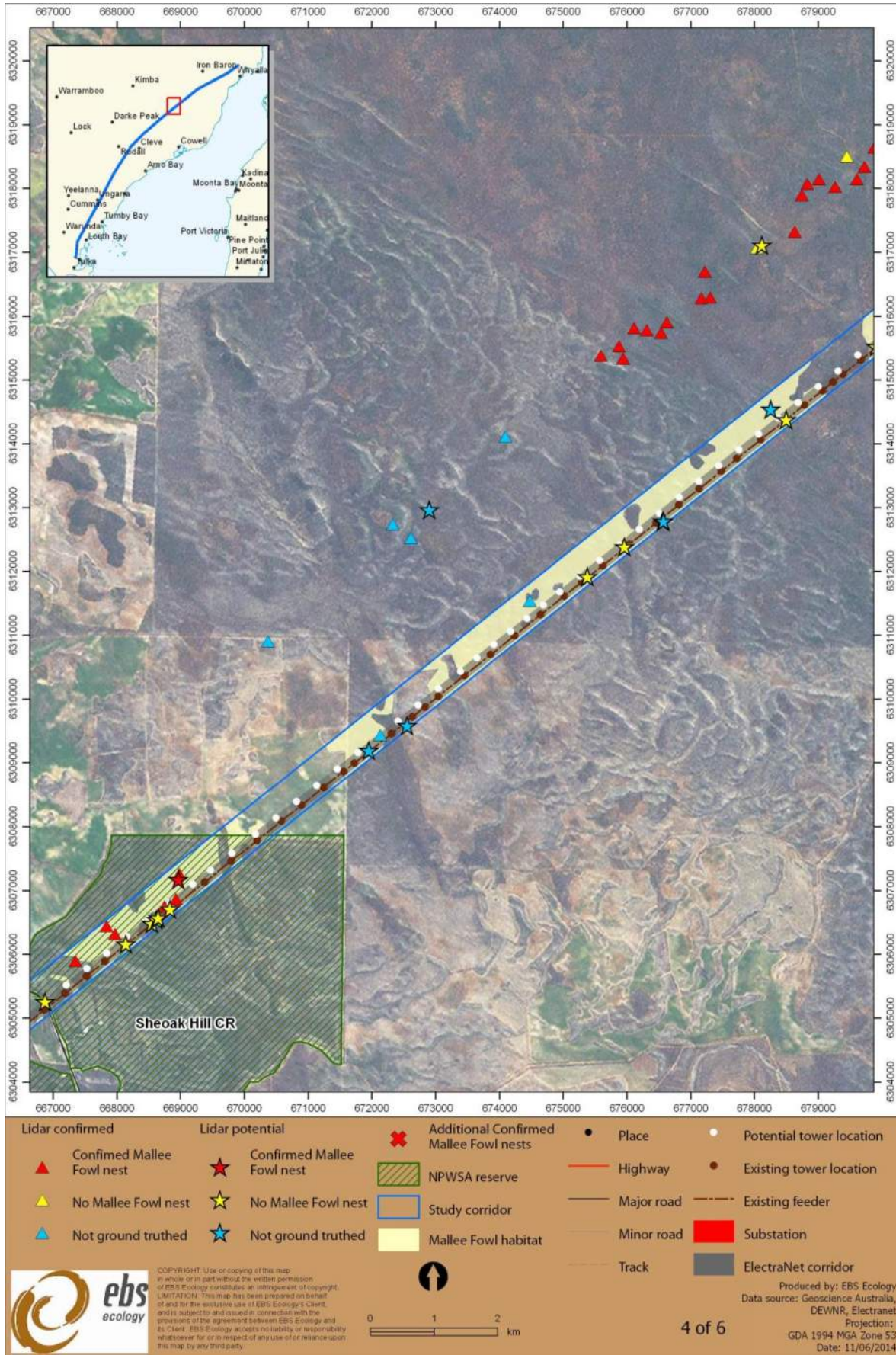


Figure 23. Location of Malleefowl mounds, confirmed and unconfirmed – Map 4 of 6.



Figure 24. Location of Malleefowl mounds, confirmed and unconfirmed – Map 5 of 6.



Figure 25. Location of Malleefowl mounds, confirmed and unconfirmed – Map 6 of 6.

Within the transmission line transect, there was no obvious pattern in higher density of mounds or ratio of historic to active mounds with increasing distance from the existing transmission line (Figure 26). However, 17% (5 of 29) of the mounds on the transmission line transect were historic compared with 12% (4 of 34) of historic mounds on the remote control transect.

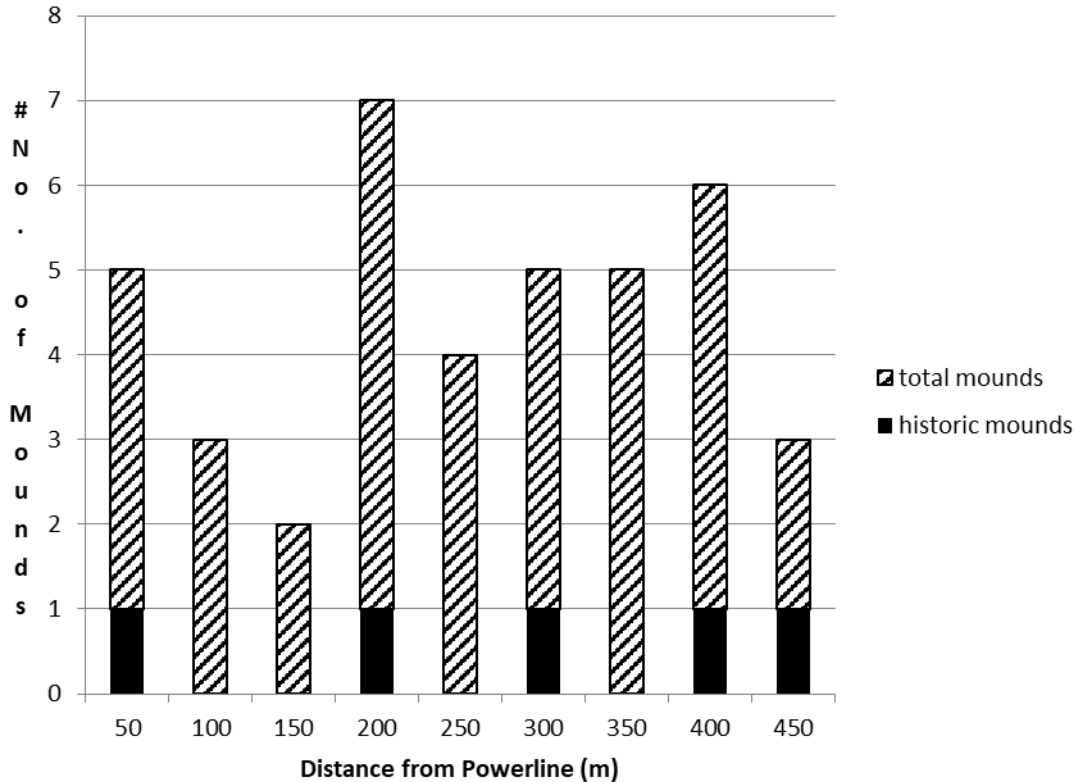


Figure 26. Distance of historic and more recent mounds from the transmission line on the transmission line transect.

Low percentages of active nests (2 from 70 mounds, 2.9%) along both transmission line and control transects recorded in this survey was consistent with low nesting success recorded by the Middleback Alliance monitoring program in 2013, when only 2 of 127 monitored mounds (1.6%) were recorded as active in the same region. This low nesting effort is believed to be related to environmental conditions and contrasts markedly with activity levels of 12.9%, 22.3% and 24.7% in the years 2011, 2012 and 2013 respectively.

One dead Malleefowl was recorded at a nest near the southern extremity of the current transmission line transect. Fresh fox scats were evident on this mound which is only 70 m from the transmission line

False positives and false negatives

The vast majority of the 67 false positives objects considered by AAM to be either ‘confirmed’ or ‘possible’ mounds that were visited were attributed to piles left by earthmoving equipment during construction or maintenance of the transmission line or fire-containment activities. Several others were the elevated lignotubers and associated soil mounding around old-growth mallees

False negatives

Four mounds identified by helicopter or ground searches along the LiDAR transects were not identified by the LiDAR survey. One of these, MA108, was identified by the LiDAR operators but discarded because, like the other three false negatives, its height above ground level was lower than the arbitrary 25 cm cut-off. Three of these undetected mounds had previously been located in the three 1 km² grids methodically surveyed by chopper and on the ground. Assuming that half of each 1 km² grid was surveyed by the 500 m LiDAR swathe, these data suggests a false negative rate of approximately 1 mound per square kilometre. Together with the correctly detected mounds described above, these undetected false negative mounds suggest that the regional density of recent and historic Malleefowl mounds is approximately 3.6 mounds per km².

5.3.10 Avian fauna

A total of eighty-four dedicated point count surveys were undertaken along the ElectraNet easement during the December, January and March survey period. Along with these were multiple opportunistic sightings, resulting in 94 species being observed. Of these 94, three were introduced species and ten species had a State conservational rating. Only one species that was classified as migratory was observed. All rated (and introduced) species observed are listed below:

State rated

- Striated Grasswren (*Amytornis striatus*) rated as State Rare
- Peregrine Falcon (*Falco peregrinus*) rated as State Rare
- Restless Flycatcher (*Myiagra inquieta*) rated as State Rare
- Gilberts Whistler (*Pachycephala inornata*) rated as State Rare
- Diamond Firetail (*Stagonopleura guttata*) rated as State Vulnerable
- Cape Barren Goose (*Cereopsis novaehollandiae*) rated as State Rare
- Shy Heathwren (*Calamanthus cautus*) rated as State Rare
- Slender-billed Thornbill (*Acanthiza iredalei iredalei*) rated as State Rare
- White-winged Chough (*Corcorax melanorhamphos*) rated as State Rare
- Western Grasswren (*Amytornis textilis myall*) rated as Rare (species recently downgraded from EBPC).

Migratory

- Rainbow Bee-eater (*Merops ornatus*).

Introduced Species

- European Goldfinch (*Carduelis carduelis*)
- House Sparrow (*Passer domesticus*)
- Common Starling (*Sturnus vulgaris*)

Abundance

Nineteen hundred and seventy seven (1977) individual birds were observed along the entire easement over the three month dedicated point count surveys or observed opportunistically (Table 31). The most abundant species recorded during the survey were the introduced European Starling (*Sturnus vulgaris*) (430 records), Weebill (*Smicronis brevirostris*) (112 records), White-browed Babbler (*Pomatostomus superciliosus*) (73 records), Superb Fairy-Wren (*Malurus cyaneus*) (73 records) and the introduced House Sparrow (*Passer domesticus*) (63 records).

Table 31. Field survey abundance counts for avian species.

Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
ACANTHIZIDAE	<i>Aphelocephala leucopsis</i>	Southern Whiteface	-	-	57
	<i>Pyrrholaemus brunneus</i>	Redthroat	-	-	10
	<i>Acanthiza apicalis</i>	Inland Thornbill	-	-	46
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	-	-	32
	<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western ssp.)	-	R	12
	<i>Smicronis brevirostris</i>	Weebill	-	-	112
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-	41
	<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-	11
	<i>Calamanthus cautus</i>	Shy Heathwren	-	R	9
ACCIPITRIDAE	<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	5
	<i>Accipiter fasciatus</i>	Brown Goshawk	-	-	1
	<i>Elanus axillaris</i>	Black-shouldered Kite	-	-	1
	<i>Circus assimilis</i>	Spotted Harrier	-	-	1
	<i>Haliastur sphenurus</i>	Whistling Kite	-	-	1
ACROCEPHALIDAE	<i>Acrocephalus australis</i>	Australian Reed-Warbler	-	-	4
ANATIDAE	<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	6
ARDEIDAE	<i>Egretta novaehollandiae</i>	White-faced Heron	-	-	3
ARTAMIDAE	<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	9
	<i>Gymnorhina tibicen</i>	Australian Magpie	-	-	47
	<i>Artamus cinereus</i>	Black-faced Woodswallow	-	-	10
	<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	-	53
	<i>Strepera versicolor</i>	Grey Currawong	-	-	12
CACATUIDAE	<i>Eolophus roseicapilla</i>	Galah	-	-	23
	<i>Nymphicus hollandicus</i>	Cockatiel	-	-	4
CAMPEPHAGIDAE	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-	2
CASUARIIDAE	<i>Dromaius novaehollandiae</i>	Emu	-	-	6
CHARADRIIDAE	<i>Vanellus tricolor</i>	Banded Lapwing	-	-	12
COLUMBIDAE	<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	11
	<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	23
	<i>Phaps elegans</i>	Brush Bronzewing	-	-	3
CORCORACIDAE	<i>Corcorax melanorhamphos</i>	White-winged Chough	-	R	12

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Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
CORVIDAE	<i>Corvus coronoides</i>	Australian Raven	-	-	2
	<i>Corvus mellori</i>	Little Raven	-	-	20
CUCULIDAE	<i>Cacomantis pallidus</i>	Pallid Cuckoo	-	-	1
ESTRILDIDAE	<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	10
FALCONIDAE	<i>Falco cenchroides</i>	Nankeen Kestrel	-	-	9
	<i>Falco peregrinus</i>	Peregrine Falcon	-	R	8
	<i>Falco berigora</i>	Brown Falcon	-	-	6
FRINGILLIDAE	<i>Carduelis carduelis</i>	European Goldfinch	-	-	20*
HALCYONIDAE	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	1
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	-	-	3
HIRUNDINIDAE	<i>Petrochelidon nigricans</i>	Tree Martin	-	-	2
	<i>Hirundo neoxena</i>	Welcome Swallow	-	-	9
	<i>Cheramoeca leucosterna</i>	White-backed Swallow	-	-	2
MALURIDAE	<i>Malurus splendens</i>	Splendid Fairy-wren	-	-	24
	<i>Amytornis textilis myall</i>	Thick-billed Grasswren	-	R	5
	<i>Malurus leucopterus</i>	White-winged Fairy-wren	-	-	9
	<i>Malurus lamberti</i>	Variegated Fairy-wren	-	-	47
	<i>Amytornis striatus</i>	Striated Grasswren	-	R	5
	<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-	73
MEGALURIDAE	<i>Cincloramphus cruralis</i>	Brown Songlark	-	-	18
MELIPHAGIDAE	<i>Lichenostomus virescens</i>	Singing Honeyeater	-	-	40
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	-	-	47
	<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	-	-	13
	<i>Manorina flavigula</i>	Yellow-throated Miner	-	-	53
	<i>Purnella albifrons</i>	White-fronted Honeyeater	-	-	39
	<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	-	-	1
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater	-	-	9
	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	-	-	38
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	-	-	16
	<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	-	-	1
	<i>Anthochaera carunculata</i>	Red Wattlebird	-	-	3
	<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	-	R	2
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	-	-	1
	MEROPIIDAE	<i>Merops ornatus</i>	Rainbow Bee-eater	Mi	-
MONARCHIDAE	<i>Grallina cyanoleuca</i>	Magpie-lark	-	-	2
	<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	1
MOTACILLIDAE	<i>Anthus novaeseelandiae</i>	Australasian Pipit	-	-	19
NECTARINIIDAE	<i>Dicaeum hirundinaceum</i>	Mistletoebird	-	-	3
NEOSITTIDAE	<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	12
PACHYCEPHALIDAE	<i>Oreoica gutturalis</i>	Crested Bellbird	-	-	11

Family	Species name	Common name	Conservation status		Number observed
			Aus	SA	
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	9
	<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	1
	<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	1
PARDALOTIDAE	<i>Pardalotus striatus</i>	Striated Pardalote	-	-	11
PASSERIDAE	<i>Passer domesticus</i>	House Sparrow	-	-	65*
PETROICIDAE	<i>Eopsaltria griseogularis</i>	Western Yellow Robin	-	-	1
	<i>Melanodryas cucullata</i>	Hooded Robin	-	-	3
	<i>Petroica goodenovii</i>	Red-capped Robin	-	-	5
	<i>Drymodes brunneopygia</i>	Southern Scrub-robin	-	-	5
PHASIANIDAE	<i>Coturnix pectoralis</i>	Stubble Quail	-	-	16
PODARGIDAE	<i>Podargus strigoides</i>	Tawny Frogmouth	-	-	5
POMATOSTOMIDAE	<i>Pomatostomus superciliosus</i>	White-browed Babbler	-	-	73
PSITTACIDAE	<i>Northiella haematogaster</i>	Blue Bonnet	-	-	16
	<i>Melopsittacus undulatus</i>	Budgerigar	-	-	10
	<i>Psephotus varius</i>	Mulga Parrot	-	-	16
	<i>Barnardius zonarius</i>	Australian Ringneck	-	-	34
	<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-	13
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	4
RHIPIDURIDAE	<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-	36
	<i>Rhipidura albiscapa</i>	Grey Fantail	-	-	8
STURNIDAE	<i>Sturnus vulgaris</i>	Common Starling	-	-	430*
TIMALIIDAE	<i>Zosterops lateralis</i>	Silvereye	-	-	31
Total					1977

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare. **Mi:** Migratory. **Ma:** Marine. **ssp.** Sub-species. * Recently down listed under EPBC (DEWSPaC 2013)

5.3.11 Bats

In total, eight bat species were positively identified via AnaBat call analysis, with three more species potentially recorded as either *Mormopterus* 'species 3' or *Mormopterus* 'species 4'. Eight of these species were also identified by Brandle (2010) in a large scale biodiversity survey of the Eyre Peninsula during 2001 to 2005 that contained 37 dedicated bat surveys, with both Harp traps and AnaBats.

Mormopterus calls were most likely 'sp3', but there is a small chance that 'sp4' is present (Sp4 is only known north of the site). This species could only be confirmed by trapping.

The most widespread species recorded across the major vegetation types is *Chalinolobus gouldii* (Gould's Wattled Bat), *Nyctophilus geoffroyi* (Lesser Long-eared Bat) and *Nyctophilus major tor* (Central Long-eared Bat).

A summary of the AnaBat and trapping results in relation to vegetation associations is provided in Table 32 (note that not all vegetation associations were surveyed). Given the inherent limitations of the data (see Section 4.4), the relative activity levels recorded (e.g. by species, site or association) has not been reported as this information may be misleading.

Table 32. Bat species recorded on Eyre Peninsula from 2001 - 2013.

Species name	Common name	Conservation status		Broad Vegetation Type	Record Source
		Aus	SA		
<i>Austronomus australis</i>	White-striped Freetail-bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland	AnaBat+, Brandle*
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	-	-	Dense mallee vegetation, <i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association	AnaBat, Brandle
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland	AnaBat, Brandle
<i>Mormopterus</i> sp 3	Inland Freetail-bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, Dense mallee vegetation	AnaBat
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
<i>Nyctophilus major tor</i>	Central Long-eared Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Eucalyptus leptophylla</i> / <i>E. brachycalyx</i> Mallee patch on roadside, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
<i>Vespadelus baverstocki</i>	Inland Forest Bat	-	-	Dense mallee vegetation	AnaBat, Brandle
<i>Vespadelus regulus</i>	Southern Forest Bat	-	-	<i>Eucalyptus cladocalyx</i> Woodland, <i>Melaleuca uncinata</i> / Mallee association, Dense mallee vegetation	AnaBat, Brandle
Unlikely but possible					
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	-	R		AnaBat
<i>Mormopterus</i> sp 4	Southern Freetail Bat	-	-	Mainly known from north of the site, and would only be known from trapping (D. Matthews pers. comm., 2013)	AnaBat, Brandle
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	-	-		AnaBat

* Eyre Peninsula Biodiversity surveys 2001-2005 (Brandle 2010)

+ EBS Ecology AnaBat recordings spring 2013

6 DISCUSSION

The initial surveys undertaken in 2012/13 formed a general assessment across the project area. These were followed by a series of targeted surveys conducted in the following spring of 2013. The proposed, infrastructure and access track locations were not known at the time of the assessments and this analysis will form the basis of a separate report. The potential issues related to the project and associated mitigation options are highlighted within the discussion. Given the large scale of the Eyre Peninsula Transmission Line Project, a wide range of constraints are inevitable. A summary of the key ecological constraints and considerations is provided below.

6.1 Flora

This report presents findings on a broad flora assessment across the project area and targeted threatened species surveys. The potential issues related to the project and associated mitigation options are highlighted within the discussion.

6.1.1 Vegetation

Almost 7,095 hectares of native vegetation was recorded within the assessment corridor, representing approximately 45% of the project area. Woodland associations covered approximately 2,054.5ha (approximately 13% of the project area) whilst mallee vegetation covered approximately 3,120.4ha (approximately 20% of the project area). Tall shrublands contributed 641ha (4%) and chenopod shrublands covered to 1041ha (6.5%), whilst grasslands and sedgelands covered ha (0.7%). The level of remnancy of native vegetation in the northern half of the project and the corresponding IBRA Subregion (Myall Plains) is relatively high (98% and 97% respectively) whereas the southern areas which are subject to much higher levels of intensive farming, have much lower remnancy levels within the project area and the IBRA Subregions of Eyre Hills and Eyre Mallee (17%, 30% and 35% respectively).

The significant tracts of intact vegetation communities occupying the northern sections of project area were largely found to be in excellent condition (5,345.2ha or 94%). The remaining 6% (292.7ha) varied between moderate to very poor. Within the southern sections, 32.7% (567ha) was in good to excellent condition, 32% (571.3ha) in moderate condition and 34.4% (596.5ha) in poor to very poor condition. Condition ratings were based on the vegetation structure, quality of the understorey and level of weed invasion (Table 10) and do not necessarily represent the value of the area as fauna habitat.

The majority of the large intact tracts of mallee in the northern zone and the *Acacia* low woodlands in the pastoral areas, contained high diversities of native species coupled with very few weeds. The continuous and undisturbed nature of the communities has led to fewer overall disturbances such as weed invasion from edge effects and over grazing from domestic and native herbivores. Some of the larger patches of intact vegetation within the central and southern zones also possess high species richness and low levels of degradation from weeds and grazing, mainly due to the size of the patches and responsible management practices. Many are also located within close proximity to other large

remnants, helping to bolster habitat value. Larger blocks of native vegetation and those occurring near other vegetation patches, are better able to maintain ecological integrity. Conversely, smaller patches of vegetation throughout the southern zone have frequently suffered significant degradation from edge effects, grazing, inappropriate fire regimes and other factors such as firewood collection and rubbish dumping. This has often attributed to high levels of modification of the understorey strata, leaving only the overstorey intact. They are also often isolated from other remnants, further reducing their viability and overall habitat value, particularly for less mobile fauna species. Small and isolated patches of remnant vegetation are therefore more vulnerable to disturbance and degradation and are at greater risk to catastrophic event and genetic isolation (Neagle 2008). Clearance and further fragmentation of remnant vegetation patches across the landscape increases this risk significantly.

6.1.2 Threatened flora

There are numerous threatened flora species records in various locations along the proposed transmission line route. With careful planning and consideration of the threatened flora populations and their critical habitats, the total impacts of the proposal can potentially be minimised.

At least 18 nationally threatened flora species and 65 State threatened flora species are known to occur in, and in close proximity to the project area. Nine of the nationally threatened species are endemic to Eyre Peninsula whilst a further nine endemic State listed species are also known to occur only in the region. A number of other species are considered threatened on a regional level (Gillam 2009) but have not specifically been highlighted in this report.

Vegetation patches in good to excellent condition are considered extremely important for threatened flora, often representing the only remaining stronghold for the species. However, threatened flora was not limited to vegetation in good condition, with many of the threatened flora recorded along degraded roadsides, rail reserves and even SA Water pipelines. All known and potential habitat is critical to survival for the highlighted threatened flora species. The small size of threatened flora sub-populations and the isolated and scattered nature of the vegetation remnants make them vulnerable to localised extinction (Moritz and Bickerton, 2011).

The concentrations of nationally threatened flora species records are mostly due to widespread clearance of habitat and presence of high quality remnant habitat areas, particularly in the southerly areas of Eyre Peninsula. Likewise for State listed species which are concentrated within similar areas. Some of these have been identified as biodiversity 'hot spots' which are discussed in more detail in Section 6.3 and formed the basis of targeted surveys undertaken in the spring of 2013. Both national and State threatened flora species were targeted during these surveys, however only the nationally threatened flora species have been discussed further here.

Many of the threatened flora species previously recorded in the BDBSA search were not observed during the initial baseline surveys, due to factors such as survey timing (e.g. orchids) and limited survey effort. However, the recent records (< 20 years) combined with the high quality of the habitat on site means that most species were assessed as 'possible', 'likely' or 'highly likely' to occur within the project

area. Targeted surveys have helped provide a more accurate determination of potential impacts to threatened flora and will assist in directing project planning and design to minimise those impacts.

The following nationally threatened species were recorded on site during the targeted surveys. Further information can be sourced from recovery plans and species profiles which exist for the nationally threatened species discussed below (see DSEWPaC 2013).

***Acacia enterocarpa* (Jumping-jack Wattle), EPBC Endangered, State Endangered**

The species occurs as a disjunct population on EP, recorded from *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee) mallee woodland; *Eucalyptus calycogona* (Square-fruit Mallee), +/- *E. phenax* ssp. *phenax* (White Mallee) mallee woodland; *Eucalyptus gracilis* (Yorrell) +/- *E. dumosa* (White Mallee) +/- *E. brachycalyx* (Gilja), +/- *E. oleosa* (Red Mallee) mallee. This vegetation is present on site and a number of recent records occur in close proximity to the project area. Sub-populations are known from roadsides and rail reserves and amongst vegetation corridors along SA Water pipelines. The species was detected during the targeted surveys from three separate locations, two from roadside reserve east of Ungarra and the third from south-east of Mount Hill. The vegetation associations were defined by *Eucalyptus odorata* +/- *Eucalyptus pileata* Mallee over *Acacia imbricata* and *Melaleuca uncinata* and *Eucalyptus peninsularis* Mallee respectively.

***Acacia pinguiifolia* (Fat-leaved Wattle), EPBC Endangered, State Endangered**

A dense spreading shrub, to 2 metres high with globular golden yellow flower heads. Considered a declining species in Eyre Hills IBRA subregion (Gillam and Urban 2009). Known from disjunct sub-populations across EP, where it grows in association with *Eucalyptus odorata* (Peppermint Box) and *E. incrassata* (Ridge-fruited Mallee), *E. dumosa* (White Mallee), *E. foecunda* (Hooked Mallee), *E. calycogona* (Square-fruited Mallee), *E. cooperiana* (Coopers Mallee), *E. flocktoniae* (Merrit) and *E. pileata* (Capped Mallee) in undulating terrain with a westerly aspect. Also occurs in *Melaleuca uncinata* (Broombush) shrubland. On northern EP, sub populations are known to occur near Cockaleechee, Ungarra, Bulter and several recent records east of Cleve near the Yeldulknie CP. Many sub-populations are located on roadsides and rail reserves. A single individual of the species was identified during the targeted surveys within a road reserve east of Koppio Township dominated by *Eucalyptus cladocalyx* Open Woodland.

***Arachnorchis tensa* (Rigid Spider-orchid), EPBC Endangered**

Widespread in South Australia from the west coast of Eyre Peninsula, and adjacent pastoral zone, Flinders Ranges, rare in the Mount Lofty Ranges, more common in the Murray and upper South-east. Occurs in dry woodland, mallee-heath, low scrub and about rock outcrops in a variety of soil types. The species was recorded from a single location during the targeted survey approximately 20m from the western boundary of assessment corridor along the Ungarra – Yeelana Road reserve.

***Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush), EPBC Vulnerable, State Vulnerable**

A widespread but rare species occurring also on the Fleurieu Peninsula, South East, Yorke Peninsula, Mid North and Kangaroo Island. Two main sub-populations on EP occurring in the Cleve Hills to

Coolanie Range area, north-west of Cowell, and in the Koppio Hills and Greenpatch area, Lower Eyre Peninsula. The perennial, low spreading shrub, occurs in the understorey of mallee, woodland and forest communities. Southern population associated with *Eucalyptus cladocalyx* (Sugar Gum), *Allocasuarina verticillata* (Drooping Sheoak), *Melaleuca uncinata* (Broombush), and less often with *Callitris* sp. (Native Pine). The northern population associated with *Allocasuarina verticillata* (Drooping Sheoak), low woodland *Eucalyptus odorata* (Peppermint Box), +/- *E. phenax* ssp. *phenax* (White Mallee) mid mallee woodland, *Eucalyptus porosa* (Mallee Box) mid open mallee woodland, *Eucalyptus incrassata* (Ridge-fruited Mallee) mid mallee woodland, *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee) mid mallee woodland. The species was detected during the targeted surveys from two populations, one of which is located just outside the assessment corridor. The other population was a single juvenile plant. Both occurrences were located east of Yallunda Flat in *Eucalyptus cladocalyx* Woodland and Open Woodland communities.

***Pultenaea trichophylla* (Tufted Bush-pea), EPBC Endangered, State Rare**

Endemic to southern Eyre Peninsula the species only occurs in Eyre Hills IBRA subregion, where it is considered rare but stable (Gillam and Urban 2009, Pobke 2007). Numerous recent records from 20 subpopulations in the Koppio Hills between Tod River Reservoir to just north of Ungarra, mainly along the western side to the project area. The species is commonly associated with *Eucalyptus cladocalyx* (Sugar Gum) woodlands, *Eucalyptus peninsularis* (Cummins Mallee) low woodland/mallee, Drooping Sheoak (*Allocasuarina verticillata*) low open woodland over *E. odorata* (Peppermint Box) and *E. angulosa* (Coast Ridge-fruited Mallee) and *E. foecunda* (Hooked Mallee), mostly over *Melaleuca uncinata* (Broombush) understories. Also occurs in tall shrublands dominated by *Melaleuca uncinata* (Broombush) and *Acacia* spp. During the targeted surveys the species was recorded as relatively widespread between north of the Bratten Way to just south of Ungarra. It was mainly associated with the Mallee /Broombush associations, *Melaleuca uncinata* Tall Shrubland and *Eucalyptus cladocalyx* Woodland and *Allocasuarina verticillata* Low Woodland located

It is possible that the following additional species exist given that the entire corridor could not be completely searched. Once the layout plan is available it will be critical to micro-site the proposed infrastructure footprints to minimise disturbance to threatened flora species.

***Acacia praemorsa* (Senna Wattle), EPBC Vulnerable, State Endangered**

Endemic to Eyre Peninsula, where it occurs in localised populations in the ranges north-east and north-west of Cleve. Occurs in mallee woodlands, open scrubs and open heath scrubs dominated by *Melaleuca uncinata* (Broombush), *Acacia calamifolia* (Wallowa), *Eucalyptus odorata* (Peppermint Box) and other mallee species. Has been found on the lower slopes of small gullies in low, rocky ranges, on exposed north-facing slopes in thick, low scrub and in shady, sheltered sites in open mallee woodlands at the base of steep gullies. Whilst not recorded during the targeted survey, the species could easily be targeted during micro-siting surveys within the remnants north of Cleve to better determine presence or absence.

***Acacia cretacea* (Chalky Wattle), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula. A spindly, straggly, single-stemmed shrub or tree, growing 4-5 m high, occurs in an extremely restricted area about 30 km north to north-west of Cowell and north-east of Coolanie on the north-eastern EP. Total population consists of between a few hundred and 5000 plants. The species is found along roadsides and in adjacent leasehold farming land. Grows in low shrubland and mallee scrub dominated by *Eucalyptus incrassata* (Ridge-fruited Mallee), *Melaleuca uncinata* (Broombush), *Triodia irritans* (Spinifex), *Phebalium bullatum* (Silvery Phebalium), on deep red sand in gently undulating country, with low sand ridges. No *Acacia cretacea* (Chalky Wattle) were recorded during the survey however thorough searches were not undertaken throughout the large remnant mallee habitats.

***Acacia rheticarpa* (Resin Wattle), EPBC Vulnerable, State Vulnerable**

Grows in disjunct sub-populations on Eyre Peninsula (also YP southern MLR) on dune crests and dunes/hills, plains and swales. It is also known to survive in degraded sites largely devoid of remnant vegetation. Sub-populations occur from Kimba to just north of Arno Bay, Cleve and Lock and are known to survive within roadside and rail reserve vegetation. It is normally associated with low mallee of *Eucalyptus dumosa* (White Mallee), *E. foecunda* (Hooked Mallee), *E. calycogona* (Square-fruited Mallee), *E. incrassata* (Ridge-fruited Mallee) and *E. brachycalyx* (Gilja) mallee associations. Considered to be a declining species in Eyre Hills and Eyre Mallee subregions (Gillam and Urban 2009). The species was not detected during targeted surveys.

***Acacia whibleyana* (Whibley Wattle), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula, the species is described as a dense shrub growing to 2.5 metres high, with globular flower heads. The species grows on limestone and loam, sometimes near salt swamps. Known population contains 322 plants from two sub-populations restricted to near-coastal areas near Tumby Bay. The species was not detected during targeted surveys.

***Arachnorchis brumalis* (Winter Spider-orchid), EPBC Vulnerable, State Vulnerable**

Endemic to South Australia, the species is found in association with Mallee-Broombush associations, *Allocasuarina verticillata* (Drooping Sheoak) woodland, *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee) mallee woodland and *Eucalyptus cladocalyx* (Sugar Gum) woodlands. The creamy coloured spider-orchid mostly found on Yorke Peninsula but likely to occur in the southern Eyre Peninsula. Four sub-populations are located within southern Eyre Peninsula near Edillilie and Wanilla and an outlying record near Tumby Bay. Found mostly on terra rossa soils or fertile sands over limestone, in mallee broom-bush associations, light woodland or sedge dominated grasslands. The orchid species was targeted during the known flowering times (Late June-July-August-September), within known habitat types, but was not detected.

***Arachnorchis macroclavia* (Large-club Spider-orchid), EPBC Endangered**

The Large-club Spider-orchid was previously thought to have a distribution that extended from the Eyre Peninsula to the Murray Region in South Australia. However, the species is now considered to be mostly

confined to the Yorke Peninsula (Bickerton 2003) and is regarded as rare on central Eyre Peninsula, where it was last recorded on the Eyre Peninsula (from Stamford Hill) in 1985 (Bickerton 2003). The species grows in fertile shallow loams in mallee-boom brush woodland in sandy loam over limestone (Bates 2011). The orchid species was targeted during the known flowering times (September - October), within known habitat types, but was not detected.

***Frankenia plicata*, EPBC Endangered, State Vulnerable**

Small, densely branched, hairy shrub. Occurs in South Australia from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Marree. No records within the BDBSA search area or in Eyre Hills or Eyre Mallee subregions (Gillam and Urban 2009). Grows in a range of habitats, including on small hillside channels, which take the first run-off after rain, and from swales of loamy sands to clay. Found in a wide range of vegetation communities that have good drainage. It is likely that the species has been under reported due to difficulty of identification of *Frankenia* spp. This species was targeted during surveys in July – August survey, but was not detected.

***Haloragis eyreana* (Prickly Raspwort), EPBC Endangered, State Endangered**

Endemic to Eyre Peninsula, Prickly Raspwort is a perennial herb growing to 10-30 cm tall with about 14 fragmented sub-populations from west of Cummins to Moreenia (DEH, 2002). The species is found on predominantly historical grassland areas that have been cleared for agriculture and now only exists in roadsides and rail reserves. Occasionally found growing in more intact habitat, where it is associated with *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. dumosa* (Dumosa Mallee) or *Melaleuca decussata* (Totem-poles). This species was targeted during appropriate flowering times (October and November), particularly within privately owned remnants, but was not detected.

***Prasophyllum goldsackii* (Goldsack's Leek-orchid), EPBC Endangered, State Endangered**

Endemic to South Australia, the orchid is found only on Yorke Peninsula and lower EP Eyre Peninsula from 14 small populations not exceeding 500-1000 individuals. The Eyre Peninsula populations are located in the south-western to central area, and within 50 km of Port Lincoln. Considered declining in Eyre Hills subregion (Gillam and Urban 2009). Occurs largely on limestone, in shallow soil pockets but also in calcareous sands in *Eucalyptus cladocalyx* (Sugar Gum) forests, as well as *Allocasuarina verticillata* (Drooping Sheoak) low woodlands and *Melaleuca uncinata* (Broombush) tall open shrublands. The species was targeted during the known flowering times (September-October) within known habitat types, but was not detected.

***Prostanthera calycina* (West Coast Mintbush), EPBC Vulnerable, State Vulnerable**

Endemic to Eyre Peninsula, the perennial shrub species is known from several sub-populations restricted to western coast from Pt Lincoln to Streaky Bay. Commonly associated with *Eucalyptus incrassata* (Ridge-fruited Mallee) mid mallee woodland over *Melaleuca uncinata* (Broombush) and *Leptospermum coriaceum* (Dune Tea-tree) and *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee), +/- *Allocasuarina verticillata* (Drooping Sheoak) mid mallee woodland over Dryland Tea-tree (*Melaleuca lanceolata*) and *Eucalyptus porosa* (Mallee Box) low open woodland. This species was targeted during appropriate flowering times, but was not detected.

***Pterostylis* sp. Eyre Peninsula (R.Bates 19474), EPBC Vulnerable, State Vulnerable**

Endemic to Eyre Peninsula, the small herb is known from about 12 localities only (two populations) near Carpie Puntha Hill and Coolanie Valley (DEH, 2002). It grows mostly in shrublands of *Melaleuca uncinata* (Broombush), but also in woodlands dominated by *Callitris* and *Eucalyptus*, particularly in stony brown loams. This species was targeted during appropriate flowering times (late October-early January), but was not detected.

***Ptilotus beckerianus*, (Ironstone Mulla Mulla) EPBC Vulnerable, State Vulnerable**

Endemic to South Australia, the small, perennial herb also grows in disjunct populations on Kangaroo Island. It is known from roadside verges and private property within the District Council of Lower Eyre Peninsula, often growing in association with *Eucalyptus cladocalyx* (Sugar Gum) and *Xanthorrhoea* sp.(Yacca) in low open forest or low open woodland, *Allocasuarina verticillata* (Drooping Sheoak) low woodlands and *Eucalyptus diversifolia* ssp. *diversifolia* (Coastal White Mallee) +/- *E. incrassata* (Ridge-fruited Mallee) +/- *E. leptophylla* (Narrow-leaf Mallee), +/- *Eucalyptus peninsularis* (Cummins Mallee) mallee woodland. The species was targeted during the known flowering times (July - August) within known habitat types, but was not detected.

***Swainsona pyrophila* (Yellow Swainson-pea), EPBC Vulnerable, State Rare**

Occurs across the Eyre Peninsula and also in Yorke Peninsula and Murraylands, NSW and Victoria. Recent records from the north and eastern side of Ironstone Hill CP. It is known to occur on sandy or loamy soil in mallee scrub and is usually found after fire and populations are found to fluctuate (Gillam and Urban 2009). Associated vegetation communities on Eyre Peninsula include *Eucalyptus incrassata* (Ridge-fruited Mallee), *E. socialis* (Beaked Red Mallee), *E. brachycalyx* (Gilja), *E. gracilis* (Yorrell), and *E. oleosa* (Red Mallee) mid mallee woodland over *Melaleuca uncinata* (Broombush) tall shrubland. Some recently burnt habitat observed during the field surveys was targeted to determine presence /absence of the species, but was not detected.

***Thelymitra epipactoides* (Metallic Sun-orchid), EPBC Endangered, State Endangered**

The extent of occurrence on Eyre Peninsula is approximately 900 km², growing within Edillilie in the north, and Mikkira in the south. Occurs also in parts of the Murraylands and South East regions of South Australia, and parts of Victoria. Approximately half of all known sub-populations, including the largest sub-population, are located on roadsides and rail reserves in Lower Eyre Peninsula. Habitat is mainly confined to *Allocasuarina verticillata* (Drooping Sheoak) low woodland, *Eucalyptus cladocalyx* (Sugar Gum) mid woodland, *Eucalyptus angulosa* (Coast Ridge-fruited Mallee), *E. diversifolia* ssp. *diversifolia* (Coastal White Mallee) mid mallee woodland, +/- *Melaleuca lanceolata* (Dryland Tea-tree), +/- *Melaleuca uncinata* (Broombush) tall shrubs and *Melaleuca uncinata* (Broombush) tall open shrubland. The orchid species was targeted during the known flowering times (August-December), particularly within privately owned remnants within known habitat types, but was not detected.

6.1.3 Threatened Ecological Communities

One ecological community is considered threatened at a national level. *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Woodland was listed as Endangered at a national level in August 2013 and is endemic to the Eyre Peninsula. At the time of the initial surveys the patches were not assessed under the Approved Conservation Advice (TSSC, 2013) and therefore it is unknown if they qualify as the TEC under the EPBC Act. However, all mapped remnants have been compromised by exotic species in the understorey and some by inappropriate grazing levels, with only a few remnants in moderate condition. Approximately 8.5 ha of the community, which was mapped within the 120m assessment corridor, is in moderate condition and may possibly qualify as the TEC. Once the layout plan is available it will be critical to micro-site the proposed infrastructure footprints to ensure that disturbance to any potential nationally listed TEC is minimised or avoided.

Six of the ecosystems are listed under the *Provisional List of Threatened Ecosystems of South Australia* (DEH in progress). Approximately 125 ha of *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia*, was mapped within the project area and all patches were in excellent condition. The woodland is considered a State vulnerable plant community of which only 5.3% is protected in Heritage Agreements and reserves across South Australia.

Allocasuarina verticillata Low Woodland is also a State vulnerable plant community. Approximately 75 ha was mapped across the project area with examples varying in quality from very poor to excellent. Only 11% of the mapped community is protected in reserves or Heritage Agreements.

Both *Eucalyptus peninsularis*, *E. dumosa* complex Woodland and *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland are listed as endangered ecosystems under the *Provisional List of Threatened Ecosystems of South Australia*. Both are also endemic vegetation associations, occupying limited distributions. The total mapped areas within the project area were 41.1 ha and 57.8 ha respectively), however these areas are significantly reduced within the 120m assessment corridor (i.e. *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland 13.7 ha). *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Grassy Woodland is restricted to creeklines and along watercourses and on heavy, fertile soils on plains. Only 11% of the mapped community is protected in reserves and Heritage Agreements and most mapped examples within the project area in moderately poor condition, compromised by exotic species, overgrazing and salinity. *Eucalyptus peninsularis*, *E. dumosa* complex Woodland occurs on flat or rarely hilly areas characterised by loams or clay-loams and has been extensively cleared for agricultural use (DEH, 2002). Most remaining examples are small and/or degraded and/or atypical.

Sedgeland dominated by *Gahnia trifida* (Cutting Grass) are considered State endangered. The mapped association covered a very small area (47.2 ha), being entirely restricted to watercourses and low lying swampy areas. The condition of these riparian communities ranged between moderate and very poor, often being degraded by exotic species, overgrazing or trampling and salinity.

Austrodanthonia spp. / *Austrostipa* spp. +/- *Themeda triandra* Tussock Grassland covered an area of approximately 6.4 ha, where most examples were in a moderate condition. The community grows on

heavy fertile soils of plains and hill slopes where most has been exposed to heavy grazing and weed invasion. Around 5% has been protected in reserves and Heritage Agreements (DEH, 2002).

Many of the mapped communities occupy relatively small patches throughout the project area and with careful consideration with regard to infrastructure design, significant impacts can likely be minimised.

6.2 Fauna

Given the large scale of the Eyre Peninsula Transmission Line project, a wide range of constraints are inevitable. It is considered that ecological considerations will present constraints regardless of the alignment that is chosen. A summary of the key ecological constraints and considerations is provided below.

Potential issues from the project will be from clearing remnant vegetation and the influences that this will have on fauna populations over time. A number of key hot spots are identified, with the mallee within the northern section of the alignment being of high concern. This is due to the habitat supporting a number of national listed species; namely the Malleefowl and Sandhill Dunnart. These two species could suffer due to clearing vegetation for construction of the new line as well as establishment of a vehicle trail that follows the line for visual inspection. This will allow greater access for introduced animals, namely the Red Fox (*Vulpes vulpes*) and feral Cat (*Felis catus*) (DEWHA 2008). Both these species prefer to move along open and cleared lands as well as hunting areas that are open (Dickman 1996). This affords easy unrestricted access, as well as removing cover and shelter for any prey items.

The area around the Koppio Hills is also of concern, as any levels of vegetation clearing may impact on breeding hollows or feed trees for the Eyre Peninsula Yellow-tailed Black Cockatoo or roosting areas for the common Brush-tailed Possums. This also could be prevalent for species such as the Southern Emu-Wren, who may be already extinct in the area.

6.2.1 Key habitats

The ElectraNet easement is approximately 290 km in length from Cultana Substation to Port Lincoln. As a result, a significant variety of habitats were present, due to factors such as soil type, climatic condition, topography and aspect. Levels of disturbance also varied markedly, with areas of pristine remnant vegetation through to severely cleared and fragmented areas used for cropping and/or stock grazing. Consequently, the bird survey results are discussed in three sections. These represent broad scale changes or boundaries and tended to have very defined and sudden changes in habitat and disturbance levels. As such the species assemblages within each area tended to vary markedly from the other areas.

Northern section- Cultana to Mangalo Road (approximately 15 km from Cleve)

This section contained large tracts of open chenopod shrubland dominated by *Acacia papyrocarpa* (Western Myall) before migrating into the Middleback Ranges and mallee country, with red and white sand dunes. Bird surveys were undertaken along this section of the easement during December 2012. This section contained the most rated species, with five species observed, with no introduced bird

species noted. Much of the vegetation was in good condition and would most likely support Malleefowl and Sandhill Dunnart, as habitat present contained appropriate tree species, correct density and sandy substrate with areas covered in dense leaf litter and large tracts of *Triodia* spp. (Spinifex).

Species such as Thick-billed Grasswren and Slender-billed Thornbills were observed in chenopod shrubland north of the Middleback Ranges in chenopod dominated pastoral areas. The pastoral areas appeared to be in good condition and are likely to support good numbers of both species.

Striated Grasswren were observed in Ironstone Hill Conversation Park, almost directly under the existing transmission line. This species requires dense *Triodia* spp. (Spinifex) growing under mallee, and areas throughout this section contained suitable habitat for this species. Gilberts Whistler was also observed at this location.

Bird density and species composition changed dramatically when the remnant mallee vegetation changed to cleared land.

Central Section- Mangalo Road to Stokes

The majority of this section is located within extensively cleared and fragmented habitats, with only a few small remnant patches of varying habitat value along the easement. Much of the remnant vegetation is located on the road reserves, providing some suitable habitat, however these are linear and relatively narrow, and highly compromised by edge effect.

This section contained the first noted introduced species, the European Starling and the House Sparrow. It also contained a number of native bird species that have adapted well to large scale landscape changes, such as the Galah (*Eolophus roseicapilla*), Yellow-throated Miner (*Manorina flavigula*) and Crested Pigeon (*Ocyphaps lophotes*). These generalist species have also benefited from excess seed production being available through cropping.

Only one species of conservation significance was observed, The Peregrine Falcon, resting on a transmission line tower on the fringes of Hincks Wilderness Area. This species was noted on a number of transmission line towers, and appears to be utilising the structures for roosting and hunting as a substitute for cliffs and other high natural features.

Southern section- Stokes to Port Lincoln

This section, while heavily utilised for a variety of agricultural purposes, traverses the Koppio Hills. The remnant woodland vegetation in the Koppio Hills is known to support high numbers of bird species compared to other habitats within the region (Brandle, 2010). A wide variety of species, including three species of conservation significance, were observed during the March 2013 survey. These species, Diamond Firetail, Shy Heathwren and Cape Barren Goose were observed in a number of habitats, ranging from large Sugar Gums to low heathy ridge tops to open, clear paddocks.

The area is also known to contain key habitats for the breeding of the Eyre Peninsula population of the Yellow-tailed Black Cockatoo, heathy areas suitable for Southern Emu-wrens and the small isolated population of the Western Gerygone (*Gerygone fusca*). Unfortunately, stochastic events such as the

'Black Tuesday' fires of 2005 have decimated these bird species in the area, and highlight the delicate nature of areas that are highly fragmented.

6.2.2 Threatened fauna

Numerous threatened species have been identified along the alignment via database searches, being either listed under national EPBC or the NPW act, South Australia. Many of the species listed may exist along the line to some extent; however species listed below were either observed, have a high chance of existing along the line due to suitable habitats existing, or may be affected by small scale changes to key habitats.

Malleefowl (*Leipoa ocellata*) EPBC Vulnerable, State Vulnerable

Critical habitat for the Malleefowl was found along approximately 35 km within the northern section, from between Iron Duchess to the southern end of She-oak Conservation Park. These areas consisted of semi-arid to arid shrublands and low woodlands dominated by mallee and associated habitats such as *Melaleuca uncinata* (Broombush) and *Callitris verrucosa* (Scrub Pine). A sandy substrate and abundance of leaf litter were present in almost the entire section, both of which are key requirements for the construction of the birds' incubator-nests.

The clearing and fragmentation of Malleefowl habitats is highlighted as a key threat to the species and it is considered that these actions are also likely to exacerbate other threats (Benshemesh 2007). There is potential for clearance of large tracts of mallee vegetation to facilitate the construction of the proposed transmission line. This may, in turn, cause extensive fragmentation of key habitat for the Malleefowl, placing further pressures on a population of animals that has suffered severe restrictions since European settlement on the Eyre Peninsula.

Although no Malleefowl were observed directly during the original survey, further efforts have located numerous Malleefowl mounds that are in close proximity to the current transmission easement. This confirms that the intact mallee vegetation traversed by the existing and proposed high voltage transmission line through the Middleback region of NE Eyre Peninsula is inhabited by Malleefowl. The area contains relatively low densities of Malleefowl mounds, approximately half of the median for other sites in South Australia, with a density of between 3.2-4.4 mounds per km². This is, however relatively high for an arid region (Ecological Horizons, 2014). Less arid areas with high density of mounds are typically restricted to small isolated remnants which suggest may that the Middleback region, whilst supporting a lower density is supporting a significant Malleefowl population due to the large area of intact habitat. The mound density determined by this study should form the basis of any offsets associated with impacts to the local Malleefowl habitat.

One key outcome of this study was the comparison of recently active Malleefowl mound density adjacent to and remote from the transmission line. This may provide evidence of the effect of the proximity to the transmission line affecting long-term nest site selection or its success. Confirmed mound densities along the transmission line were 28% lower than densities on the remote transect. There was also a 5% higher percentage of historic mounds on the transmission line transect compared to the control transect. This lower density of recently active mounds and relatively low percentage of

historic mounds would be expected if proximity to the transmission line increased the likelihood of mounds being abandoned or led to higher predation rate of nesting birds. Together these data suggest that proximity to the transmission line may negatively influence nest site selection and possibly nesting success in Malleefowl. The most plausible conclusion from this study is that recently active Malleefowl mound density and hence possibly nesting success, is reduced by approximately one third in the vicinity of the existing ElectraNet transmission line.

Relative densities of recently active Malleefowl mounds adjacent to the transmission line compared with remote areas could be confounded by variation in fire history and habitat between the two transects. Therefore, the negative correlation found in this study should ideally be compared with analogous datasets from other regions. Within the transmission line transect, there was no indication that the distribution of recent or historic mounds showed any relationship with distance to the transmission line, as could have been expected if higher predation rates (foxes and raptors using the transmission line easement) affected nest location choice in the Malleefowl. It is possible that any effect of the transmission line could extend for the entire 500 m width of the transmission line easement and hence not exhibit a pattern at a finer scale. Furthermore, if Malleefowl select their mound locations on the basis of habitat quality, rather than variability in predation risk, mound location would not be expected to be influenced by proximity to the transmission line.

Sandhill Dunnart (*Sminthopsis psammophila*) EPBC Endangered, State Vulnerable

The Sandhill Dunnart is known to occur on sandy substrates in arid and semi-arid regions. The most consistent features of the habitat are the presence of *Triodia* spp. (*Spinifex*) and sand dunes (Churchill 2001). Suitable habitat for Sandhill Dunnarts on Eyre Peninsula is limited due to historical land clearance.

Previous records of the species are present across the project area (refer to Figure 12 and Figure 13). One of the key populations of Sandhill Dunnarts is located near Whyalla in the Middleback Ranges, an area that the current easements transect. There are also several conservation areas in the vicinity of the project area that contain habitat potentially suitable for the species; primarily Pinkawillinie CP, Lake Gilles CP, Hambidge CP, and Munyaroo CP (Churchill 2001). Previous surveys of Pinkawillinie, Lake Gilles, and Hambidge CPs have failed to detect the species, but further survey work is needed. Munyaroo CP has not been surveyed for the species. There has been limited survey effort in general for this species across the region. It is considered likely that the BDBSA records for this species in the vicinity of the proposed transmission line alignments are part of a larger population that extends to the west of the State, where there is a known population and historical records in the Yellabinna region (Churchill 2001).

Habitat modeling and subsequent assessment of the proposed transmission line corridor identified a total of 1213 hectares of native vegetation from Middleback Range to Sheoak Hill Conservation Park containing suitable *Triodia* habitat within four vegetation associations. At least two of these vegetation associations support confirmed records of Sandhill Dunnarts and although it is likely that the other two suitable *Triodia* associations also support dunnarts, these are currently unsurveyed. The patchy nature

of the *Triodia* habitat suggests that it is also likely that some of the remaining non-*Triodia* native vegetation along the corridor is used by Sandhill Dunnarts for dispersal and feeding.

The height of *Triodia* is an important variable that can be used to predict the abundance and presence of Sandhill Dunnarts and is dependent to some degree on fire age. The relationship between *Triodia* height and fire age is unclear for sites more than 50 years post fire, but Sandhill Dunnarts appear to require habitat more than 10 years post burn for local persistence.

Sandhill Dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation, possibly because such large areas can support fire mosaics of varying age, ensuring that at least some habitat is always suitable for Sandhill Dunnart breeding. The large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of Sandhill Dunnart habitat within the proposed corridor and there are numerous current records of the species from this area.

To increase certainty about Sandhill Dunnart occurrence in the corridor, ground trapping surveys of two of the *Triodia* vegetation associations (excluding the small patch of *Triodia* with *Austrostipa* on the Whyalla plain) currently not known to support Sandhill Dunnarts would be required. Additionally, *Triodia* height measurements of the unknown fire age *Triodia* habitat (54% of it) could be measured to finalise the map of current and future optimal habitat. Without further detailed surveys it should be assumed that the transmission line corridor mallee habitat from the Middleback Range to south of Sheoak Hill Conservation Park is suitable Sandhill Dunnart habitat and important for the preservation of the species.

There is potential for impacts to this species as a result of the proposed transmission line development, including:

- the direct removal, degradation or further fragmentation of suitable *Triodia* habitat (optimal, future and unclassified) used for shelter and breeding;
- the direct removal of individuals;
- the increased predation of the species via further accessibility of suitable habitat to exotic species such as Cats and Foxes; and
- removal or modification of connective non-*Triodia* habitat used for dispersal and feeding.

It is considered a referral under the EPBC Act is required for this species, given the potential impact to this species as a result of the proposed development.

Southern Emu-Wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) EPBC Vulnerable State Endangered

The Southern Emu-wren (Eyre Peninsula) is a small bird that has an overall length of 17–19 cm and a mass only 9 g. The tail is exceptional long in this small species, and is over 10 cm in length with some males exceeding 13 cm. The tail is a stick-like bunch, and comprised of only six emu-like feathers (Higgins et al. 2001).

The Southern Emu-wren (Eyre Peninsula) sub-species is restricted to the extreme south of the Eyre Peninsula (Pickett 2006), and exists in numerous small disjointed populations. Its range extends broadly

from Marble Range, South Block and Edillilie in the north-west and north, to Point Avoid in the west, Cape Wiles and West Point in the south and south-east, to McLaren Point-Carcase Rock and the central Koppio Hills in the east and north-east (Pickett 2006). The largest populations occur in the Kellidie Bay, Whalers Way, McLaren Point-Point Haselgrove and West Point areas (Pickett 2006). The extent of occurrence is estimated at 2545 km². The Southern Emu-wren (Eyre Peninsula) occurs in three types of habitat: shrubland or heathland, mallee and sedgeland (Pickett 2002). These habitats are characterised by one or two layers of dense vegetation up to 3 m in height (Morgan 1982; Pickett 2002).

Surveys for the species were undertaken during the March survey in areas historically known to have Southern Emu-wrens, however none were observed. This species can be very cryptic and shy making confirmed detection very difficult. The presence of Superb Fairy-wren (*Malurus cyaneus*) in the area also hampers searching, due to similarity in calls. Unfortunately, the population within the Koppio hills appears to have been decimated by the 2005 'Black Tuesday' fires that burnt through this region. Southern Emu-wrens were historically found within the Charlton Gully, an area which is in close proximity to the current power line, however they have not been observed at this area since 2005 (Pickett 2005). It is unknown if this species will re-habituate this area; suitable habitat has recovered and could sustain this species. However other populations are some distance away (Edillilie is approximately 18 km away and holds a stable population) and with the highly fragmented habitat between the sites, plus the species poor long distance movements, recruitment is more than likely limited. This may be the reason for not finding this species; however further searching may locate birds and re-recruitment to the area cannot be discounted.

Potential impacts to the species associated with the construction phase can be minimised by sensitive micro-siting of infrastructure, however a referral under the EPBC Act is considered necessary for the species.

Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) (Eyre Peninsula population) State Rare

The Yellow-tailed Black Cockatoo is a large 56-66cm black parrot with a long tail, broad wings and strong bill. It is one of three species of Black Cockatoo that occur in South Australia and can be easily distinguished by the yellow panels in its tail and yellow ear coverts. Three recognised sub-species exist; *C. f. funereus* found through south-east Queensland, eastern New South Wales and eastern Victoria, *C. f. xanthanotus* that occurs in Tasmania and the islands of Bass Strait, and *C. Funereus whitei* that occurs in western Victoria, and southern South Australia.

Historically, there were three main vegetation communities on the Eyre Peninsula throughout the birds' current southern range: Sugar Gum woodlands and heathy woodlands, heathlands (typically on hill tops and ridges) and water courses characterised by *E. petiolaris* woodland (Eyre Peninsula Blue Gum) and/or swamp habitats. It is possible that the cockatoos may have also ranged more widely and historically utilised *Allocasuarina verticillata* (Sheoak) Grassy woodlands that have largely been cleared on Eyre Peninsula. The ironstone soils of Southern Eyre Peninsula are agriculturally productive and the majority of these vegetation communities in the region were historically cleared for cropping and sheep grazing

Numbers of the Eyre Peninsula Yellow-tailed Black Cockatoo have been monitored closely for the past 20 years, and showed a general steady increase in population. This was until 2005, when the “Black Tuesday” fires decimated the estimated 30-34 birds reducing the known maximum population to between 11 and 12 individuals. As such, the Eyre Peninsula population of Yellow-tailed Black-Cockatoo is considered Critically Endangered by the Eyre Peninsula Yellow-tailed Black-Cockatoo Recovery Team.

No Eyre Peninsula Yellow-tailed Black Cockatoos were observed during the survey period.

Fairy Tern (*Strenua nereis nereis*) – EPBC Vulnerable and migratory, State Endangered (likely to be fly-over species across the easement where it is closest to the coastline).

The Fairy Tern is like the Little Tern but has a larger head, with a more rounded profile. Fairy Terns also have a bulkier body and shorter, thicker legs. Legs are bright orange. They are found on coastal beaches, inshore and offshore islands, sheltered inlets, sewage farms, harbours, estuaries and lagoons. It favours both fresh and saline wetlands and near-coastal terrestrial wetlands, including lakes and salt-ponds.

Movements are poorly known and the Fairy Tern appears partly migratory and partly non-migratory. The relationship between breeding and non-breeding ranges is not known. In South Australia Fairy Terns appear not to move regularly and are numerous at all times in some areas. Fairy Terns are predominantly located in the south east, Coorong and along the Eyre Peninsula coastline, with breeding colonies recorded on the Fleurieu Peninsula, Yorke Peninsula, Eyre Peninsula and the Coorong.

Fairy Terns normally breed in colonies (2 to 400 birds) but also nest solitary, above the high-tide mark on sheltered beaches, spits, bars, banks and ridges, usually of sand but also of shell grit or coral, either on the mainland or on inshore islands. They often nest in clear view of the water and on sites where the substrate is sandy and the vegetation low and sparse. Nests typically consist of a shallow scrape in the sand which is often lined with small shells and vegetation. Fairy Tern often nests in association with other species, especially Little Tern (*Strenua albifrons*).

The Fairy Tern population has dramatically declined over the past ten years. Results from the November 2010 State-wide census recorded a range between 650 and 750 Fairy Tern across South Australia. This species, if occurring on site, would likely to be as a fly-over species with impact from the proposed easement being difficult to predict but assumed as unlikely.

Thick-billed Grasswren (*Amytornis textilis myall*), State Rare (no longer listed under EPBC (DSEWPaC 2013)) now referred to as Western Grasswren

Western Grasswren are thickset, dull brown in colouration with dark stout bills. The underparts are pale grey-buff, with fine streaking from the chin to the breast and on the back. The Female Thick-billed Grasswren has chestnut flanks (Pizzey & Knight 1999).

A. textilis myall is restricted to South Australia and is one of a number of sub-species of Thick-billed Grasswren in the State. It is scattered and widespread on the north-eastern Eyre Peninsula, from

around Whyalla and Mt Middleback, northwest through the Gawler Ranges (particularly the eastern Gawler Ranges), north to around Lake MacFarlane and eastern Lake Gairdner (Black 2011).

Preferred habitats occur in open chenopod shrublands, often where dense stands of *Acacia tetragonophylla* (Dead Finish) or *Maireana pyramidata* (Black Bush) surround drainage lines (Higgins et al. 2001). It also occurs in *Atriplex* spp (Saltbush) with a sparse or open overstorey of low trees or shrubs, such as *Acacia papyrocarpa* (Western Myall), *Casuarina pauper* (Black Oak), *Lycium australe* (Australian Boxthorn), *Alectryon oleifolius* (Bullock Bush) and *Myoporum platycarpum* (Sugarwood); this is in contrast to other sub-species of *A. textilis*, who prefer lower shrubland. (Black et al 2011; Higgins et al. 2001)

The Gawler Ranges subspecies of the Thick-billed Grasswren is usually seen in pairs or small groups, but sometimes occurs singly (Higgins et al. 2001). EBS recorded this species in preferred chenopod shrublands on Middleback and Broadview station.

Striated Grasswren (*Amytornis striatus*), State Rare

This species is sedentary in nature, with local movements in the non-breeding season. They are secretive species, principally terrestrial in character, and live as singles, in pairs or small groups of up to five individuals. Territories of about 1 ha are maintained by breeding pairs during the breeding season. They are capable of breeding in fragmented Spinifex (*Triodia* sp.) habitats of less than 1ha in area (Higgins et al. 2001).

The Striated Grasswren inhabits dense, tall (mature) Spinifex with or without a shrub overstorey. This overstorey generally consists of Mallee, *Acacia*, *Grevillea* and/or *Hakea* spp. And tends to occupy vegetation with a post fire age of 6 to 30 years (Garnett et al 2011)

The species was observed within the study area; being found in an area with extensive *Triodia* sp groundcover with numerous short, but dense mallee trees within the Ironstone Hill Conservation Park. The species was found advertising calling actively in the morning and responded to call play back. This allowed visual confirmation of the species. This species was recorded within the 10 km of buffer on the line within the BDBSA database, with specimens recorded in Ironstone Hill CP in 2008. This may indicate that this area is a hot spot for this species and as Stated earlier their habitat requirements are similar to Sandhill Dunnarts.

Peregrine Falcon (*Falco peregrinus*), State Rare

The Peregrine Falcon is arboreal, foraging over plains, vegetated areas, wetlands, beaches, dunes and farmland, from a height or close to the ground, for small vertebrates, invertebrates, and occasionally fruit. The sedentary species is known to follow the distribution of prey from season to season and roosts and nests in cliffs, cavities, hollows, other bird nests, sink holes and on buildings.

The Peregrine Falcon is found across Australia, but is not common anywhere. Although these birds are not common, they have successfully spread worldwide, and will sometimes nest on artificial structures such as the window ledges of high buildings and in this instance, along the easement in towers. It is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine

areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water. Peregrine Falcons commonly occur at windy sites along ranges, and often nest in crevices of rocky cliff faces (Pizzey and Knight 1997). This species has a distinctive flight and call, and is often observed flying above the tree canopy or in open areas between patches of woodland, or over wetlands. Pairs are known to nest in the same locations for many years. Peregrine Falcon pairs are known to have large territories, and an estimated 3,000 to 5,000 pairs exist in Australia, of a world total of 12,000 to 18,000 pairs (Blakers et al. 1984). Given that Peregrines have large territories and nest in the same location for years, it would appear that the birds that were observed during the survey period are likely to remain on site in the future. This may have implications in terms of altering prey abundance or changing the behaviour of this species i.e. individuals were found quite close together along the easement resting on a tower on the fringes of Wharminda Conservation Park. This species was noted on a number of towers, and is possibly benefiting from the structures due to their use of cliffs for roosting and hunting.

6.2.3 Potential impacts to threatened fauna species

Introduced predators have taken a heavy toll on native Australian species, with both the Red Fox and Feral Cat proving to be extremely adaptable and accomplished hunters (Dickman 1996; Kinner et al 2002). The direct effect of these species is well documented (Saunders et al 2010; Letnic et al 2009; Read and Bowen, 2001; Paltridge et al 1998) and numerous species exist within the study area that may suffer due to an increase in predator numbers or accessibility. Both introduced species have been strongly implicated with the reductions in native mammal populations, or extinction of native mammals in the critical weight range (CWR) from 35-5000 g (Read and Bowen, 2001; May and Norton 1996). Both the Red Fox and Cat tend to prefer modified habitat and move into more highly degraded open habitats. This helps their movement as well as reducing available areas of cover for prey to shelter, assisting in hunting. Opening areas of remnant vegetation may assist in an increase in population of these two predators, which may have an impact on native species such as the Sandhill Dunnart, a national listed species which falls into the CWR.

The Red Fox have also been heavily linked with reductions and impacts on the Malleefowl (Benshemesh, 2007). This predator will predate young that have emerged the nest chamber 'mound' as well as predated unhatched eggs that are in the mound. They also have the potential to prey upon adults, and as such can cause large scale devastation to this species. Fragmentation and habitat alteration has also been shown to have an effect on this species and any increase of pressures on the small and isolated Eyre Peninsula population could prove to be a tipping point, and may cause long term reductions of this species.

It is recognised that feral animal movement along the current power line easement is already happening. The line has been cleared of vegetation for visual inspections as well as reducing fire risk facilitating accesses and movement for these species. The addition of a second line 120 m from the current line and a series of 'spur' tracks connecting the tower location between new and old alignments, will significantly increase the access and fragmentation of habitats. It will also effectively create small 'islands' of native vegetation between the cleared lines, which could limit movement from the 'islands'

due to the surrounding hostile cleared environment. Edge effects will also be more pronounced with some species tolerant of these conditions benefiting, which may increase pressures on sensitive species. It may also affect species which tend to be very specific in their habitat requirements and sensitive to disturbances.

A second line will also double the amount of towers (assuming that there is no decommissioning of the existing line undertaken) and will allow birds of prey such as the Peregrine Falcon extra areas for breeding and hunting. Numerous Peregrines were noted along the line, always resting on towers and many nests visible. Naturally this species rests and breeds on cliffs or similar high structures and as such artificial towers provide unnatural areas that they will utilise. Peregrines tend not to occur in habitats that do not have cliffs or rocky outcrops, and the construction of towers such as power poles may assist in this species habituating areas that they could not before. This may have an effect on bird species in the area that the Peregrine hunts. Methods of avoiding this potential issue are difficult to rectify, as a second line will need to be constructed while the existing line is in use, however techniques to limit available roosting or breeding areas may be possible.

Potential impacts on the flora and fauna associated with the proposed transmission line construction include direct removal of native vegetation and habitat (including vegetation, soil structure and resources), loss of habitat connection (e.g. through tracks), noise disturbance on fauna and direct mortality of fauna (e.g. through road-kills).

6.3 Biodiversity hot spots

A series of 'hot spots' have been highlighted along the project area that identify key constraints associated with areas possessing a high concentration of nationally and State threatened species records, TECs, protected areas and remnant native vegetation. Six areas have been identified and discussed individually (Figure 27 to Figure 32). Several of these are associated with the recognised threatened habitat areas, Koppio Hills and Cleve Hills.

Hot spot area 1

This area is located from Cultana substation at the northern extremity of the project area to the Middleback Ranges in the Myall Plains IBRA Subregion, encompassing the semi-arid pastoral lease country. These areas contained large tracts of open chenopod shrubland with *Acacia papyrocarpa* (Western Myall) before migrating into the Middleback ranges and Mallee country. Mallee was dominated by red and white sand, with areas of large dunes present. Much of the vegetation was in excellent condition with very low levels of weed invasion and grazing impacts generally associated with some boundary fences and water points. A number of key constraints were listed for this area:

- State Vulnerable *Santalum spicatum* (Sandalwood) recorded within the 120m wide assessment corridor.
- State Rare Slender-billed Thornbill (western) (*Acanthiza iredalei iredalei*)
- State Rare Western Grasswren (previously Thick-billed Grasswren) (*Amytornis textilis myall*) (no longer listed under EPBC (DSEWPaC 2013))

- State Vulnerable *Alectryon oleifolius* ssp. *canescens* Low Woodland over *Atriplex vesicaria* / *Maireana sedifolia*
- Protected areas
 - Whyalla CP

Hot spot area 2

This area is at the southern end of Hot Spot 1 and ends at the Plug Range CP, also identified as part of the Cleve Hills Threatened Habitat Area within the Eyre Hills IBRA Subregion. The vegetation is defined by large and continuous tracts of mallee / spinifex communities associated with large dune complexes and provides important refuge areas to a large number of fauna and flora species. The key constraints listed for this area are:

- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Acacia cretacea* (Chalky Wattle) (Endemic)
 - *Swainsona pyrophila* (Yellow Swainson-pea)
 - *Pterostylis xerophila* (Desert Greenhood)
- Nationally Threatened Fauna Species
 - Malleefowl (*Leipoa ocellata*)
 - Sandhill Dunnart (*Sminthopsis psammophila*)
- State Listed flora species - recorded within the 120m wide assessment corridor.
 - *Acacia rhigiophylla* (Dagger-leaf Wattle) – State Rare
- State Listed fauna species
 - Striated Grasswren (*Amytornis striatus*)
 - Gilberts Whistler (*Pachycephala inornata*)
- Protected Areas
 - Ironstone Hill CP
 - Sheoak Hill CP
 - Sheoak Hill CR
 - Plug Range CP
 - 9 Heritage Agreements
 - 1 SEB area
- Cleve Hills Threatened Habitat Area (DEH, 2002)

Hot spot area 3

This area extends from the Plug Range CP to just north-west of Cleve and is also located in the Cleve Hills Threatened Habitat Area within the Eyre Hills IBRA Subregion. The vegetation which is mainly characterised by mallee / broombush communities and Native Pine open woodlands are more

fragmented than Hot Spot Area 2, but are still known to provide valuable habitat to a number of threatened fauna and flora species. The key constraints listed for this area are:

- State Endangered vegetation associations
 - *Allocasuarina verticillata* Low Woodland
- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Acacia cretacea* (Chalky Wattle) (Endemic)
 - *Acacia praemorsa* (Senna Wattle) (Endemic)
 - *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush)
 - *Acacia rhetinocarpa* (Neat Wattle)
 - *Acacia pinguifolia* (Fat-leaved Wattle)
- State Listed flora species - recorded within the 120m wide assessment corridor.
 - *Acacia hexaneura* (Six-nerve Spine-bush) – State Rare
 - *Goodenia benthamiana* (Bentham's Goodenia) – State Rare
 - *Acacia rhigiophylla* (Dagger-leaf Wattle) – State Rare
 - *Austrostipa breviglumis* (Cane Spear-grass) – State Rare
 - *Olearia adenolasia* (Musk Daisy-bush) – State Rare
- Cleve Hills Threatened Habitat Area (DEH, 2002)

Hot spot area 4

This area encompasses approximately 14 kilometres of the project area on the eastern side of Hincks Wilderness Area and west of Wharminda in the Eyre Mallee IBRA Subregion. The vegetation is predominately fragmented mallee / broombush patches, but is still known to provide valuable habitat to a number of threatened fauna and flora species. Most patches are isolated but in relatively close proximity to Wharminda CP, Hincks WA and a number of larger remnant patches of native Vegetation. A number of key constraints were listed for this area:

- Nationally Threatened Flora Species records within 10kms of the assessment corridor (may exist within the corridor)
 - *Arachnorchis tensa* (Greencomb Spider-orchid)
- State listed flora species - recorded within the 120m wide assessment corridor.
 - *Microtis* sp. Nash (R. Bates 44740) (Nash's onion orchid) – State Rare
- State listed fauna species
 - Peregrine Falcon (*Falco peregrinus*)
- Protected areas
 - Wharminda CP

Hot spot area 5

This area is located from just west of Butler and extends to Green Patch in the Eyre Hills IBRA Subregion, encompassing part of the Koppio Hills Threatened Habitat Area. The area contains highly significant, but highly fragmented vegetation, State and regionally listed TEC's, significant wildlife habitat, many nationally and State listed fauna and flora species. More specifically the constraints listed for the area are:

- Nationally Endangered and endemic vegetation association
 - *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland
- State Endangered vegetation associations
 - *Allocasuarina verticillata* Low Woodland
 - *Eucalyptus petiolaris* (Eyre Peninsula Blue Gum) Low Woodland
 - *Eucalyptus peninsularis*, *E. dumosa* complex Woodland
 - *Gahnia trifida* (Cutting Grass) Sedgeland
 - *Austrodanthonia* spp. / *Austrostipa* ssp. +/- *Themeda triandra* Tussock Grassland
- Regionally threatened vegetation association
 - *Eucalyptus cladocalyx* (Sugar Gum) Woodland (DEH, 2002)
- Nationally Threatened Flora Species
 - *Acacia enterocarpa* (Jumping-jack Wattle)
 - *Acacia pinguifolia* (Fat-leaved Wattle)
 - *Acacia whibleyana* (Whibley Wattle)
 - *Arachnorchis brumalis* (Winter Spider-orchid)
 - *Arachnorchis tensa* (Rigid Spider-orchid)
 - *Haloragis eyreana* (Prickly Raspwort),
 - *Olearia pannosa* subsp. *pannosa* (Silver Daisy-bush)
 - *Prasophyllum goldsackii* Goldsack's (Leek-orchid)
 - *Prostanthera calycina* (West Coast Mintbush)
 - *Ptilotus beckerianus* (Ironstone Mulla Mulla)
 - *Pultenaea trichophylla* (Tufted Bush-pea)
 - *Thelymitra epipactoides* (Metallic Sun-orchid)
- State threatened flora species
 - *Acacia imbricata* (Feathery Wattle) – Stare Rare
 - *Daviesia pectinata* (Zig-zag Bitter-pea) – Stare Rare
 - *Eremophila gibbifolia* (Coccid Emubush) – Stare Rare
 - *Philothea angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) – Stare Rare
 - *Spyridium leucopogon* (Silvery Spyridium) - Stare Rare
 - *Spyridium spathulatum* (Spoon-leaf Spyridium) - Stare Rare

- *Eremophila gibbifolia* (Coccid Emubush) – Stare Rare
- *Philothea angustifolia* ssp. *angustifolia* (Narrow-leaf Wax-flower) – Stare Rare
- *Spyridium leucopogon* (Silvery Spyridium) - Stare Rare
- *Spyridium spathulatum* (Spoon-leaf Spyridium) - Stare Rare

Hot spot Area 6

This section, whilst largely utilised for a variety of agricultural purposes, possess a few attributes of State conservation significance. Potential constraints listed for the area are:

- State Endangered and endemic vegetation associations
 - *Allocasuarina verticillata* Low Woodland
- State threatened fauna species
 - Diamond Firetail (*Stagonopleura guttata*)
 - Cape Barren Goose (*Cereopsis novaehollandiae*)

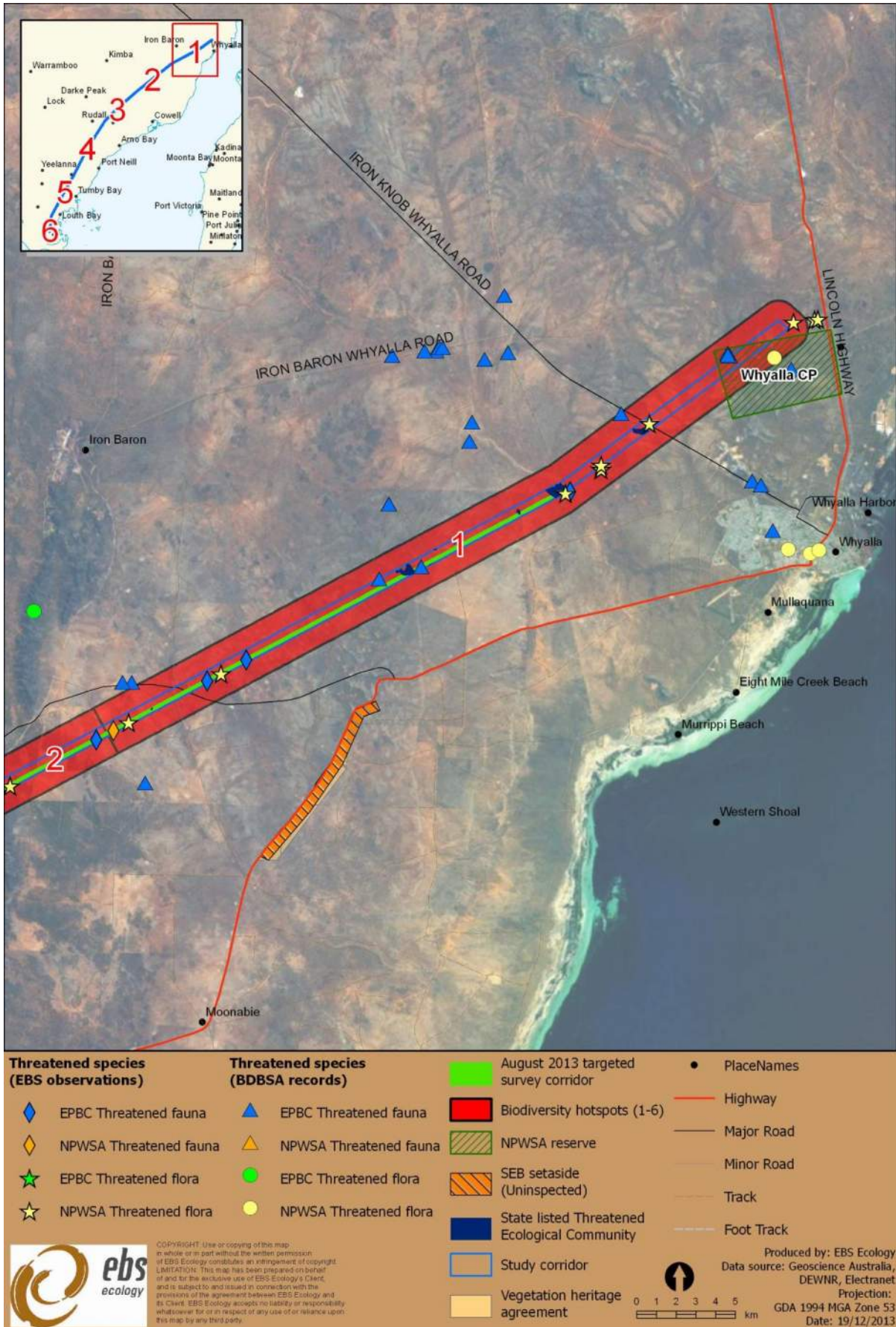


Figure 27. Project area hot spot 1.

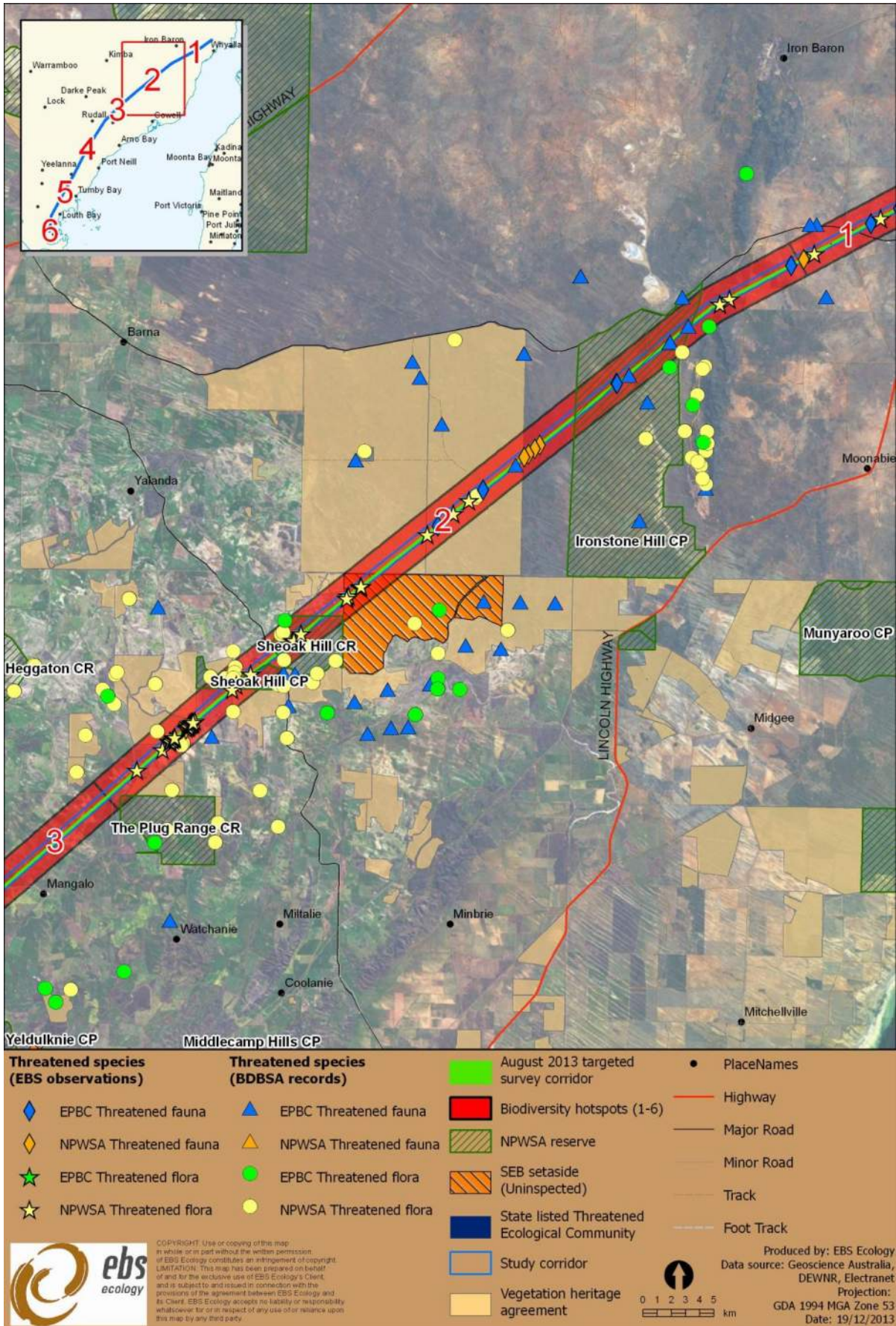


Figure 28. Project area hot spot 2.

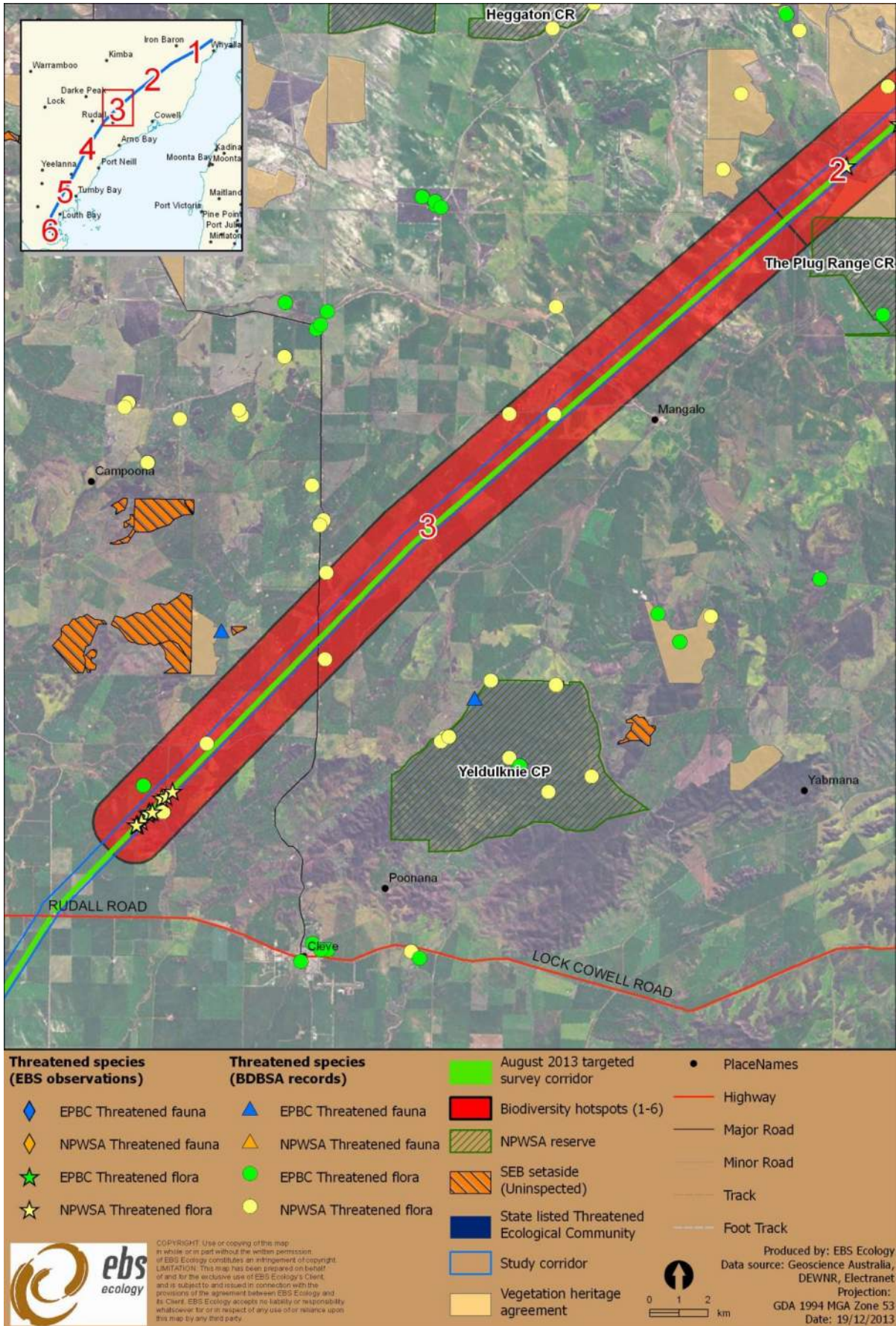


Figure 29. Project area hot spot 3.

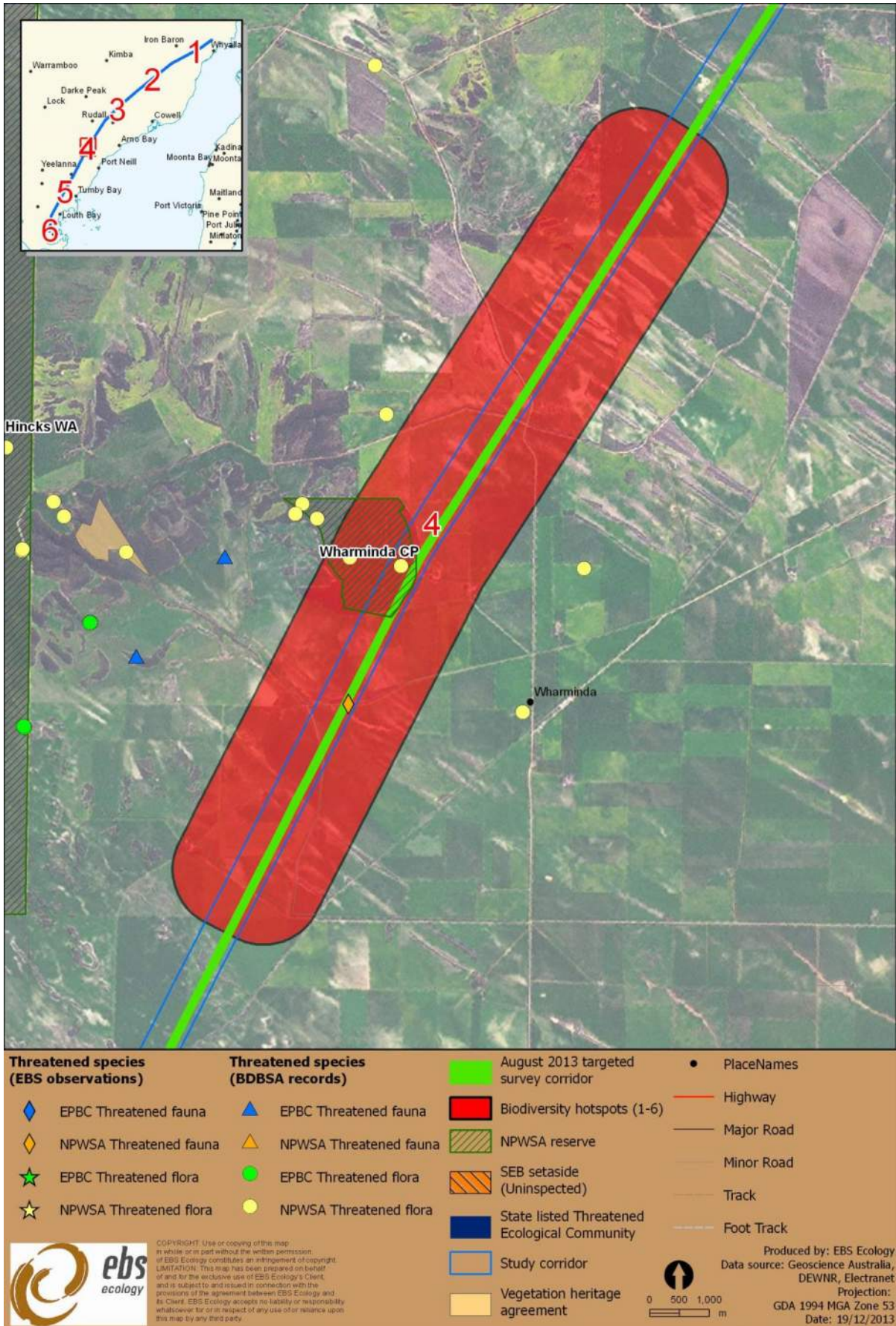


Figure 30. Project area hot spot 4.

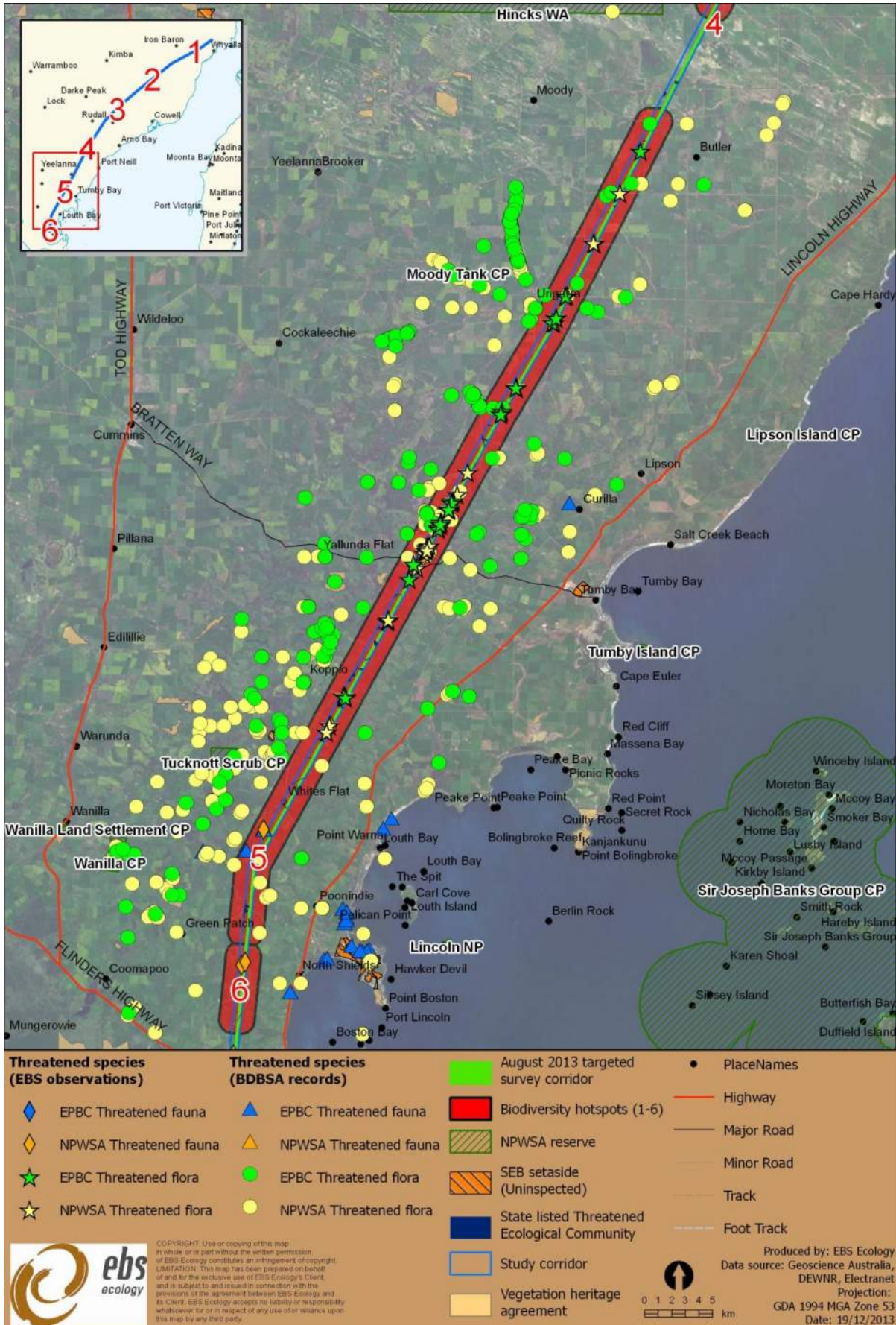


Figure 31. Project area hot spot 5.

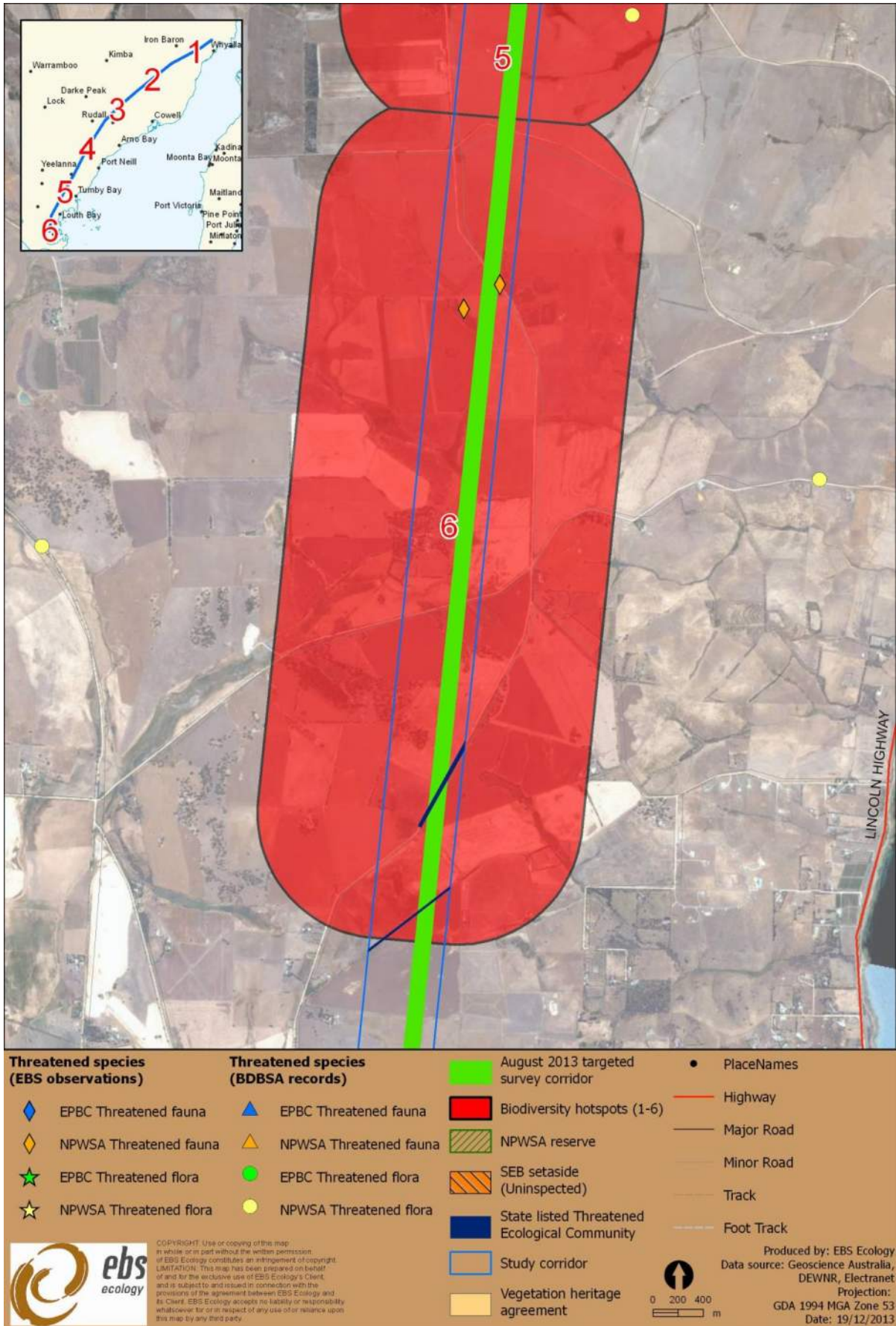


Figure 32. Project area hot spot 6.

6.4 Protected areas

The proposed alignment is sited within close proximity and, in some areas, intersects a number of protected areas (reserves under the NPW Act or Heritage Agreements and SEB areas under the NV Act). All protected areas should be avoided as far as practicable.

Information in relation to Heritage Agreements is not publicly available, so consultation with the NVC will be required to understand the reasons for protection of these areas and the extent to which the NVC would consent to establishment of a development easement within Heritage Agreements. An approval from the NVC and relevant Minister would be required if development within an existing Heritage Agreement is proposed (*P. Farmer, NVC, pers. comm. 2012*). The proponent would require support from the NVC in relation to the concept and design of the project, and management methods to be implemented to reduce impacts of native flora and fauna. Even if the NVC are receptive to consideration of an easement through a Heritage Agreement, this does not guarantee approval to proceed with the development. It is therefore considered preferable to explore all other alternatives for the alignment before planning an easement through an existing Heritage Agreement.

6.5 Road and rail corridors

A small proportion of the remnant native vegetation assessed within the project area occurred along roadsides and rail reserves, with the majority characterised by woodland and mixed mallee associations. Vegetation condition and width of the road reserve was variable with those located in the northern zone, in much better condition to those in the southern half. Roadsides and rail reserves often comprise the last stands of native vegetation in landscapes which have otherwise been extensively cleared and this is particularly poignant in the southern half of the project area. These areas can support significant populations of threatened flora and provide a refuge and corridor for local fauna. A number of the road and rail reserves contain rare and threatened plant species, including nationally threatened species such as *Acacia cretacea* (Chalky Wattle), *Acacia pinguifolia* (Fat-leaf Wattle), *Acacia whibleyana* (Whibley's Wattle), *Haloragis eyreana* (Prickly Raspwort), *Acacia enterocarpa* (Jumping-jack Wattle), *Acacia rheticarpa* (Resin Wattle), *Olearia pannosa ssp. pannosa* (Silver Daisy-bush), *Ptilotus beckerianus* (Ironstone Mulla Mulla), *Thelymitra epipactoides* (Metallic Sun-orchid), *Arachnorchis brumalis* (Winter Spider-orchid) and *Pultenaea trichophylla* (Tufted Bush-pea). Some of these, in particular, *Haloragis eyreana* (Prickly Raspwort) have sub-populations that persist almost entirely in roadside and rail reserves. Targeted surveys have helped identify the significance of each of the remnants and particular caution will need to be exercised in dealing with roadsides and rail reserves during the construction phase. Some of the roadside reserves containing threatened species include Baila Hill Road, Dray Pole Hill Road, Lipson-Ungarra Roar, Ungarra-Yeelanna Road, Pfitzner Road, North Spriggs Road, Schubert Road and a few minor tracks.

6.6 Potential mitigation actions

A variety of management actions could be implemented to mitigate the potential impacts of the proposed development. Some of these actions may be mandatory under relevant legislation. The

specific nature of these actions would need to be determined once the final route alignment has been selected and the extent of potential impacts has been determined. Potential actions include, but are not limited to:

- Micro-site all infrastructure prior to final design to ensure areas of least impact are utilised;
- Design towers to ensure minimal roosting sites for birds of prey and nesting sites for introduced bird species;
- Develop detailed and extensive environmental management processes and procedures for the construction phase of the project;
- Preparation of appropriate management plans, for implementation prior to, during and post construction, to ensure environmental impacts are minimised as far as practicable;
- Utilising low-impact construction methods within highly sensitive environments; for example, within dune and mallee habitats;
- Protection of critical habitat for threatened species;
- Provision of funding to support recovery objectives and actions for threatened species; for example:
 - Protection of habitat
 - Undertaking surveys
 - Research projects to further understand species ecology
 - Establishment of monitoring programs
 - Preparation of management plans
 - Threat abatement (e.g. feral predator control)
 - Education and support for landowners

Where impacts on native vegetation are unavoidable, areas of excellent condition (high SEB ratio) should be avoided over areas of poorer condition. This will reduce potential impact on native vegetation and fauna and reduce the required SEB offset under the *Native Vegetation Act 1991*.

- Establishment of a Significant Environmental Benefit (SEB) under the *Native Vegetation Act 1991*. Options include:
 - Heritage Agreement
 - Set-aside area
 - Payment into the Native Vegetation Fund

7 RECOMMENDATIONS

The following recommendations have been provided to minimise the impacts associated with the proposal on the biodiversity assets within the region.

Further investigations

- Investigate, in detail, the use of alternative construction and maintenance methods to minimise the footprint of the infrastructure / long-term impact of the works. This may include tower design, line stringing methods, maintenance methods that avoid the need for a track between towers and use of underground lines so sensitive areas can be rehabilitated.
- Undertake investigations as per the Approved Conservation Advice, to determine whether the *Eucalyptus petiolaris* Woodland remnants along the alignment qualify as the nationally Endangered TEC, *Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland*.
- Undertake spring micro-siting surveys once a layout plan is available, given that it was not practical to thoroughly search every area within the assessment corridor.

Minimise clearance of threatened flora, TECS, threatened fauna habitat

- Avoid areas of known threatened species and significant threatened fauna habitat and TECs (Vegetation Associations 4, 31, 40, 46, 47, 58, 62 and 70) by using alternative routes and positioning towers in cleared areas and avoiding large scale clearance along the corridor for access, by using alternative access routes where possible. Micrositing tower locations prior to construction should be undertaken to ensure any impact is minimised.

Avoid protected areas such as NPW reserves, Heritage Agreements and SEB set aside areas

- The project area currently intersects four Conservation Parks, one Conservation Reserve, 18 Heritage Agreements and two SEB offset areas which are protected in perpetuity for biodiversity conservation under the *Native Vegetation Act, 1991*. Where impacts to protected areas are unavoidable consider construction modifications such as altering the span between towers to avoid significant areas or consider undergrounding sections of the line and allowing the initial clearance to regenerate.

Minimise impact on threatened fauna

- Known locations of threatened fauna and potentially suitable habitat should be avoided where possible. In particular Hot Spot areas 2 and 5 which fall within the Threatened Habitat Areas of Cleve Hills and Koppio Hills.

Impact assessment

- The ecological constraints of the project need to be taken into consideration when designing this project. A suitably qualified and experienced ecologist should be included in the design team to ensure infrastructure locations and construction methodologies are ecologically sensitive.

- It is recommended that all infrastructure is micro-sighted prior to final design to ensure the areas of least impact are utilised.
- Once final design is complete, a full impact assessment will be required for the project which should include native vegetation clearance, fauna habitat clearance and impact on threatened species.

Legislation

- EPBC Act, 2003

Due to the number of Matters of National Environmental Significance along the current alignment, a referral under the EPBC Act will be required for the project. Extensive consultation with DSEWPaC will also be required.

- Native Vegetation Act, 1991

Once the infrastructure design is finalised, the extent of vegetation removal required will need to be determined to calculate the required SEB offset. The provision of an SEB can be undertaken in several forms including managing and conserving areas of native vegetation, undertaking native vegetation restoration activities or making a payment into the Native Vegetation Fund.

Seek Native Vegetation Council approval for any vegetation clearance required and provide an appropriate SEB offset. The intent of SEB is to not only replace the immediate and direct environmental values lost through clearing, but also to achieve a net gain that contributes to improving the condition of the environment and biodiversity of the region and account for the indirect impacts on flora and fauna as a result of the construction and operation of the transmission line.

Clearance of native vegetation

- Where the proposed transmission line corridor passes through:
 - Fragmented vegetation patches, position infrastructure (towers) in cleared areas, or if necessary in areas of poorer quality vegetation.
 - Large tracts of high quality remnant mallee vegetation (e.g. Biodiversity Hot spots 1 (part) and 2), position infrastructure away from known high habitat areas or known significant areas (e.g. Malleefowl mounds)
 - Large tracts of high quality pastoral country dominated by Western Myall, chenopod associations with patches of Bullock Bush and Black Oak, ensure micro-siting of towers aims to avoid all patches of significant vegetation (e.g. State listed Bullock Bush Tall Shrubland) and where possible avoid clearance of long-lived procumbent Western Myall trees.
- Where impacts on native vegetation are unavoidable, areas of high quality vegetation should be avoided over areas of poorer condition. This will assist in minimising potential impacts on

native vegetation and fauna and reduce the required SEB offset under the *Native Vegetation Act, 1991*.

- Ensure vegetation clearance or damage is restricted to the project area.
- Relocate any cleared hollows (if any) and large cut timbers to remnant areas of vegetation, where appropriate to do so, to enhance available habitat to native fauna species.
- All other cleared vegetation is to be disposed of sensitively (mulched or spread over restoration areas to encourage natural regeneration) and should not be pushed into adjacent vegetation.

Off-target impacts to vegetation

- All machinery and vehicles should not be parked or stored underneath the drip line of trees or within areas containing native vegetation. Use previously cleared areas such as existing easement clearance along existing transmission line.
- Rubble or any other materials should not be placed or compacted under the drip line of trees. Use previously cleared areas such as existing easement clearance along existing transmission line.

Weed & soil pathogen management

- Best practice environmental management measures should be adopted during and following the construction phase. Ensure that any construction machinery is clean and free from soil pathogens such as *Phytophthora* and any plant materials before entering the area. This includes performing appropriate hygiene before entering and leaving the project area to avoid potential spread.
- Control of the declared and environmental weed species should be undertaken in the area prior to construction works commencing to help prevent the spread of weeds within the construction site.

Minimum disturbance construction

- The construction footprint should be kept to a minimum for least impact on flora and fauna. Management strategies for the construction phase of the project need to be developed and incorporated into the environmental management plan. Ideally, construction and any required vegetation clearance should avoid the peak breeding time for fauna and nesting time for birds (e.g. spring-summer).

Implement an environmental management plan

- If the project is to proceed, a detailed environmental management plan, incorporating best practice principles, should be developed and implemented. This would include, but would not be limited to, threatened species management, vegetation management, weed management and rehabilitation requirements.

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9 APPENDICES

Appendix 1 – Flora list EBS Ecology 2012-13 Field Surveys

Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
MALVACEAE	<i>Abutilon sp.</i>	Lantern-bush			
LEGUMINOSAE	<i>Acacia acanthoclada ssp. acanthoclada</i>	Harrow Wattle			
LEGUMINOSAE	<i>Acacia ancistrophylla var. lissophylla</i>	Hook-leaf Wattle			
LEGUMINOSAE	<i>Acacia burkittii</i>	Pin-bush Wattle			
LEGUMINOSAE	<i>Acacia calamifolia</i>	Wallowa			
LEGUMINOSAE	<i>Acacia continua</i>	Thorn Wattle			
LEGUMINOSAE	<i>Acacia dodonaeifolia</i>	Hop-bush Wattle		R	
LEGUMINOSAE	<i>Acacia enterocarpa</i>	Jumping-jack Wattle	EN	E	
LEGUMINOSAE	<i>Acacia farinosa</i>	Mealy Wattle			
LEGUMINOSAE	<i>Acacia gillii</i>	Gill's Wattle			
LEGUMINOSAE	<i>Acacia hakeoides</i>	Hakea Wattle			
LEGUMINOSAE	<i>Acacia halliana</i>	Hall's Wattle			
LEGUMINOSAE	<i>Acacia hexaneura</i>	Six-nerve Spine-bush		R	
LEGUMINOSAE	<i>Acacia imbricata</i>	Feathery Wattle		R	
LEGUMINOSAE	<i>Acacia ligulata</i>	Umbrella Bush			
LEGUMINOSAE	<i>Acacia microcarpa</i>	Manna Wattle			
LEGUMINOSAE	<i>Acacia myrtifolia</i>	Myrtle Wattle			
LEGUMINOSAE	<i>Acacia notabilis</i>	Notable Wattle			
LEGUMINOSAE	<i>Acacia nyssophylla</i>	Spine Bush			
LEGUMINOSAE	<i>Acacia oswaldii</i>	Umbrella Wattle			
LEGUMINOSAE	<i>Acacia papyrocarpa</i>	Western Myall			
LEGUMINOSAE	<i>Acacia paradoxa</i>	Kangaroo Thorn			
LEGUMINOSAE	<i>Acacia pinguifolia</i>	Fat-leaf Wattle	EN	E	
LEGUMINOSAE	<i>Acacia pycnantha</i>	Golden Wattle			
LEGUMINOSAE	<i>Acacia rhigiophylla</i>	Dagger-leaf Wattle		R	
LEGUMINOSAE	<i>Acacia rigens</i>	Nealie			
LEGUMINOSAE	<i>Acacia rupicola</i>	Rock Wattle			
LEGUMINOSAE	<i>Acacia sclerophylla var. sclerophylla</i>	Hard-leaf Wattle			
LEGUMINOSAE	<i>Acacia spinescens</i>	Spiny Wattle			
LEGUMINOSAE	<i>Acacia wilhelmiana</i>	Dwarf Nealie			
ORCHIDACEAE	<i>Acianthus pusillus</i>	Mosquito Orchid			
COMPOSITAE	<i>Actinobole uliginosum</i>	Flannel Cudweed			
PROTEACEAE	<i>Adenanthos terminalis</i>	Yellow Gland-flower			
GRAMINEAE	<i>Aira sp.</i>	Hair-grass			*
SAPINDACEAE	<i>Alectryon oleifolius ssp. canescens</i>	Bullock Bush			
CASUARINACEAE	<i>Allocasuarina muelleriana ssp.</i>	Common Oak-bush			
CASUARINACEAE	<i>Allocasuarina verticillata</i>	Drooping Sheoak			
MALVACEAE	<i>Alyogyne huegelii</i>	Native Hibiscus			
APOCYNACEAE	<i>Alyxia buxifolia</i>	Sea Box			
GRAMINEAE	<i>Amphipogon caricinus var. caricinus</i>	Long Grey-beard Grass			
LORANTHACEAE	<i>Amyema miquelii</i>	Box Mistletoe			
LORANTHACEAE	<i>Amyema quandang var. quandang</i>	Grey Mistletoe			
LEGUMINOSAE	<i>Aotus subspinescens</i>	Mallee Aotus			

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Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
ORCHIDACEAE	<i>Arachnorchis cardiochila</i>	Heart-lip Spider-orchid			
ORCHIDACEAE	<i>Arachnorchis macroclavia</i>	Large-club Spider-orchid	EN	E	
ORCHIDACEAE	<i>Arachnorchis tensa</i>	Inland Green-comb Spider-orchid	EN		
GRAMINEAE	<i>Aristida contorta</i>	Curly Wire-grass			
LILIACEAE	<i>Arthropodium sp.</i>	Vanilla-lily			
LILIACEAE	<i>Asphodelus fistulosus</i>	Onion Weed			*
EPACRIDACEAE	<i>Astroloma conostephioides</i>	Flame Heath			
EPACRIDACEAE	<i>Astroloma humifusum</i>	Cranberry Heath			
CHENOPODIACEAE	<i>Atriplex holocarpa</i>	Pop Saltbush			
CHENOPODIACEAE	<i>Atriplex nummularia ssp.</i>	Old-man Saltbush			
CHENOPODIACEAE	<i>Atriplex stipitata</i>	Bitter Saltbush			
CHENOPODIACEAE	<i>Atriplex vesicaria ssp.</i>	Bladder Saltbush			
CACTACEAE	<i>Austrocylindropuntia cylindrica</i>	Cane Cactus			*
GRAMINEAE	<i>Austrostipa elegantissima</i>	Feather Spear-grass			
GRAMINEAE	<i>Austrostipa eremophila X</i>				
GRAMINEAE	<i>Austrostipa plumigera</i>				
GRAMINEAE	<i>Austrostipa exilis</i>	Heath Spear-grass			
GRAMINEAE	<i>Austrostipa nitida</i>	Balcarra Spear-grass			
GRAMINEAE	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass			
GRAMINEAE	<i>Austrostipa puberula</i>	Fine-hairy Spear-grass			
GRAMINEAE	<i>Austrostipa scabra ssp. falcata</i>	Slender Spear-grass			
GRAMINEAE	<i>Austrostipa tenuifolia</i>			R	
GRAMINEAE	<i>Avena barbata</i>	Bearded Oat			*
MYRTACEAE	<i>Babingtonia behrii</i>	Silver Broombush			
MYRTACEAE	<i>Baeckea crassifolia</i>	Desert Baeckea			
EUPHORBIACEAE	<i>Beyeria lechenaultii</i>	Pale Turpentine Bush			
PITTIOSPORACEAE	<i>Billardiera cymosa ssp.</i>				
PITTIOSPORACEAE	<i>Billardiera uniflora</i>	One-flower Apple-berry			
RUTACEAE	<i>Boronia coerulescens ssp. coerulescens</i>	Blue Boronia			
RUTACEAE	<i>Boronia inornata ssp. leptophylla</i>	Dryland Boronia			
COMPOSITAE	<i>Brachyscome ciliaris var.</i>	Variable Daisy			
CRUCIFERAE	<i>Brassica tournefortii</i>	Wild Turnip			*
GRAMINEAE	<i>Bromus madritensis</i>	Compact Brome			*
LILIACEAE	<i>Bulbine bulbosa</i>	Bulbine-lily			
PITTIOSPORACEAE	<i>Bursaria spinosa ssp. spinosa</i>	Sweet Bursaria			
ORCHIDACEAE	<i>Caladenia latifolia</i>	Pink Caladenia			
MYRTACEAE	<i>Callistemon rugulosus</i>	Scarlet Bottlebrush			
CUPRESSACEAE	<i>Callitris glaucophylla</i>	White Cypress-pine			
CUPRESSACEAE	<i>Callitris gracilis</i>	Southern Cypress Pine			
CUPRESSACEAE	<i>Callitris verrucosa</i>	Scrub Cypress Pine			
MYRTACEAE	<i>Calytrix involucrata</i>	Cup Fringe-myrtle			
MYRTACEAE	<i>Calytrix tetragona</i>	Common Fringe-myrtle			
CRUCIFERAE	<i>Carrichtera annua</i>	Ward's Weed			*
COMPOSITAE	<i>Carthamus lanatus</i>	Saffron Thistle			*
COMPOSITAE	<i>Cassinia complanata</i>	Sticky Cassinia			
COMPOSITAE	<i>Cassinia laevis</i>	Curry Bush			
COMPOSITAE	<i>Cassinia uncata</i>				
LAURACEAE	<i>Cassytha glabella f. dispar</i>	Slender Dodder-laurel			
LAURACEAE	<i>Cassytha melantha</i>	Coarse Dodder-laurel			
LAURACEAE	<i>Cassytha pubescens</i>	Downy Dodder-laurel			
CASUARINACEAE	<i>Casuarina pauper</i>	Black Oak			
LEGUMINOSAE	<i>Chamaecytisus palmensis</i>	Tree Lucerne			*

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			AUS	SA	
LILIACEAE	<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>	Blue Squill			
EUPHORBIACEAE	<i>Chamaesyce drummondii</i>				
ADIANTACEAE	<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern			
ADIANTACEAE	<i>Cheilanthes lasiophylla</i>	Woolly Cloak-fern			
PITTIOSPORACEAE	<i>Cheiranthra alternifolia</i>	Hand-flower			
CHENOPODIACEAE	<i>Chenopodium curvispicatum</i>	Cottony Goosefoot			
CHENOPODIACEAE	<i>Chenopodium desertorum</i> ssp.	Desert Goosefoot			
SANTALACEAE	<i>Choretrum glomeratum</i> var.	Sour-bush			
COMPOSITAE	<i>Chrysocephalum apiculatum</i>	Common Everlasting			
COMPOSITAE	<i>Chrysocephalum semipapposum</i>	Clustered Everlasting			
CUCURBITACEAE	<i>Citrullus lanatus</i>	Bitter Melon			*
RANUNCULACEAE	<i>Clematis microphylla</i>	Old Man's Beard			
POLYGALACEAE	<i>Comesperma calymega</i>	Blue-spike Milkwort			
POLYGALACEAE	<i>Comesperma scoparium</i>	Broom Milkwort			
POLYGALACEAE	<i>Comesperma volubile</i>	Love Creeper			
STERCULIACEAE	<i>Commersonia tatei</i>	Trailing Commersonia			
PROTEACEAE	<i>Conospermum patens</i>	Slender Smoke-bush			
COMPOSITAE	<i>Cratystylis conocephala</i>	Bluebush Daisy			
RHAMNACEAE	<i>Cryptandra amara</i> var.	Cryptandra			
CUCURBITACEAE	<i>Cucumis myriocarpus</i>	Paddy Melon			*
ORCHIDACEAE	<i>Cyrtostylis robusta</i>	Robust Gnat-orchid			
GOODENIACEAE	<i>Dampiera dysantha</i>	Shrubby Dampiera			
GOODENIACEAE	<i>Dampiera lanceolata</i> var. <i>lanceolata</i>	Grooved Dampiera			
GOODENIACEAE	<i>Dampiera rosmarinifolia</i>	Rosemary Dampiera			
LEGUMINOSAE	<i>Daviesia asperula</i> ssp. <i>obliqua</i>	Eyre Peninsula Bitter-pea			
LEGUMINOSAE	<i>Daviesia benthamii</i> ssp. <i>humilis</i>	Mallee Bitter-pea		R	
LEGUMINOSAE	<i>Daviesia brevifolia</i>	Leafless Bitter-pea			
LEGUMINOSAE	<i>Daviesia pectinata</i>	Zig-zag Bitter-pea		R	
LILIACEAE	<i>Dianella revoluta</i> var.				
LILIACEAE	<i>Dianella revoluta</i> var. <i>divaricata</i>	Broad-leaf Flax-lily			
CHLOANTHACEAE	<i>Dicrastylis verticillata</i>	Whorled Sand-sage			
LEGUMINOSAE	<i>Dillwynia uncinata</i>	Silky Parrot-pea			
AIZOACEAE	<i>Disphyma crassifolium</i> ssp. <i>clavellatum</i>	Round-leaf Pigface			
CHENOPODIACEAE	<i>Dissocarpus paradoxus</i>	Ball Bindyi			
SAPINDACEAE	<i>Dodonaea baueri</i>	Crinkled Hop-bush			
SAPINDACEAE	<i>Dodonaea bursariifolia</i>	Small Hop-bush			
SAPINDACEAE	<i>Dodonaea hexandra</i>	Horned Hop-bush			
SAPINDACEAE	<i>Dodonaea lobulata</i>	Lobed-leaf Hop-bush			
SAPINDACEAE	<i>Dodonaea stenozyga</i>	Desert Hop-bush			
SAPINDACEAE	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush			
DROSERACEAE	<i>Drosera auriculata</i>	Tall Sundew			
DROSERACEAE	<i>Drosera macrantha</i> ssp. <i>planchonii</i>	Climbing Sundew			
GRAMINEAE	<i>Ehrharta calycina</i>	Perennial Veldt Grass			*
CHENOPODIACEAE	<i>Einadia nutans</i> ssp.	Climbing Saltbush			
CHENOPODIACEAE	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			
GRAMINEAE	<i>Enneapogon nigricans</i>	Black-head Grass			
MYOPORACEAE	<i>Eremophila alternifolia</i>	Narrow-leaf Emubush			
MYOPORACEAE	<i>Eremophila behriana</i>	Rough Emubush			
MYOPORACEAE	<i>Eremophila crassifolia</i>	Thick-leaf Emubush			

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			AUS	SA	
MYOPORACEAE	<i>Eremophila deserti</i>	Turkey-bush			
MYOPORACEAE	<i>Eremophila gibbifolia</i>	Coccid Emubush		R	
MYOPORACEAE	<i>Eremophila glabra ssp. glabra</i>	Tar Bush			
MYOPORACEAE	<i>Eremophila oppositifolia ssp.</i>	Opposite-leaved Emubush			
MYOPORACEAE	<i>Eremophila scoparia</i>	Broom Emubush			
MYOPORACEAE	<i>Eremophila serrulata</i>	Green Emubush			
MYOPORACEAE	<i>Eremophila subfloccosa ssp. Lanata (R.Bates 33587)</i>	Woolly Emubush			
CHENOPODIACEAE	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush			
MYRTACEAE	<i>Eucalyptus brachycalyx</i>	Gilja			
MYRTACEAE	<i>Eucalyptus calycogona ssp.</i>	Square-fruit Mallee			
MYRTACEAE	<i>Eucalyptus cretata</i>	Darke Peak Mallee		R	
MYRTACEAE	<i>Eucalyptus dumosa</i>	White Mallee			
MYRTACEAE	<i>Eucalyptus gracilis</i>	Yorrell			
MYRTACEAE	<i>Eucalyptus incrassata</i>	Ridge-fruited Mallee			
MYRTACEAE	<i>Eucalyptus incrassata complex</i>	Ridge-fruited Mallee			
MYRTACEAE	<i>Eucalyptus leptophylla</i>	Narrow-leaf Red Mallee			
MYRTACEAE	<i>Eucalyptus odorata</i>	Peppermint Box			
MYRTACEAE	<i>Eucalyptus oleosa ssp.</i>				
MYRTACEAE	<i>Eucalyptus petiolaris</i>	Eyre Peninsula Blue Gum			
MYRTACEAE	<i>Eucalyptus phenax ssp.</i>				
MYRTACEAE	<i>Eucalyptus pileata</i>	Capped Mallee			
MYRTACEAE	<i>Eucalyptus porosa</i>	Mallee Box			
MYRTACEAE	<i>Eucalyptus socialis ssp.</i>				
LEGUMINOSAE	<i>Eutaxia microphylla</i>	Common Eutaxia			
SANTALACEAE	<i>Exocarpos aphyllus</i>	Leafless Cherry			
SANTALACEAE	<i>Exocarpos sparteus</i>	Slender Cherry			
FRANKENIACEAE	<i>Frankenia serpyllifolia</i>	Thyme Sea-heath			
CYPERACEAE	<i>Gahnia deusta</i>	Limestone Saw-sedge			
AIZOACEAE	<i>Galenia pubescens var. pubescens</i>	Coastal Galenia			*
RUTACEAE	<i>Geijera linearifolia</i>	Sheep Bush			
GERANIACEAE	<i>Geranium dissectum</i>	Cut-leaf Geranium			*
HALORAGACEAE	<i>Glischrocaryon behrii</i>	Golden Pennants			
ORCHIDACEAE	<i>Glossodia major</i>	Purple Cockatoo			
HALORAGACEAE	<i>Gonocarpus mezeianus</i>	Broad-leaf Raspwort			
GOODENIACEAE	<i>Goodenia benthamiana</i>	Bentham's Goodenia		R	
GOODENIACEAE	<i>Goodenia geniculata</i>	Bent Goodenia			
GOODENIACEAE	<i>Goodenia ovata</i>	Hop Goodenia			
GOODENIACEAE	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia			
GOODENIACEAE	<i>Goodenia varia</i>	Sticky Goodenia			
PROTEACEAE	<i>Grevillea aspera</i>	Rough Grevillea			
PROTEACEAE	<i>Grevillea huegelii</i>	Comb Grevillea			
PROTEACEAE	<i>Grevillea ilicifolia ssp.</i>				
PROTEACEAE	<i>Grevillea juncifolia ssp. juncifolia</i>	Honeysuckle Grevillea			
PROTEACEAE	<i>Grevillea pterosperma</i>	Dune Grevillea			
GYROSTEMONACEAE	<i>Gyrostemon australasicus</i>	Buckbush Wheel-fruit			
GYROSTEMONACEAE	<i>Gyrostemon ramulosus</i>	Bushy Wheel-fruit			
PROTEACEAE	<i>Hakea cycloptera</i>	Elm-seed Hakea			
PROTEACEAE	<i>Hakea francisiana</i>	Bottlebrush Hakea			
PROTEACEAE	<i>Hakea mitchellii</i>	Heath Needlebush			
PROTEACEAE	<i>Hakea rostrata</i>	Beaked Hakea			
BORAGINACEAE	<i>Halgania andromedifolia</i>	Scented Blue-flower			
BORAGINACEAE	<i>Halgania cyanea</i>	Rough Blue-flower			
LEGUMINOSAE	<i>Hardenbergia violacea</i>	Native Lilac			

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			AUS	SA	
COMPOSITAE	<i>Helichrysum leucopsideum</i>	Satin Everlasting			
BORAGINACEAE	<i>Heliotropium europaeum</i>	Common Heliotrope			
DILLENACEAE	<i>Hibbertia cinerea</i>	Port Lincoln Guinea-flower			
DILLENACEAE	<i>Hibbertia exutiacies</i>	Prickly Guinea-flower			
DILLENACEAE	<i>Hibbertia riparia</i>	Bristly Guinea-flower			
DILLENACEAE	<i>Hibbertia virgata</i>	Twiggy Guinea-flower			
MALVACEAE	<i>Hibiscus krichauffianus</i>	Velvet-leaf Hibiscus			
MYRTACEAE	<i>Homoranthus homoranthoides</i>	Port Lincoln Ground-myrtle			
MYRTACEAE	<i>Homoranthus wilhelmii</i>	Wilhelm's Homoranthus			
	<i>Hybanthus floribundus</i> ssp. <i>floribundus</i>				
VIOLACEAE		Shrub Violet			
ORCHIDACEAE	<i>Hymenochilus pisinnus</i>	Tiny Shell-orchid			
CAMPANULACEAE	<i>Isotoma petraea</i>	Rock Isotome			
COMPOSITAE	<i>Ixiochlamys nana</i>	Small Fuzzweed			
ORCHIDACEAE	<i>Jonesiopsis capillata</i>	Wispy Spider-orchid			
COMPOSITAE	<i>Lagenophora huegelii</i>	Coarse Bottle-daisy			
STERCULIACEAE	<i>Lasiopetalum baueri</i>	Slender Velvet-bush			
STERCULIACEAE	<i>Lasiopetalum behrii</i>	Pink Velvet-bush			
CYPERACEAE	<i>Lepidosperma carphoides</i>	Black Rapier-sedge			
CYPERACEAE	<i>Lepidosperma laterale</i>	Tall Sword-sedge			
CYPERACEAE	<i>Lepidosperma</i> sp.	Sword-sedge/Rapier-sedge			
CYPERACEAE	<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			
ORCHIDACEAE	<i>Leporella fimbriata</i>	Fringed Hare-orchid			
SANTALACEAE	<i>Leptomeria aphylla</i>	Leafless Currant-bush			
COMPOSITAE	<i>Leptorhynchos</i> sp.	Buttons			
MYRTACEAE	<i>Leptospermum coriaceum</i>	Dune Tea-tree			
EPACRIDACEAE	<i>Leucopogon cordifolius</i>	Heart-leaf Beard-heath			
LIMONIACEAE	<i>Limonium lobatum</i>	Winged Sea-lavender			*
EPACRIDACEAE	<i>Lissanthe strigosa</i> ssp. <i>subulata</i>	Peach Heath			
LOGANIACEAE	<i>Logania nuda</i>	Leafless Logania			
LOGANIACEAE	<i>Logania ovata</i>	Oval-leaf Logania			
LILIACEAE	<i>Lomandra collina</i>	Sand Mat-rush			
LILIACEAE	<i>Lomandra effusa</i>	Scented Mat-rush			
	<i>Lomandra leucocephala</i> ssp. <i>robusta</i>				
LILIACEAE		Woolly Mat-rush			
LILIACEAE	<i>Lomandra micrantha</i> ssp.	Small-flower Mat-rush			
SOLANACEAE	<i>Lycium australe</i>	Australian Boxthorn			
SOLANACEAE	<i>Lycium ferocissimum</i>	African Boxthorn			*
LORANTHACEAE	<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Harlequin Mistletoe			
CHENOPODIACEAE	<i>Maireana brevifolia</i>	Short-leaf Bluebush			
CHENOPODIACEAE	<i>Maireana erioclada</i>	Rosy Bluebush			
CHENOPODIACEAE	<i>Maireana georgei</i>	Satiny Bluebush			
CHENOPODIACEAE	<i>Maireana pentatropis</i>	Erect Mallee Bluebush			
CHENOPODIACEAE	<i>Maireana pyramidata</i>	Black Bluebush			
CHENOPODIACEAE	<i>Maireana radiata</i>	Radiate Bluebush			
CHENOPODIACEAE	<i>Maireana sedifolia</i>	Bluebush			
CHENOPODIACEAE	<i>Maireana suaedifolia</i>	Lax Bluebush		R	
CHENOPODIACEAE	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush			
CHENOPODIACEAE	<i>Maireana turbinata</i>	Top-fruit Bluebush			
CHENOPODIACEAE	<i>Malacocera biflora</i>	Two-flower Soft-horns			
LABIATAE	<i>Marrubium vulgare</i>	Horehound			*
	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>				
MYRTACEAE		Mallee Honey-myrtle			
MYRTACEAE	<i>Melaleuca brevifolia</i>	Short-leaf Honey-myrtle			
MYRTACEAE	<i>Melaleuca decussata</i>	Totem-poles			

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			AUS	SA	
MYRTACEAE	<i>Melaleuca lanceolata</i>	Dryland Tea-tree			
MYRTACEAE	<i>Melaleuca pauperiflora</i> ssp. <i>mutica</i>	Boree			
MYRTACEAE	<i>Melaleuca uncinata</i>	Broombush			
VIOLACEAE	<i>Melicytus dentatus</i>	Tree Violet			
AIZOACEAE	<i>Mesembryanthemum</i> sp.	Iceplant			*
RUTACEAE	<i>Microcybe multiflora</i> ssp. <i>baccharoides</i>	Scale-leaf Microcybe			
RUTACEAE	<i>Microcybe pauciflora</i> ssp. <i>pauciflora</i>	Yellow Microcybe			
COMPOSITAE	<i>Microseris lanceolata</i>	Yam Daisy			
ORCHIDACEAE	<i>Microtis</i> sp. Nash (R. Bates 44740)	Nash's onion orchid		R	
COMPOSITAE	<i>Minuria cunninghamii</i>	Bush Minuria			
COMPOSITAE	<i>Minuria denticulata</i>	Woolly Minuria			
MYOPORACEAE	<i>Myoporum brevipes</i>	Warty Boobialla			
MYOPORACEAE	<i>Myoporum montanum</i>	Native Myrtle			
MYOPORACEAE	<i>Myoporum platycarpum</i> ssp. <i>platycarpum</i>	False Sandalwood			
GRAMINEAE	<i>Neurachne alopecuroidea</i>	Fox-tail Mulga-grass			
ZYGOPHYLLACEAE	<i>Nitraria billardierei</i>	Nitre-bush			
COMPOSITAE	<i>Olearia adenolasia</i>	Musk Daisy-bush		R	
COMPOSITAE	<i>Olearia brachyphylla</i>	Short-leaf Daisy-bush			
COMPOSITAE	<i>Olearia decurrens</i>	Winged Daisy-bush			
COMPOSITAE	<i>Olearia floribunda</i> var. <i>floribunda</i>	Heath Daisy-bush			
COMPOSITAE	<i>Olearia lepidophylla</i>	Clubmoss Daisy-bush			
COMPOSITAE	<i>Olearia muelleri</i>	Mueller's Daisy-bush			
COMPOSITAE	<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	
COMPOSITAE	<i>Olearia passerinoides</i> ssp. <i>passerinoides</i>	Feather Daisy-bush			
COMPOSITAE	<i>Olearia pimelioides</i>	Pimelea Daisy-bush			
COMPOSITAE	<i>Olearia ramulosa</i>	Twiggy Daisy-bush			
COMPOSITAE	<i>Olearia teretifolia</i>	Cypress Daisy-bush			
COMPOSITAE	<i>Onopordum acaulon</i>	Horse Thistle			*
RUBIACEAE	<i>Opercularia turpis</i>	Twiggy Stinkweed			
OXALIDACEAE	<i>Oxalis perennans</i>	Native Sorrel			
COMPOSITAE	<i>Ozothamnus decurrens</i>	Ridged Bush-everlasting			
COMPOSITAE	<i>Ozothamnus retusus</i>	Notched Bush-everlasting			
ORCHIDACEAE	<i>Petalochilus carneus</i>	Pink Fingers			
CARYOPHYLLACEAE	<i>Petrorhagia dubia</i>	Velvet Pink			*
RUTACEAE	<i>Phebalium bullatum</i>	Silvery Phebalium			
ORCHIDACEAE	<i>Pheladenia deformis</i>	Bluebeard Orchid			
RUTACEAE	<i>Philotheca angustifolia</i> ssp. <i>angustifolia</i>	Narrow-leaf Wax-flower		R	
LEGUMINOSAE	<i>Phyllota remota</i>	Slender Phyllota			
THYMELAEACEAE	<i>Pimelea humilis</i>	Low Riceflower			
THYMELAEACEAE	<i>Pimelea microcephala</i> ssp. <i>microcephala</i>	Shrubby Riceflower			
THYMELAEACEAE	<i>Pimelea</i> sp.	Riceflower			
PITTOSPORACEAE	<i>Pittosporum angustifolium</i>	Native Apricot			
PLANTAGINACEAE	<i>Plantago drummondii</i>	Dark Plantain			
COMPOSITAE	<i>Podolepis capillaris</i>	Wiry Podolepis			
COMPOSITAE	<i>Podotheca angustifolia</i>	Sticky Long-heads			
RHAMNACEAE	<i>Pomaderris flabellaris</i>	Fan Pomaderris			
RHAMNACEAE	<i>Pomaderris obcordata</i>	Wedge-leaf Pomaderris			
ORCHIDACEAE	<i>Prasophyllum occidentale</i>	Plains Leek-orchid			

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Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
ORCHIDACEAE	<i>Prasophyllum odoratum</i>	Scented Leek-orchid			
ORCHIDACEAE	<i>Prasophyllum sp.</i>	Leek-orchid			
LABIATAE	<i>Prostanthera ammophila</i>	Sand Mintbush			
LABIATAE	<i>Prostanthera aspalathoides</i>	Scarlet Mintbush			
LABIATAE	<i>Prostanthera chlorantha</i>	Green Mintbush		R	
LABIATAE	<i>Prostanthera serpyllifolia ssp. microphylla</i>	Small-leaf Mintbush			
LABIATAE	<i>Prostanthera serpyllifolia ssp. serpyllifolia (red flowers)</i>	Thyme Mintbush			
ORCHIDACEAE	<i>Pterostylis nana</i>	Dwarf Greenhood			
AMARANTHACEAE	<i>Ptilotus decipiens</i>				
AMARANTHACEAE	<i>Ptilotus obovatus var. obovatus</i>	Silver Mulla Mulla			
AMARANTHACEAE	<i>Ptilotus spathulatus f. spathulatus</i>	Pussy-tails			
LEGUMINOSAE	<i>Pultenaea canaliculata</i>	Soft Bush-pea			
LEGUMINOSAE	<i>Pultenaea trichophylla</i>	Tufted Bush-pea	EN	R	
ORCHIDACEAE	<i>Pyrorchis nigricans</i>	Black Fire-orchid			
COMPOSITAE	<i>Reichardia tingitana</i>	False Sowthistle			*
CHENOPODIACEAE	<i>Rhagodia candolleana ssp.</i>	Sea-berry Saltbush			
CHENOPODIACEAE	<i>Rhagodia crassifolia</i>	Fleshy Saltbush			
CHENOPODIACEAE	<i>Rhagodia parabolica</i>	Mealy Saltbush			
CHENOPODIACEAE	<i>Rhagodia preissii ssp. preissii</i>	Mallee Saltbush			
CHENOPODIACEAE	<i>Rhagodia spinescens</i>	Spiny Saltbush			
CHENOPODIACEAE	<i>Rhagodia ulicina</i>	Intricate Saltbush			
GRAMINEAE	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			
GRAMINEAE	<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass			
CHENOPODIACEAE	<i>Salsola tragus</i>	Buckbush			
LABIATAE	<i>Salvia verbenaca</i>	Wild Sage			*
SANTALACEAE	<i>Santalum acuminatum</i>	Quandong			
SANTALACEAE	<i>Santalum spicatum</i>	Sandalwood		V	
AIZOACEAE	<i>Sarcozona praecox</i>	Sarcozona			
GOODENIACEAE	<i>Scaevola aemula</i>	Fairy Fanflower			
GOODENIACEAE	<i>Scaevola spinescens</i>	Spiny Fanflower			
CYPERACEAE	<i>Schoenus sp.</i>	Bog-rush			
CHENOPODIACEAE	<i>Sclerolaena brachyptera</i>	Short-wing Bindyi			
CHENOPODIACEAE	<i>Sclerolaena decurrens</i>	Green Bindyi			
CHENOPODIACEAE	<i>Sclerolaena diacantha</i>	Grey Bindyi			
CHENOPODIACEAE	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi			
CHENOPODIACEAE	<i>Sclerolaena uniflora</i>	Small-spine Bindyi			
CHENOPODIACEAE	<i>Sclerolaena uniflora hybrid</i>				
CHENOPODIACEAE	<i>Sclerolaena ventricosa</i>	Salt Bindyi			
COMPOSITAE	<i>Senecio quadridentatus</i>	Cotton Groundsel			
LEGUMINOSAE	<i>Senna artemisioides ssp. artemisioides x ssp. coriacea</i>	Desert Senna			
LEGUMINOSAE	<i>Senna artemisioides ssp. petiolaris</i>				
LEGUMINOSAE	<i>Senna artemisioides ssp. X artemisioides</i>	Silver Senna			
GRAMINEAE	<i>Setaria constricta</i>	Knotty-butt Paspalidium			
MALVACEAE	<i>Sida corrugata var.</i>	Corrugated Sida			
MALVACEAE	<i>Sida fibulifera</i>	Pin Sida			
MALVACEAE	<i>Sida intricata</i>	Twiggy Sida			
MALVACEAE	<i>Sida petrophila</i>	Rock Sida			
SOLANACEAE	<i>Solanum coactiliferum</i>	Tomato-bush			
SOLANACEAE	<i>Solanum elaeagnifolium</i>	Silver-leaf Nightshade			*

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Family	Species name	Common name	Cons. status		Introduced
			AUS	SA	
SOLANACEAE	<i>Solanum ellipticum</i>	Velvet Potato-bush			
SOLANACEAE	<i>Solanum linnaeanum</i>	Apple Of Sodom			*
RHAMNACEAE	<i>Spyridium bifidum var. bifidum</i>	Forked Spyridium			
RHAMNACEAE	<i>Spyridium leucopogon</i>	Silvery Spyridium		R	
RHAMNACEAE	<i>Spyridium nitidum</i>	Shining Spyridium			
RHAMNACEAE	<i>Spyridium spathulatum</i>	Spoon-leaf Spyridium		R	
RHAMNACEAE	<i>Spyridium subochreatum</i>				
RHAMNACEAE	<i>Spyridium vexilliferum var.</i>	Winged Spyridium			
STACKHOUSIACEAE	<i>Stackhousia monogyna</i>	Creamy Candles			
RHAMNACEAE	<i>Stenanthemum leucophractum</i>	White Cryptandra			
CHENOPODIACEAE	<i>Tecticornia sp.</i>	Samphire			
LEGUMINOSAE	<i>Templetonia egena</i>	Broombush Templetonia			
LEGUMINOSAE	<i>Templetonia retusa</i>	Cockies Tongue			
LABIATAE	<i>Teucrium sessiliflorum</i>	Mallee Germander			
ORCHIDACEAE	<i>Thelymitra albiflora</i>				
ORCHIDACEAE	<i>Thelymitra nuda</i>	Scented Sun-orchid			
ORCHIDACEAE	<i>Thelymitra pauciflora</i>	Slender Sun-orchid			
CHENOPODIACEAE	<i>Threlkeldia diffusa</i>	Coast Bonefruit			
LILIACEAE	<i>Thysanotus patersonii</i>	Twining Fringe-lily			
GRAMINEAE	<i>Triodia irritans</i>	Spinifex			
GRAMINEAE	<i>Triodia lanata</i>	Woolly Spinifex			
GRAMINEAE	<i>Triodia scariosa</i>	Spinifex			
COMPOSITAE	<i>Vittadinia cuneata var.</i>	Fuzzy New Holland Daisy			
COMPOSITAE	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			
COMPOSITAE	<i>Vittadinia sp.</i>	New Holland Daisy			
CAMPANULACEAE	<i>Wahlenbergia stricta ssp. stricta</i>	Tall Bluebell			
LABIATAE	<i>Westringia rigida</i>	Stiff Westringia			
LILIACEAE	<i>Wurmbea centralis</i>	Inland Nancy			
LILIACEAE	<i>Xanthorrhoea semiplana ssp. semiplana</i>	Yacca			
ZYGOPHYLLACEAE	<i>Zygophyllum aurantiacum ssp.</i>				

*Denotes exotic species

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Appendix 2 – Fauna species identified in BDBSA database search

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	-	-	22/10/2008
<i>Acanthiza apicalis</i>	Inland Thornbill	-	-	16/05/2008
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-	16/05/2008
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western ssp.)	-	R	1/08/2006
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	-	-	14/05/2008
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk	-	-	13/12/2007
<i>Accipiter fasciatus</i>	Brown Goshawk	-	-	15/12/2004
<i>Acrocephalus australis</i>	Australian Reed-Warbler	-	-	10/01/2003
<i>Actitis hypoleucos</i>	Common Sandpiper	-	R	10/01/2003
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	-	-	15/05/2008
<i>Alauda arvensis</i>	Eurasian Skylark	-	-	14/12/2004
<i>Amytornis striatus</i>	Striated Grasswren	-	R	15/05/2008
<i>Amytornis textilis myall</i>	Thick-billed Grasswren		R	3/08/2006
<i>Anas castanea</i>	Chestnut Teal	-	-	4/08/2008
<i>Anas gracilis</i>	Grey Teal	-	-	17/11/2006
<i>Anas platyrhynchos</i>	Northern Mallard	-	-	26/04/2006
<i>Anas rhynchotis</i>	Australasian Shoveler	-	R	4/02/2006
<i>Anas superciliosa</i>	Pacific Black Duck	-	-	26/04/2006
<i>Anas superciliosa x anas platyrhynchos</i>	Pacific Black Duck/Mallard Hybrid	-	-	22/11/1987
<i>Anthochaera carunculata</i>	Red Wattlebird	-	-	16/05/2008
<i>Anthus novaeseelandiae</i>	Australasian Pipit	-	-	14/05/2008
<i>Aphelocephala leucopsis</i>	Southern Whiteface	-	-	3/08/2006
<i>Aphrodroma brevirostris</i>	Kerguelen Petrel	-	-	8/08/1994
<i>Apus pacificus</i>	Fork-tailed Swift	-	-	28/03/1996
<i>Aquila audax</i>	Wedge-tailed Eagle	-	-	14/05/2008
<i>Ardea alba</i>	Great Egret	-	-	9/10/2001
<i>Ardea ibis</i>	Cattle Egret	-	R	22/06/1998
<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	-	-	1/01/1900
<i>Ardeotis australis</i>	Australian Bustard	-	V	26/03/2005
<i>Arenaria interpres</i>	Ruddy Turnstone	-	R	21/02/1981
<i>Artamus cinereus</i>	Black-faced Woodswallow	-	-	3/08/2006
<i>Artamus cyanopterus</i>	Dusky Woodswallow	-	-	15/05/2008
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	-	-	4/01/1992
<i>Artamus personatus</i>	Masked Woodswallow	-	-	7/10/2001
<i>Artamus superciliosus</i>	White-browed Woodswallow	-	-	7/10/2001
<i>Aythya australis</i>	Hardhead	-	-	4/02/2006
<i>Barnardius zonarius</i>	Australian Ringneck	-	-	14/05/2008

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Barnardius zonarius zonarius (NC)</i>	Port Lincoln Parrot	-	-	5/09/1996
<i>Biziura lobata</i>	Musk Duck	-	R	4/02/2006
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	V	1/02/1965
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	-	-	25/08/2002
<i>Cacomantis pallidus</i>	Pallid Cuckoo	-	-	3/08/2006
<i>Calamanthus campestris</i>	Rufous Fieldwren	-	-	1/08/2006
<i>Calamanthus cautus</i>	Shy Heathwren	-	R	15/05/2008
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	-	4/02/2006
<i>Calidris alba</i>	Sanderling	-	R	2/10/2000
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	-	2/11/2003
<i>Calidris ruficollis</i>	Red-necked Stint	-	-	19/01/2010
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	V	27/02/2008
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	-	R	19/01/2010
<i>Chalcites basalus</i>	Horsfield's Bronze-Cuckoo	-	-	13/12/2007
<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo	-	-	15/12/2004
<i>Chalcites osculans</i>	Black-eared Cuckoo	-	-	3/08/2006
<i>Charadrius australis</i>	Inland Dotterel	-	-	1/08/2006
<i>Charadrius bicinctus</i>	Double-banded Plover	-	-	10/04/2007
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	R	17/02/1973
<i>Charadrius ruficapillus</i>	Red-capped Plover	-	-	19/01/2010
<i>Chenonetta jubata</i>	Australian Wood Duck	-	-	16/12/2004
<i>Chlidonias hybrida</i>	Whiskered Tern	-	-	14/12/2004
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	-	-	19/01/2010
<i>Chrysococcyx sp.</i>	(blank)	-	-	15/12/2004
<i>Cincloramphus cruralis</i>	Brown Songlark	-	-	14/05/2008
<i>Cincloramphus mathewsi</i>	Rufous Songlark	-	-	7/10/2001
<i>Cinclosoma castanotum fordianum</i>	Chestnut Quail-thrush	-	-	15/05/2008
<i>Circus approximans</i>	Swamp Harrier	-	-	18/02/2001
<i>Circus assimilis</i>	Spotted Harrier	-	-	14/12/2004
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	-	V	26/04/2006
<i>Climacteris rufus</i>	Rufous Treecreeper	-	-	16/05/2008
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	-	-	16/05/2008
<i>Columba livia</i>	Rock Dove	-	-	14/12/2004
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-	16/05/2008
<i>Corcorax melanorhamphos</i>	White-winged Chough	-	R	15/05/2008
<i>Corvus bennetti</i>	Little Crow	-	-	2/08/2006
<i>Corvus coronoides</i>	Australian Raven	-	-	16/05/2008
<i>Corvus mellori</i>	Little Raven	-	-	13/12/2007
<i>Corvus sp.</i>	(blank)	-	-	5/10/2001
<i>Coturnix pectoralis</i>	Stubble Quail	-	-	13/12/2004

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Coturnix sp.</i>	(blank)	-	-	5/12/2003
<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	16/05/2008
<i>Cygnus atratus</i>	Black Swan	-	-	11/11/2008
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-	13/12/2007
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	14/05/2008
<i>Dicaeum hirundinaceum</i>	Mistletoebird	-	-	3/08/2006
<i>Dromaius novaehollandiae</i>	Emu	-	-	14/05/2008
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	-	-	13/12/2007
<i>Egretta garzetta</i>	Little Egret	-	R	26/01/2000
<i>Egretta novaehollandiae</i>	White-faced Heron	-	-	19/01/2010
<i>Elanus axillaris</i>	Black-shouldered Kite	-	-	26/04/2006
<i>Euseyonis melanops</i>	Black-fronted Dotterel	-	-	4/02/2006
<i>Eolophus roseicapilla</i>	Galah	-	-	13/05/2008
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	-	-	29/03/2008
<i>Epthianura albifrons</i>	White-fronted Chat	-	-	27/11/2007
<i>Epthianura aurifrons</i>	Orange Chat	-	-	31/10/1963
<i>Epthianura sp.</i>	(blank)	-	-	13/05/2008
<i>Epthianura tricolor</i>	Crimson Chat	-	-	3/11/1991
<i>Erythronyctes alba</i>	Red-kneed Dotterel	-	-	10/01/2003
<i>Eudyptula minor</i>	Little Penguin	-	-	7/01/1999
<i>Eurostopodus argus</i>	Spotted Nightjar	-	-	3/10/2003
<i>Falco berigora</i>	Brown Falcon	-	-	4/12/2006
<i>Falco cenchroides</i>	Nankeen Kestrel	-	-	14/05/2008
<i>Falco longipennis</i>	Australian Hobby	-	-	13/12/2004
<i>Falco peregrinus</i>	Peregrine Falcon	-	R	23/11/2006
<i>Falco subniger</i>	Black Falcon	-	-	1/01/1900
<i>Fulica atra</i>	Eurasian Coot	-	-	26/04/2006
<i>Gallinula tenebrosa</i>	Dusky Moorhen	-	-	10/01/2003
<i>Gallirallus philippensis</i>	Buff-banded Rail	-	-	1/01/1900
<i>Geopelia placida</i>	Peaceful Dove	-	-	3/10/2003
<i>Gerygone fusca</i>	Western Gerygone	-	R	13/12/2007
<i>Gliciphila melanops</i>	Tawny-crowned Honeyeater	-	-	22/10/2008
<i>Glossopsitta concinna</i>	Musk Lorikeet	-	-	16/12/2004
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	-	-	15/05/2008
<i>Grallina cyanoleuca</i>	Magpie-lark	-	-	26/04/2006
<i>Gymnorhina tibicen</i>	Australian Magpie	-	-	14/05/2008
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	-	R	19/01/2010
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher	-	R	19/01/2010
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	E	26/01/2000
<i>Haliastur sphenurus</i>	Whistling Kite	-	-	3/10/2003

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Hieraaetus morphnoides</i>	Little Eagle	-	-	12/12/2004
<i>Himantopus himantopus</i>	Black-winged Stilt	-	-	26/04/2006
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	-	26/03/1990
<i>Hirundo neoxena</i>	Welcome Swallow	-	-	13/05/2008
<i>Hydroprogne caspia</i>	Caspian Tern	-	-	8/03/2007
<i>Lalage tricolor</i>	White-winged Triller	-	-	14/12/2004
<i>Larus pacificus</i>	Pacific Gull	-	-	19/01/2010
<i>Leipoa ocellata</i>	Malleefowl	VU	V	13/11/2007
<i>Lichenostomus cratitius occidentalis</i>	Purple-gaped Honeyeater	-	R	15/12/2004
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	-	-	16/05/2008
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	-	-	15/05/2008
<i>Lichenostomus virescens</i>	Singing Honeyeater	-	-	15/05/2008
<i>Limosa lapponica</i>	Bar-tailed Godwit	-	R	4/06/2004
<i>Limosa limosa</i>	Black-tailed Godwit	-	R	5/01/1999
<i>Lophoictinia isura</i>	Square-tailed Kite	-	E	20/12/1972
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	-	-	4/02/2006
<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-	22/02/2008
<i>Malurus lamberti</i>	Variiegated Fairy-wren	-	-	15/05/2008
<i>Malurus leucopterus</i>	White-winged Fairy-wren	-	-	13/05/2008
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren	-	-	15/05/2008
<i>Malurus splendens</i>	Splendid Fairy-wren	-	-	2/08/2006
<i>Manorina flavigula</i>	Yellow-throated Miner	-	-	2/08/2006
<i>Megalurus gramineus</i>	Little Grassbird	-	-	16/12/2004
<i>Melanodryas cucullata</i>	Hooded Robin	-	-	3/08/2006
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	-	-	15/05/2008
<i>Melopsittacus undulatus</i>	Budgerigar	-	-	7/10/2001
<i>Merops ornatus</i>	Rainbow Bee-eater	-	-	3/10/2003
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	-	-	22/02/2008
<i>Microeca fascinans</i>	Jacky Winter	-	-	16/05/2008
<i>Milvus migrans</i>	Black Kite	-	-	7/10/2001
<i>Mirafra javanica</i>	Horsfield's Bushlark	-	-	15/12/2004
<i>Morus serrator</i>	Australasian Gannet	-	-	3/03/2001
<i>Myiagra inquieta</i>	Restless Flycatcher	-	R	13/05/2008
<i>Neophema elegans</i>	Elegant Parrot	-	R	2/08/2006
<i>Neophema petrophila</i>	Rock Parrot	-	R	22/10/2008
<i>Neophema sp.</i>	(blank)	-	-	8/03/2007
<i>Neopsephotus bourkii</i>	Bourke's Parrot	-	-	8/08/2006
<i>Ninox boobook</i>	Southern Boobook	-	-	13/05/2008
<i>Northiella haematogaster</i>	Blue Bonnet	-	-	2/08/2006

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Northiella haematogaster</i> <i>haematogaster</i>	Yellow-vented Bluebonnet	-	-	6/09/1996
<i>Numenius madagascariensis</i>	Eastern Curlew	-	V	10/02/1985
<i>Numenius phaeopus</i>	Whimbrel	-	R	2/01/1973
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron	-	-	25/09/2001
<i>Nymphicus hollandicus</i>	Cockatiel	-	-	17/11/2001
<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-	13/12/2007
<i>Oreoica gutturalis</i>	Crested Bellbird	-	-	15/05/2008
<i>Oxyura australis</i>	Blue-billed Duck	-	R	14/12/2004
<i>Pachycephala inornata</i>	Gilbert's Whistler	-	R	15/05/2008
<i>Pachycephala pectoralis</i>	Golden Whistler	-	-	15/05/2008
<i>Pachycephala rufiventris</i>	Rufous Whistler	-	-	13/12/2007
<i>Pandion cristatus</i>	Eastern Osprey	-	E	10/02/2008
<i>Pardalotus punctatus</i>	Spotted Pardalote	-	-	15/05/2008
<i>Pardalotus striatus</i>	Striated Pardalote	-	-	16/05/2008
<i>Passer domesticus</i>	House Sparrow	-	-	26/04/2006
<i>Pelagodroma marina</i>	White-faced Storm-Petrel	-	-	25/03/1996
<i>Pelecanus conspicillatus</i>	Australian Pelican	-	-	24/11/2009
<i>Petrochelidon ariel</i>	Fairy Martin	-	-	10/01/2003
<i>Petrochelidon nigricans</i>	Tree Martin	-	-	14/05/2008
<i>Petroica boodang</i>	Scarlet Robin	-	V	15/12/2004
<i>Petroica goodenovii</i>	Red-capped Robin	-	-	15/05/2008
<i>Petroica rosea</i>	Rose Robin	-	-	3/06/1981
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	-	-	13/01/1919
<i>Phalacrocorax carbo</i>	Great Cormorant	-	-	16/12/2004
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	-	-	9/10/2001
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	-	-	4/02/2006
<i>Phalacrocorax varius</i>	Pied Cormorant	-	-	24/11/2009
<i>Phalaropus lobatus</i>	Red-necked Phalarope	-	-	17/02/1973
<i>Phaps chalcoptera</i>	Common Bronzewing	-	-	1/08/2006
<i>Phaps elegans</i>	Brush Bronzewing	-	-	20/03/2005
<i>Phaps sp.</i>	(blank)	-	-	15/05/2008
<i>Philomachus pugnax</i>	Ruff	-	R	21/02/1981
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	-	-	22/10/2008
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	-	-	15/12/2004
<i>Plegadis falcinellus</i>	Glossy Ibis	-	R	21/11/1987
<i>Pluvialis squatarola</i>	Grey Plover	-	-	8/03/2007
<i>Podargus strigoides</i>	Tawny Frogmouth	-	-	15/12/2004
<i>Podiceps cristatus</i>	Great Crested Grebe	VU	R	16/12/2004
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	-	-	4/02/2006

Eyre Peninsula Transmission Line - Biodiversity Assessment Report

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Pomatostomus superciliosus</i>	White-browed Babbler	-	-	16/05/2008
<i>Porphyrio porphyrio</i>	Purple Swamphen	-	-	1/10/1982
<i>Porzana fluminea</i>	Australian Spotted Crake	-	-	29/10/2002
<i>Porzana pusilla</i>	Baillon's Crake	-	-	2/09/1994
<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-	13/04/1996
<i>Psephotus varius</i>	Mulga Parrot	-	-	16/05/2008
<i>Pterodroma lessonii</i>	White-headed Petrel	-	-	13/11/1989
<i>Puffinus gavia</i>	Fluttering Shearwater	-	-	1/01/1900
<i>Purnella albifrons</i>	White-fronted Honeyeater	-	-	15/05/2008
<i>Pyrrholaemus brunneus</i>	Redthroat	-	-	3/08/2006
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	-	-	16/12/2004
<i>Rhipidura albiscapa</i>	Grey Fantail	-	-	15/05/2008
<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-	16/05/2008
<i>Rhipidura sp.</i>	(blank)	-	-	5/12/2003
<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-	17/12/2004
<i>Smicrornis brevirostris</i>	Weebill	-	-	16/05/2008
<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	17/11/2008
<i>Stercorarius parasiticus</i>	Arctic Jaeger	-	-	26/03/2006
<i>Sterna hirundo</i>	Common Tern	-	R	26/01/2000
<i>Strenua nereis</i>	Fairy Tern	VU	E	19/01/2010
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	10/01/2003
<i>Stigmatopelia chinensis</i>	Spotted Dove	-	-	28/11/2002
<i>Stipiturus malachurus</i>	Southern Emu-wren	VU	E	3/11/2002
<i>Stipiturus malachurus parimeda</i>	Southern Emu-wren (Eyre Peninsula ssp.)	VU	E	1/07/2004
<i>Strepera versicolor</i>	Grey Currawong	-	-	16/05/2008
<i>Sturnus vulgaris</i>	Common Starling	-	-	13/12/2007
<i>Sugomel nigrum</i>	Black Honeyeater	-	-	6/10/2001
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	-	-	4/02/2006
<i>Tadorna tadornoides</i>	Australian Shelduck	-	-	16/12/2004
<i>Taeniopygia guttata</i>	Zebra Finch	-	-	7/10/2001
<i>Thalasseus bergii</i>	Crested Tern	-	-	22/10/2008
<i>Threskiornis molucca</i>	Australian White Ibis	-	-	8/04/1985
<i>Todiramphus sanctus</i>	Sacred Kingfisher	-	-	17/12/2004
<i>Tribonyx ventralis</i>	Black-tailed Native-hen	-	-	26/04/2006
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	-	-	17/12/2004
<i>Tringa glareola</i>	Wood Sandpiper	-	R	16/12/2004
<i>Tringa nebularia</i>	Common Greenshank	-	-	19/01/2010
<i>Tringa stagnatilis</i>	Marsh Sandpiper	-	-	26/01/2000
<i>Turdus merula</i>	Common Blackbird	-	-	4/02/2006

Species name	Common name	Conservation status		Last year sighted
		Aus	SA	
<i>Turnix varius</i>	Painted Button-quail	-	R	14/12/2004
<i>Turnix velox</i>	Little Button-quail	-	-	5/12/2003
<i>Tyto delicatula</i>	Australian Barn Owl	-	-	14/12/2004
<i>Vanellus miles</i>	Masked Lapwing	-	-	19/01/2010
<i>Vanellus tricolor</i>	Banded Lapwing	-	-	1/08/2006
<i>Xenus cinereus</i>	Terek Sandpiper	-	R	6/12/1981
<i>Zosterops lateralis</i>	Silvereye	-	-	15/05/2008

*Denotes exotic species

Aus: Australia (Environment Protection and Biodiversity Conservation Act 1999). **SA:** South Australia (National Parks and Wildlife Act 1972). Conservation Codes: **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

Appendix 3 – Sandhill Dunnart Targeted Survey Report

**Sandhill Dunnart Habitat Assessment
Proposed ElectraNet Transmission Line Corridor
Eastern Eyre Peninsula
March 2014**



Report prepared by Ecological Horizons Pty. Ltd.
Author: Dr Katherine Moseby

Limitations Statement

In preparing this document Ecological Horizons Pty Ltd has presumed accurate and up-to-date information provided by certain State government agencies as identified herein. No warranty or guarantee, whether expressed or implied, is made with respect to the information reported or to the findings, observations or conclusions expressed in this document. Further, such information, findings, observations and conclusions are based solely on information available to Ecological Horizons Pty Ltd at the time of this study.

Introduction

The sandhill dunnart is an insectivorous marsupial inhabiting dune fields in southern semi-arid Australia. Weighing 40-50g, these dunnarts are within the critical weight range (Burbidge and McKenzie 1989) of mammals that have declined or become extinct since European settlement. The sandhill dunnart is nationally listed under the Australian Federal EPBC Act (1999) as Endangered and is thought to have significantly declined in range. First recorded in 1894 at Lake Amadeus in the southern Northern Territory (Spencer 1896), the species was next recorded 75 years later in 1969 on the Eyre Peninsula, South Australia. Between 1969 and 2001 the species was recorded from only five sites within three isolated localities; the Middleback Range, Eyre Peninsula; and the Ooldea region in South Australia (Copley and Kemper 1987) and Mulga Rock and Queen Victoria Spring regions of the Great Victoria Desert in Western Australia (Hart and Kitchener 1986, Pearson and Robinson 1989). All locations are characterised by semi-arid dunefields.

Although sandhill dunnarts have recently been recorded almost exclusively from *Triodia* grasslands with mallee understorey on sand dunes, little is known of the specific habitat requirements of this elusive species. Trapping in apparently suitable habitat does not guarantee capture of the species, particularly of adults (Middleback Alliance 2012). Churchill (2001) radio-tracked sandhill dunnarts and found they preferred to nest within large domed *Triodia* hummocks and highlighted the role that fire may play in creating suitable habitat. *Triodia* hummocks provide excellent thermal insulation and predator protection. However, *Triodia* cover is removed by fire and gradually re-establishes from seed, forming first dense hummocks and then rings as they age. Radio-collared sandhill dunnarts preferred dense thick hummocks and Churchill (2001) suggested these hummocks may be present on the Eyre Peninsula between 8 and 28 years post fire. However, in long unburnt areas sandhill dunnarts have been found to construct burrows under ageing *Triodia* (Churchill 2001), suggesting that a minimum age of post-fire age habitat may be more likely to restrict occurrence than a maximum. Other arid and semi-arid mammals have been found to respond to seral succession with Kelly et al. (2011) finding the dasyurid, *Ningaui yvonnae*, in higher abundance in mature *Triodia* more than 40 years post fire and Masters (1993) also finding mulgara (*Dasyercus blythi*) preferring areas of mature *Triodia*. Other variables could also influence the occurrence or abundance of the species in an area including productivity, area of continuous habitat, time of year, *Triodia* cover and *Triodia* species.

Scope

ElectraNet have proposed constructing an additional high voltage electricity transmission line in the Eastern Eyre Peninsula which passes through known sandhill dunnart habitat. This proposed line will be placed approximately 300m north of the existing high voltage powerline and pass through several conservation parks and nature reserves (Ironstone Hill Conservation Park, Sheoak Hill Conservation Park, Secret Rocks Nature Reserve). Ecological Horizons Pty. Ltd. was subcontracted by EBS to provide a desktop habitat assessment for the likelihood of sandhill dunnart occurrence along the proposed new transmission line based on fire and vegetation characteristics. The impact corridor was stated as all habitat within a 300m strip between the existing line and the new proposed line to the north. Information collected from more than 70 previous sandhill dunnart survey sites were also analysed to provide underlying models to predict likely habitat utilisation by the sandhill dunnart.

This assessment of likely habitat suitability was considered more valuable than trapping for sandhill dunnarts at certain sites for the following reasons:

- 1) Considerable long term survey effort had already confirmed the presence of sandhill dunnarts at several sites along the corridor
- 2) Even the minimum survey effort recommended by the Sandhill Dunnart Recovery team of 4 nights of trapping with large deep pitfall traps fails to record the species at sites where it is known to occur
- 3) Sandhill dunnart occupancy can be predicted with some certainty by measuring habitat variables
- 4) Habitat suitability and site occupancy by sandhill dunnarts changes through time, hence informed habitat assessment is likely to be more useful for infrastructure projects than trapping at limited sites.



Methods

Habitat modelling

Site surveys

Data were taken from seventy seven survey sites trapped between April 2009 and May 2013 within the extent of occurrence of the sandhill dunnart in South Australia. Survey sites also included previously known capture locations of the species recorded between 1980 and 2007. All sites were in suitable habitat and were in sand plain or sand dune habitat in *Triodia* vegetation associations with mallee overstorey.

At each site, one to two pitfall lines were established consisting of between two and six deep pits (225mm diameter or 150mm diameter x 600mm deep) per line. Additional short (500mm) pits were used at some sites and Elliott traps were also used at some sites. All sites were trapped for four nights. Captured animals were weighed, sexed, checked for reproductive status and marked with a temporary mark to distinguish same session recaptures. All animals were released at point of capture.

The presence/absence of first and second year cohorts of sandhill dunnarts was recorded at each site as well as the trap success of each cohort in deep pits. Animals captured in Elliott traps or short pits were only included in presence/absence comparisons to standardise trap success for deep pits.

Habitat and Site Variables

At each site the following measurements were taken; *Triodia* height, separation, cover and length. For details of methods see Ward 2009. Fire history data was derived from the DEWNR 2014 Fire History Dataset (GDA 1994) containing fire history data from 1956 until present. A number of site and habitat variables were compared with sandhill dunnart presence and abundance using generalised linear models. These included seral age, distance from edge of burn, *Triodia* height, *Triodia* cover, 90th percentile *Triodia* height, *Triodia* separation and *Triodia* length.

Data Analysis

Sandhill dunnart trapping parameters were compared with habitat and site variables using generalised linear models. All analyses were conducted using R statistical package. The dependent variables included sandhill dunnart presence/absence, adult presence/absence, total pitfall trap success and adult pitfall trap success. For each response variable, ten models were compared;

0. null model
1. fire age
2. fire age + distance from edge

3. *Triodia* cover
4. *Triodia* height
5. *Triodia* separation
6. *Triodia* length
7. *Triodia* height 90th percentile
8. global *Triodia* model (fire age+distance from edge+*Triodia* cover+*Triodia* height+*Triodia* separation+*Triodia* length+*Triodia* height 90th percentile)
9. global model (all parameters)

For those models that were selected as having enough evidence for a response, we used Tjur's Coefficient of Discrimination (Tjur, 2009), with output ranging from 0 (model has no discriminatory power) to 1 (model has perfect discriminatory power).

The relationship between the important non-fire habitat variables (as determined from the analyses above) and fire age were also investigated. As it was not possible to determine the fire age for sites that were greater than 50 years post fire, these sites were excluded from these analyses. As with the analyses above, generalised linear models were used to determine the relationships between fire age and habitat variables.

Transmission Line

The total area of native vegetation encompassed by the proposed powerline corridor was calculated in ArcMap 10 using the field geometry function in the attribute table. All area calculations are in ha.

Sandhill dunnart habitat was identified by only selecting native vegetation associations which included *Triodia* spp. Data were derived from the vegetation shapefile provided by EBS (EBS veg mapping GDA94 Zone 53 region). Again, area of vegetation associations including *Triodia* spp was calculated in ArcMap 10 using the field geometry function.

A shapefile was then created based on the selected *Triodia* vegetation associations and classified as sandhill dunnart habitat. Previous sandhill dunnart trapping locations were overlaid with the sandhill dunnart habitat data.

To identify currently optimal sandhill dunnart habitat, all *Triodia* spp vegetation association and areas of 10 – 50 years post fire (1974 – 2004) were selected and then classified as optimum sandhill dunnart habitat. Future optimal sandhill dunnart habitat was classified based on areas including *Triodia* spp vegetation associations and less than 10 year post fire history (<2004 until present). Areas with no known fire history were classified as sandhill dunnart habitat but would require ground truthing to determine if the *Triodia* characteristics are currently suitable for sandhill dunnarts.

Separate shapefiles were created based on the sandhill dunnart habitat classifications for map display. Again, areas of optimal and future optimal habitats were calculated in ArcMap 10 using the field geometry function.

Ground Truthing

Twenty four sites in the five *Triodia* vegetation associations were randomly chosen for ground truthing. Although ground truthing was outside of the scope of the brief, five sites were visited in Sheoak Hill Conservation Park where targeted surveys for sandhill dunnarts have not occurred. At these sites, the maximum height of 30 random *Triodia* hummocks was measured using a range pole. The average height and 90th percentile height were calculated.

Results

Habitat modelling

Using the 77 survey sites previously sampled, the strongest explanatory variable for the presence or absence of sandhill dunnarts at a site was the 90th percentile *Triodia* height (Fig. 1). The 90th percentile height was also the strongest variable explaining variation in the probability of capture of sandhill dunnarts (Fig. 2). The model suggests that the probability of capturing a sandhill dunnart increases significantly when the 90th percentile of *Triodia* heights exceeds 400mm and peaks at 600mm.

When the relationship between fire age and 90th percentile *Triodia* height was investigated, 90th percentile height peaked between 20 and 40 years post fire (Fig. 3). However, sites older than 50 years could not be included in this model as their fire age was unknown. Fire mapping is only available for areas from the 1960's onwards. Sandhill dunnarts were also recorded at many older fire age sites that

also contained tall *Triodia*, suggesting that a minimum fire age is more important for predicting sandhill dunnart presence than maximum fire age. Sandhill dunnarts were not captured at sites less than 10 years post fire.

Results suggest that the presence of at least some tall *Triodia* hummocks are important for sandhill dunnarts, supporting observations of Churchill (2001) who found adult females selected tall *Triodia* hummocks for nest sites. Sites on the Eyre Peninsula containing *Triodia* between 10 and 50 years post-fire are considered currently optimal for sandhill dunnarts with sites > 50 years post fire requiring ground truthing to measure *Triodia* height. *Triodia* species where sandhill dunnarts have been recorded include *T. lanata*, *T. bunicola* and *T. scariosa*.

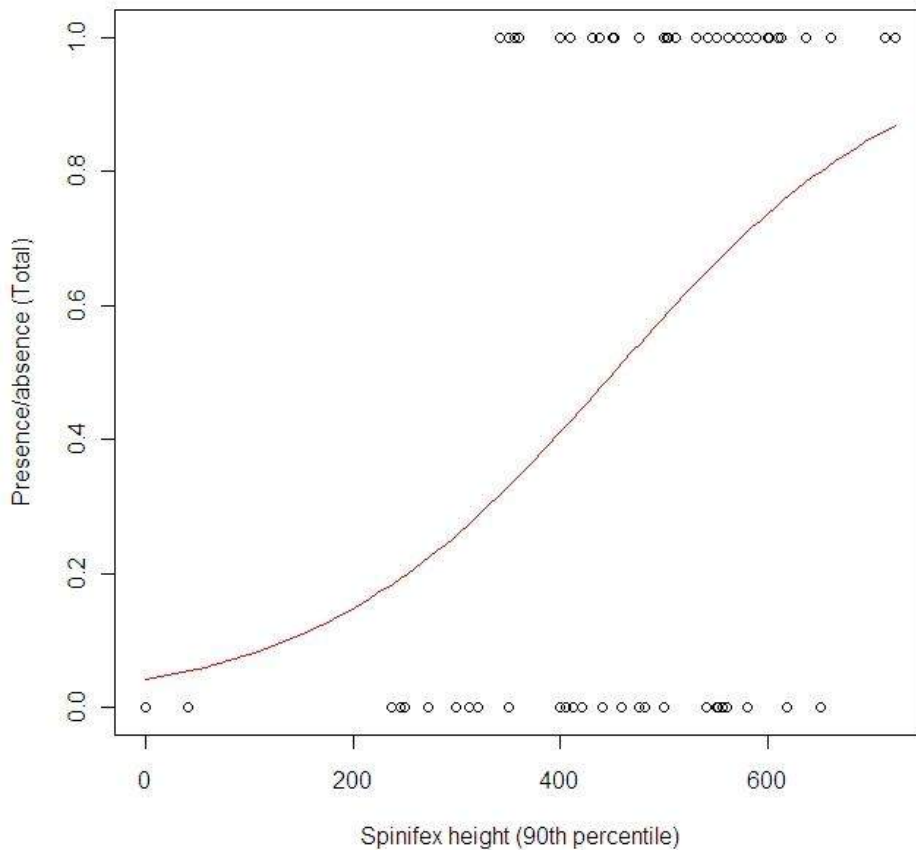


Figure 1: Relationship between the 90th percentile *Triodia* height and the presence/absence of sandhill dunnarts.

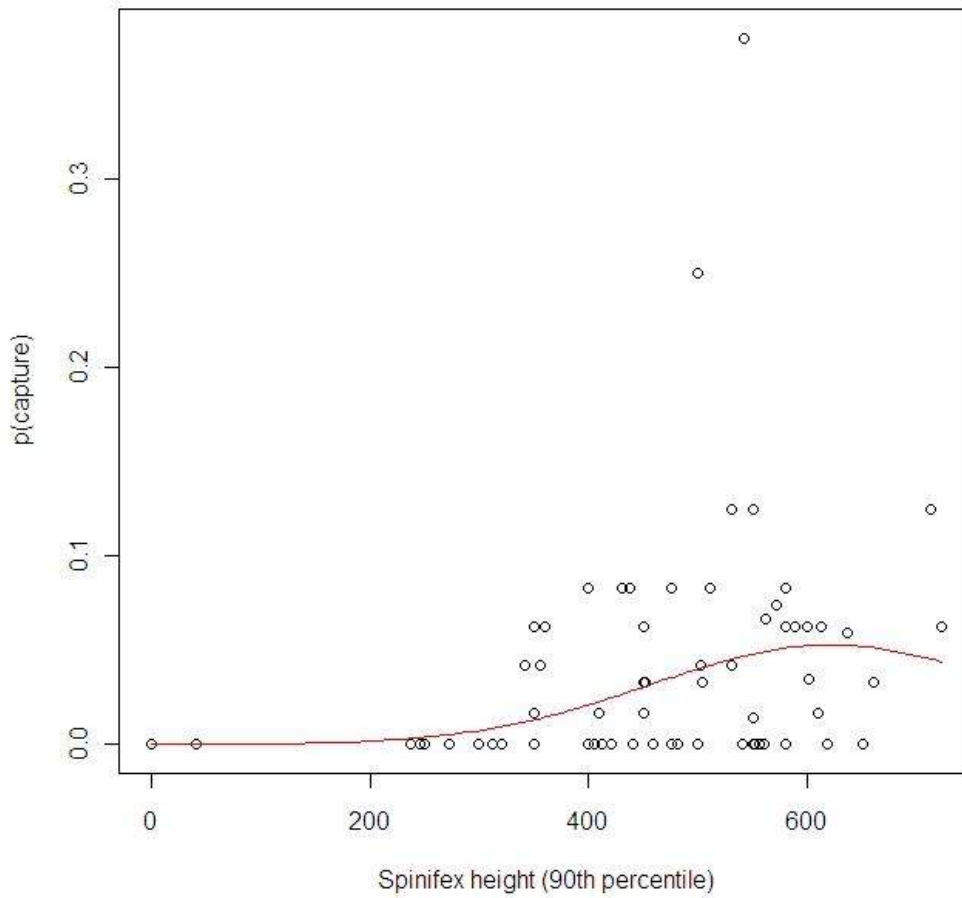


Figure 2: Relationship between the 90th percentile *Triodia* height and the probability of capture of sandhill dunnarts.

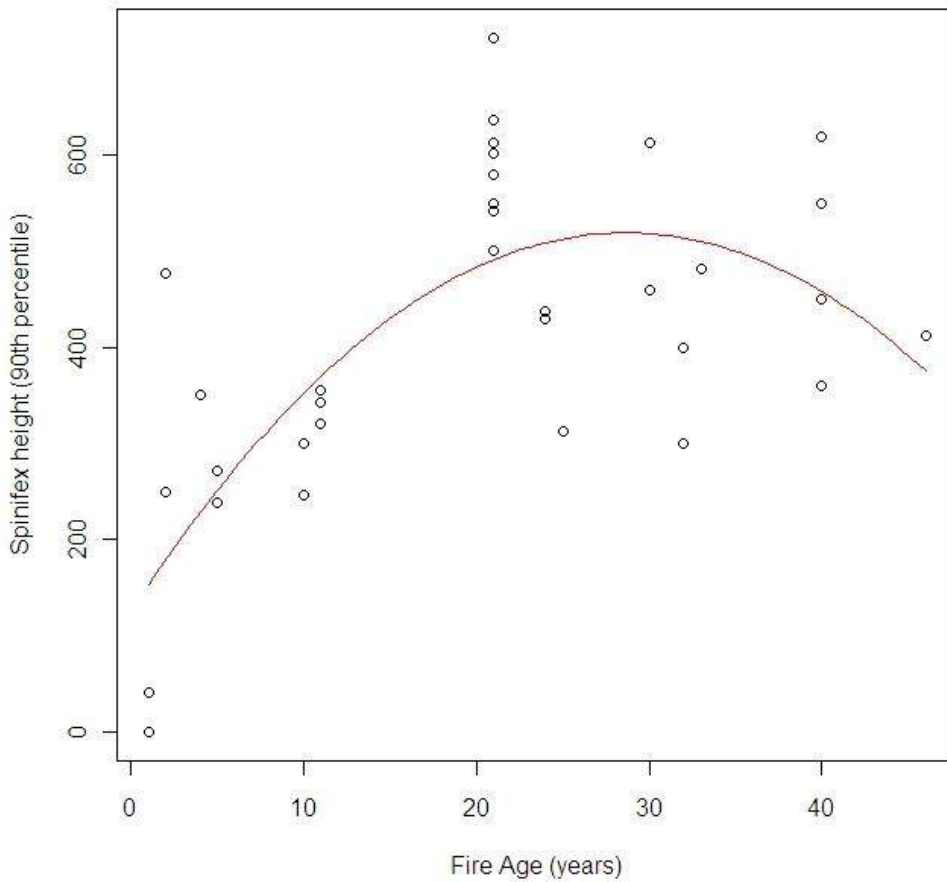


Figure 3: Relationship between *Tridodia* height and fire age. Sites > 50 years post fire were excluded due to unknown fire age.

Transmission Line

Using the vegetation data provided by EBS, a total of 1,236.4 hectares of native vegetation within the transmission line corridor contained *Tridodia* habitat. Of this, 1,213.3 hectares was considered suitable *Tridodia* habitat for sandhill dunnarts. This equates to nearly 17% of the total native vegetation along the assessed portion of the corridor and includes four of the five *Tridodia* vegetation associations identified (Table 2). The small isolated patch of the vegetation association “*Tridodia* spp. Hummock Grassland over *Austrostipa* spp., *Aristida contorta*, *Sida petrophila*” located near Whyalla was not considered suitable for sandhill dunnarts due to the absence of mallee species and isolated location within chenopod clay swales (Fig. 4). The main area of sandhill dunnart habitat was located between the Middleback Range and Sheoak Hill Conservation Park (Fig. 5). Patches of suitable *Tridodia* habitat were interspersed with other habitat types which would likely be used by sandhill dunnarts for dispersal and feeding.

Table 1. Native vegetation within the proposed powerline corridor

Native vegetation in development area	ha	%
Total area of native vegetation	7,332.9	100%
Total area of native vegetation containing <i>Tridodia</i> spp	1,236.4	16.86%

Within *Tridodia* habitat, five vegetation associations were recorded (Table 2). The vegetation association *Eucalyptus socialis* / *Eucalyptus oleosa* / *Eucalyptus brachycalyx* *Eucalyptus leptophylla* Mallee over *Tridodia scariosa* / *Tridodia lanatus* comprised the majority of the *Tridodia* habitat within the corridor. Seven of the eight sites where sandhill dunnarts have been recorded within the proposed transmission line

corridor are located in this vegetation association and one in *Eucalyptus incrassata*, *Callitris verrucosa* Mallee over *Leptospermum coriaceum*, *Phebalium bullatum*, *Triodia* spp. and *Calytrix tetragona* (Table 2). There are currently no known sandhill dunnart survey locations within three of the five vegetation associations. Although all of the five associations contain *Triodia* the relative importance of each association as sandhill dunnart habitat is unknown due to as absence of stratified sampling within the region.

Table 2. Flora composition of *Triodia* vegetation associations within the proposed corridor. Vegetation association in bold is not considered suitable for sandhill dunnarts.

Detailed flora species composition of <i>Triodia</i> vegetation associations	ha	%*	SHD sites
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>	892.4	12.17%	7
<i>Eucalyptus incrassata</i> <i>Callitris verrucosa</i> Mallee over <i>Leptospermum coriaceum</i> , <i>Phebalium bullatum</i> , <i>Triodia</i> spp. and <i>Calytrix tetragona</i>	186.7	2.55%	1
<i>Acacia wilhelmiana</i> <i>Senna artemisioides</i> ssp. <i>coriacea</i> <i>Eucalyptus gracilis</i> <i>Melaleuca uncinata</i> Tall Shrubland over <i>Triodia</i> spp.	125.0	1.70%	
<i>Triodia</i> spp. Hummock Grassland over <i>Austrostipa</i> spp., <i>Aristida contorta</i>, <i>Sida petrophila</i>	22.7	0.31%	
<i>Eucalyptus socialis</i> / <i>Eucalyptus oleosa</i> / <i>Eucalyptus brachycalyx</i> <i>Eucalyptus leptophylla</i> Mallee over <i>Acacia</i> spp., <i>Leptospermum coriaceum</i> , <i>Triodia</i> spp. , <i>Austrostipa</i> spp. and <i>Austrodanthonia caespitosa</i>	9.6	0.13%	

*Note: percentage calculation is based on total area of native vegetation.

The majority of the sandhill dunnart habitat was recorded in Ironstone Hill CP, Sheoak Hill CP, Secret Rocks Nature Reserve and adjacent heritage agreements (Figs 5 and 6). Only small isolated patches of *Triodia* habitat were recorded in other areas which are unlikely to support sandhill dunnart populations due to their small size and isolation (Figs. 4,7,8,9).

Although all *Triodia* habitat is likely to be suitable for sandhill dunnarts, the fire history of the transmission line corridor was overlaid over the *Triodia* vegetation associations to determine current and future optimal habitat based on fire age (Fig. 10). Modelling suggests that habitat between 10 and 50 years post fire contains *Triodia* of suitable height for nesting sandhill dunnarts. These areas currently comprise 35% of the suitable *Triodia* habitat within the proposed corridor (Table 3). Approximately 11% of suitable *Triodia* habitat is currently < 10 years post burn and will likely be suitable for sandhill dunnarts within 10 years. More than half of the mapped *Triodia* habitat in the corridor is of unknown fire age and would require ground truthing to determine whether it is currently suitable habitat. However, sandhill dunnarts have been recorded from some of these unknown fire age sites (Fig. 5) and even if these areas do not contain *Triodia* of sufficient height for nesting they would be considered future optimal habitat depending on fire regimes in the future. Importantly, all *Triodia* habitat between the Middleback Range and Sheoak Hill Conservation Park is likely to be important for sandhill dunnarts as it allows a mosaic of fire ages to be sustained over large areas.

Table 3. Sandhill dunnart habitat

Sandhill dunnart habitat classification	Ha	%
Total area of SHD habitat (<i>Triodia</i> spp, no fire history)	664.04	54%
Total area of optimal SHD habitat (<i>Triodia</i> spp + 10-50 years post fire)	433.95	35%
Total area of future optimal SHD habitat (<i>Triodia</i> spp + < 10 years post fire)	138.42	11%

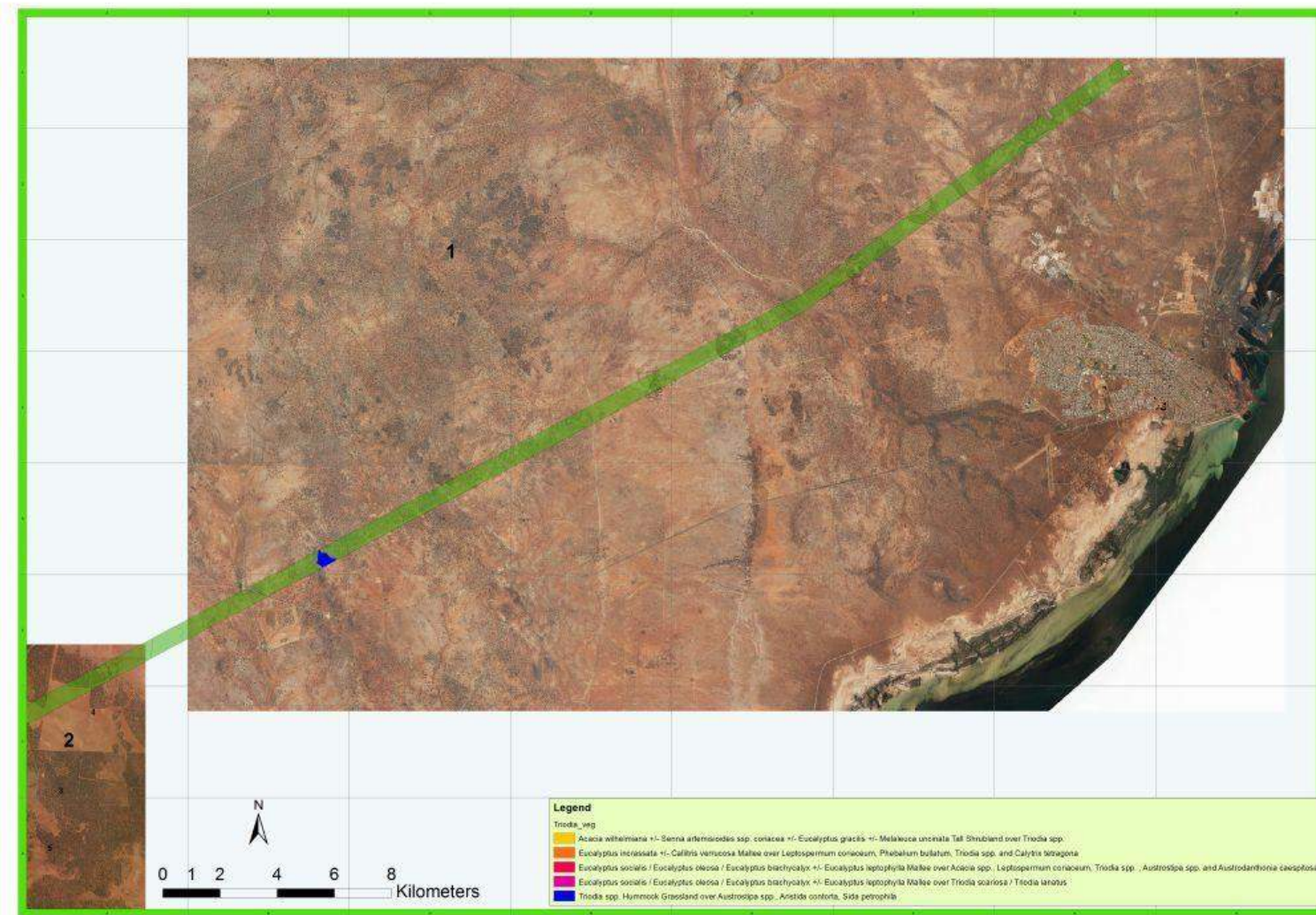


Figure 4: *Trodia* habitat along the proposed ElectraNet transmission line corridor, Whyalla to Moola Station.

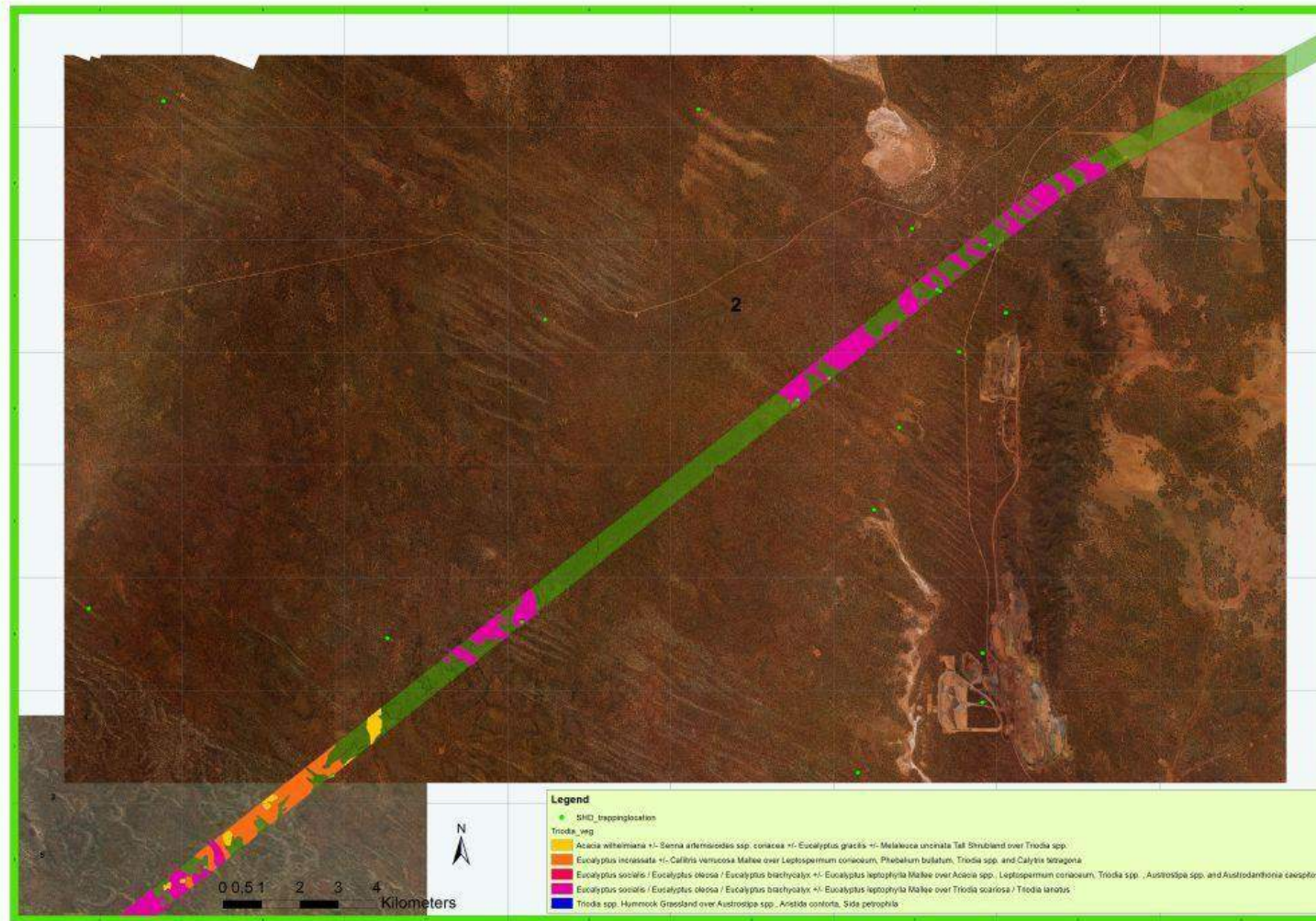


Figure 5: *Triodia* habitat along the proposed ElectraNet transmission line corridor, Middleback Range to Secret Rocks Nature Reserve.

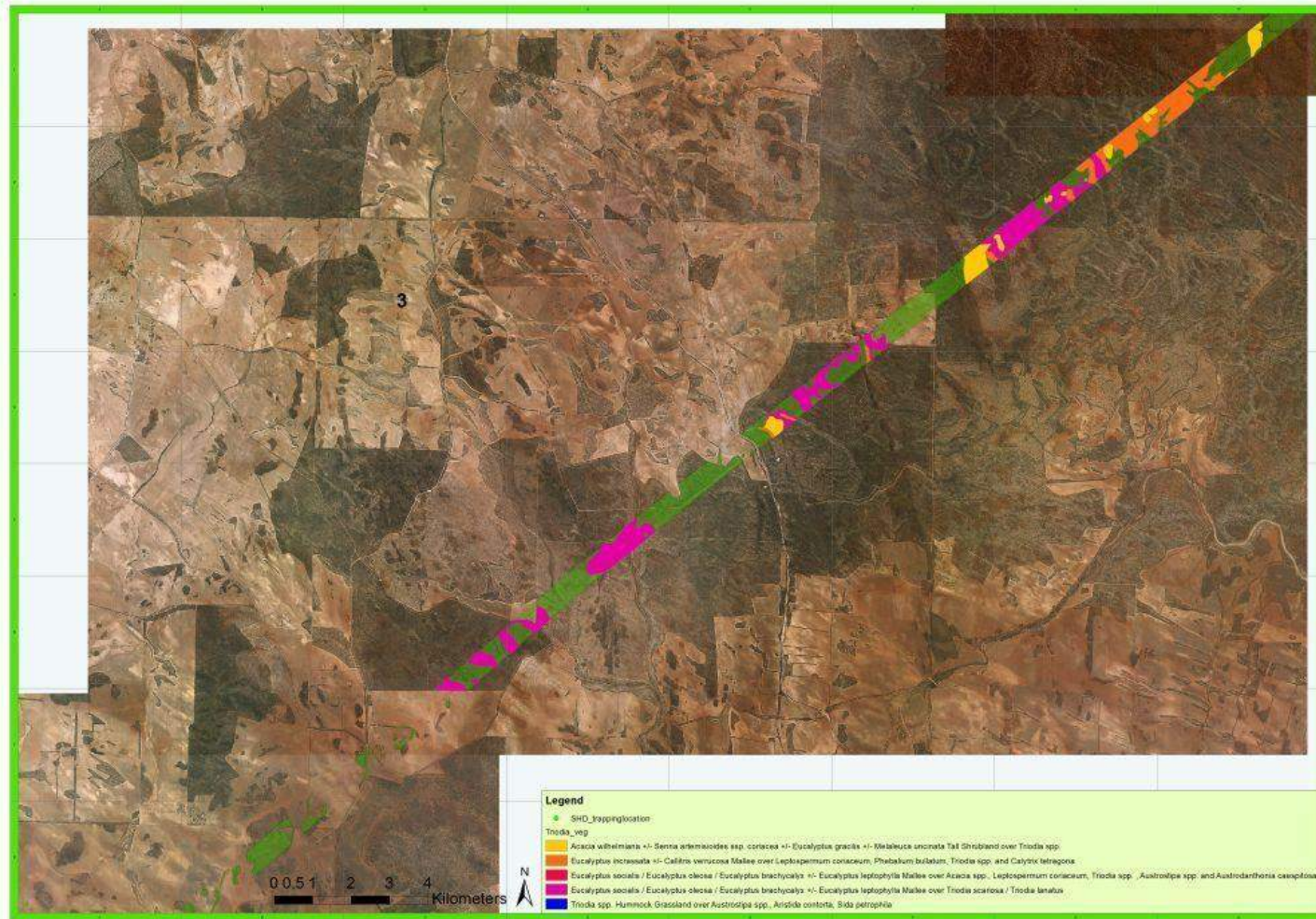


Figure 6: *Tridodia* habitat along the proposed ElectraNet transmission line corridor from Secret Rocks Nature Reserve to Sheoak Hill CP.



Figure 7: *Triodia* habitat along the proposed ElectraNet transmission line corridor, Sheoak Hill Conservation Park to Southern EP.



Figure 8: *Tridonia* habitat along the proposed ElectraNet transmission line corridor, southern EP

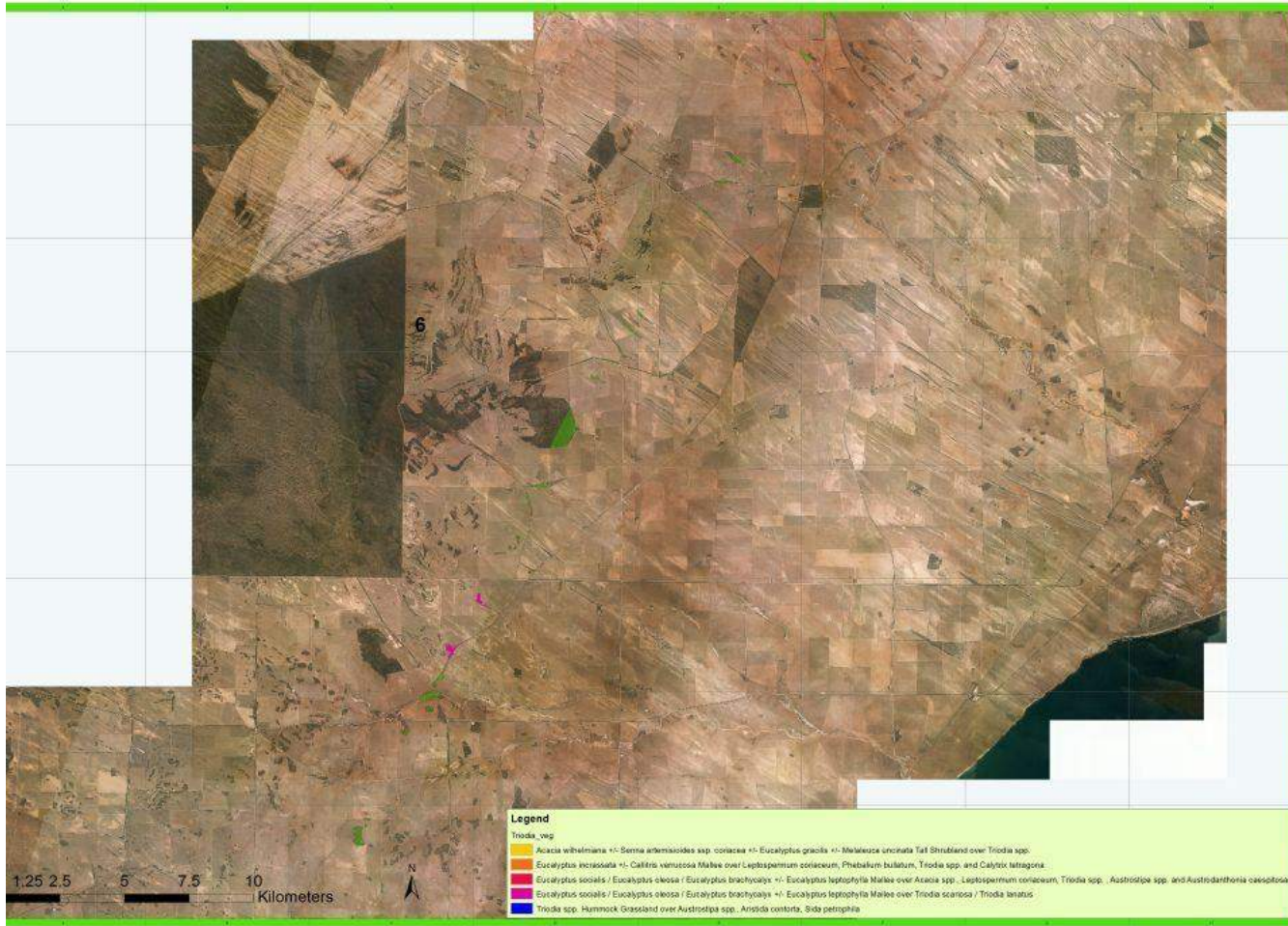


Figure 9: *Tridonia* habitat along the proposed ElectraNet transmission line corridor, Hambidge CP vicinity.



Figure 10: Sandhill Dunnart habitat classified according to fire age. Known optimal habitat is between 10 and 50 years post burn, future optimal habitat is less than 10 years post burn and green is unclassified habitat (unknown fire age, ground truthing required). Note: All *Triodia* habitat between Middleback Range and Sheoak Hill on sandy soils is suitable for sandhill dunnarts at some stage in its post-fire trajectory and large areas are required to support habitat mosaics of different fire age to ensure long term dunnart survival in the region.

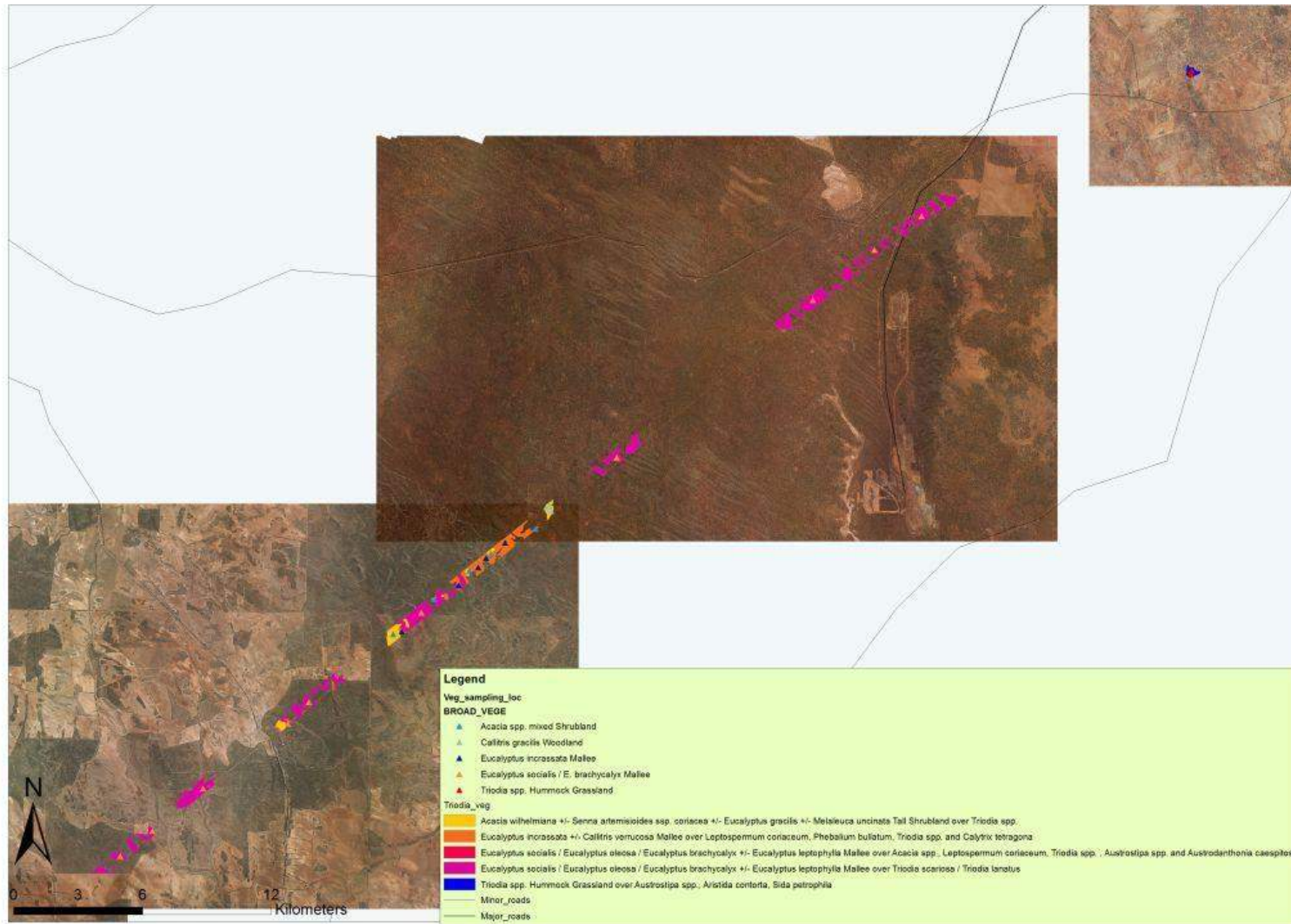


Figure 11: Suggested ground truth sites for the five *Triodia* associations identified along the proposed powerline corridor

Table 4: Suggested ground truth sites for the five *Triodia* associations identified along the proposed powerline corridor.

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
0	24	672617.241	6309968.176	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
1	24	679251.441	6314885.54	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
2	24	677139.968	6313652.203	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
3	24	676151.325	6312924.041	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
4	24	674547.001	6311609.798	Shrubland	Acacia spp. mixed Shrubland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
5	23	679976.182	6315724.616	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
6	23	679765.577	6315877.309	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
7	23	679947.842	6315946.444	Mallee	Callitris gracilis Woodland	Acacia wilhelmiana +/- Senna artemisioides ssp. coriacea +/- Eucalyptus gracilis +/- Melaleuca uncinata Tall Shrubland over <i>Triodia</i> spp.
8	26	676955.325	6313523.122	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
9	26	676586.11	6313085.751	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
10	26	677841.907	6314227.482	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
11	26	675659.411	6312237.156	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
12	26	673023.945	6310095.839	Mallee	Eucalyptus incrassata Mallee	Eucalyptus incrassata +/- Callitris verrucosa Mallee over Leptospermum coriaceum, Phebalium bullatum, <i>Triodia</i> spp. and Calytrix tetragona
13	17	697257.26	6329472.82	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
14	17	695047.981	6327898.545	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
15	17	692190.476	6325556.977	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus

FID	VEG_NO	Easting	Northing	TYPE	BROAD_VEGE	Species
						leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
16	17	683043.695	6318211.866	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
17	17	673928.693	6310957.517	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
18	17	668681.552	6306800.106	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
19	17	663756.094	6302768.457	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
20	17	659895.601	6299611.6	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
21	17	667711.674	6305792.194	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
22	17	661397.96	6300790.668	Mallee	Eucalyptus socialis / E. brachycalyx Mallee	Eucalyptus socialis / Eucalyptus oleosa / Eucalyptus brachycalyx +/- Eucalyptus leptophylla Mallee over <i>Triodia scariosa</i> / <i>Triodia lanatus</i>
23	8	709839.79	6336253.67	Grassland/ Sedgeland	<i>Triodia</i> spp. Hummock Grassland	Myall Plains
24	8	709795.81	6336093.46	Grassland/ Sedgeland	<i>Triodia</i> spp. Hummock Grassland	Myall Plains

Ground Truthing

Twenty four sites within the 5 *Triodia* vegetation associations were randomly chosen for future ground truthing, should greater certainty about sandhill dunnart suitability be required (Fig. 11, Table 4). An additional 5 sites were visited in Sheoak Hill Conservation Park in unknown fire age *Triodia* habitat. The 90th percentile *Triodia* height at these sites ranged from 57-87cm with average *Triodia* height from 35-58cm. These measurements, along with visual appraisal, suggest that the *Triodia* in Sheoak Hill, although of unknown fire age, is also currently optimal for sandhill dunnarts.

Conclusions

Using the vegetation data provided by EBS, a total of 1,213 hectares of native vegetation within the transmission line corridor from Middleback Range to Sheoak Hill Conservation Park contained suitable *Triodia* habitat within four vegetation associations. At least two of these vegetation associations support confirmed records of sandhill dunnarts and although it is likely that the other two suitable *Triodia* associations also support dunnarts, these are currently unsurveyed. The patchy nature of the *Triodia* habitat suggests that it is also likely that some of the remaining non-*Triodia* native vegetation along the corridor is used by sandhill dunnarts for dispersal and feeding.

The height of *Triodia* is an important variable that can be used to predict the abundance and presence of sandhill dunnarts and is dependent to some degree on fire age. The relationship between *Triodia* height and fire age is unclear for sites more than 50 years post fire but sandhill dunnarts appear to require habitat more than 10 years post burn for local persistence.

Sandhill dunnarts are currently only recorded from large, intact areas of mallee *Triodia* vegetation, possibly because such large areas can support fire mosaics of varying age, ensuring that at least some habitat is always suitable for sandhill dunnart breeding. The large area of intact vegetation between Ironstone Hill Conservation Park and Sheoak Hill Conservation Park contains the majority of sandhill dunnart habitat and there are numerous current records of the species from this area.

To increase certainty about sandhill dunnart occurrence in the corridor, ground trapping surveys of two of the *Triodia* vegetation associations (excluding the small patch of *Triodia* with *Austrostipa* on the Whyalla plain) currently not known to support sandhill dunnarts would be required. Additionally, *Triodia* height measurements of the unknown fire age *Triodia* habitat could be measured to finalise the map of current and future optimal habitat. Without further detailed surveys it should be assumed that the transmission line corridor mallee habitat from the Middleback Range to south of Sheoak Hill Conservation Park is suitable sandhill dunnart habitat and important for the preservation of the species.

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Appendix 4 – Malleefowl Targeted Survey Report – Ecological Horizons Pty Ltd, 2014.

Scope of work

Ecological Horizons Pty Ltd, sub-consulting through EBS, were contracted to provide ElectraNet with details on the distribution of Malleefowl mounds in the vicinity of their high voltage powerline in the Middleback region of north-eastern Eyre Peninsula, South Australia. Malleefowl are mound-nesting birds that are nationally listed as a vulnerable species by the EPBC Act due to significant declines in range and abundance, primarily as a result of clearance of their mallee habitat, inappropriate fire regimes and predation by foxes. ElectraNet propose to construct another high voltage transmission line adjacent to their existing line, and hence are required to describe and minimise any potential impacts to Malleefowl.

Ecological Horizons were contracted to provide the following;

- conduct a search and provide a map of all known Malleefowl mounds within 500m NW of the existing powerline in the Middleback region, where the proposed powerline is planned.

- Provide informed commentary on the density of recently active and historic mounds along the proposed powerline route in comparison with regional densities to determine whether long-term nesting density is likely affected by proximity to powerlines.

Methods

Malleefowl construct large mounds, typically 4-6 metres in diameter and up to 90cm high in which they incubate their eggs. Disused mounds can persist in the environment for many decades, with historic mounds not used for several decades distinguished from more recently used mounds by crusting of lichen or moss on the mounds. Inspection of mounds can therefore facilitate appraisals of whether nesting densities have increased (low percentage of historic mounds) or decreased (high percentage of historic mounds) in recent decades.

Four different techniques were used to locate Malleefowl mounds in the study area. Opportunistic searches have located over 100 mounds in the Ironstone Hill CP and Secret Rocks Nature Reserve section of the study area from 2008-13. Secondly, aerial surveys conducted from a helicopter provided more detailed assessment of 4 x 1 km² search grids in the study area in April 2013. Thirdly, strategic ground based walking surveys in November 2013 provided further precision on the location and number of mounds in these same grids. Finally, the relatively new LiDAR technology was utilised to survey all the mallee vegetation within the proposed powerline easement (500m width) for mounds (Powerline transect), along with an additional transect (Control transect- also 500m width) located 2.5km west of the powerline easement. The advantage of the LiDAR survey is that it uniformly covered the entire survey area, unlike the other surveys that were more limited in geographic scope.

LiDAR survey techniques

The LiDAR survey, coordinated by Mark Lander of AAM surveyed:

Powerline transect: 60km survey at 500m buffer from 33 06.1498'S, 137 13.2769'E to 33 26.1961'S, 136 42.3993'E.

Control transect: 30km survey at 500m buffer from 33 09.2684'S, 137 04.1706'E to 19.3521'S, 136 49.5152'E.

A Bell Longranger L3 (C30 Turbine) aircraft flown at 400m AGL and 60 knots equipped with a ALTM 3100 LiDAR Sensor was flown over the transects between 30 November – 2 December 2013. A DiMAC 51 mm image sensor, using nominal point density of 20+ points / m² provided a resolution of 10cm pixel size with relative system accuracy of 2 cm on both horizontal and vertical scales. Data analysis and modelling was conducted from 16 December 2013- 26 February 2014.

By exaggerating the vertical scale of the surface created by the LiDAR ground points most mounds were clearly visible (Fig. 1) and a 3D point were manually placed by operators in the centre of objects of similar size and shape to Malleefowl mounds. A total of 253 objects were identified but cross-checking with orthorectified photos suggested that a percentage of these objects were not Malleefowl mounds. To eliminate most of these false positives an algorithm was created to eliminate all objects with an arbitrary height lower than 25cm above the surrounding plain, which eliminated 80 of the identified objects. The remaining 173 objects (from both transects) were reviewed using the LiDAR ground points and the orthorectified imagery to differentiate between objects with a concave apex and those with a domed apex. This process differentiated 81 'confirmed' mounds (Fig 1) with a concave shape and 92 'possible' mounds which were flat or domed.

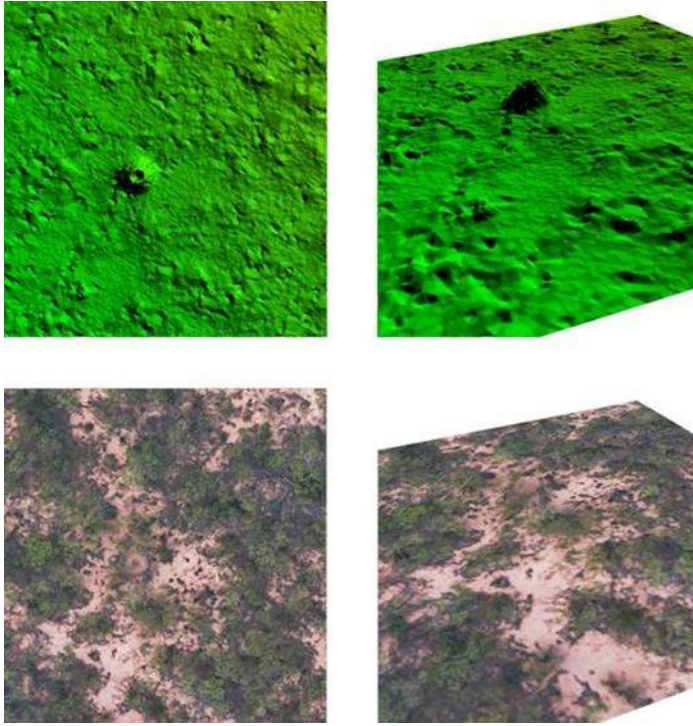


Figure 1 examples of LiDAR and aerial photography (used to 'confirm' mounds) for Malleefowl mound MA78.

Ground truthing

Ground truthing of 137 of the 173 identified mounds, constituting 67 (83%) of the 81 'confirmed' and 70 (76%) of the 92 'possible' mounds was conducted by John Read of Ecological Horizons in March and April 2014. Dimensions and characteristics of the mounds were scored using standard national Malleefowl mound monitoring sheets. Distance from powerline was determined on the Google Earth image generated by AAM. 'Historic' mounds were distinguished from more recently active mounds by moss or lichen (Fig. 2). Incidentally, several earthen mounds, presumably created during the powerline construction, exhibited similar degrees of crusting as these historic mounds.



Figure 2. Old Malleefowl eggshell, moss and lichen on a historic Malleefowl mound (C056)

Results

95% (64 of 67) of the ‘confirmed’ objects identified by LiDAR were found to be Malleefowl mounds by ground truthing (Table 1). If the same percentage accuracy is assumed for the 14 ‘confirmed’ objects which were not visited on the ground, we can assume another 13 of these objects were mounds. By contrast, only 8.5% (6 of 70) ‘possible’ objects were confirmed to be Malleefowl mounds (Table 1). If the same percentage of false positives is assumed for the 22 ‘possible’ objects that were not visited on the ground we can assume another 2 ‘possible’ objects were mounds.

The powerline transect included several areas of cleared land or unsuitable habitat, and only 35.8km was considered to traverse Malleefowl habitat. Together these data suggest that 85 Malleefowl mounds were detected by LiDAR on the 65.8 km of mallee habitat on both transects combined, at a density of 2.6 mounds per square kilometre (Fig. 4).

The only two mounds visited that were likely to have been active in the previous summer (see cover photo) were considered to be ‘possible’ mounds through the LiDAR analyses. Active mounds may alter from having a concave shape to a domed shape over the course of a day (Fig. 3), and it is likely that these mounds were indeed mounded and active when the LiDAR was flown. Improvements in the algorithm used to distinguish mounds from LiDAR data to include these convex mounds, would likely improve the percentage of active mounds correctly assigned as ‘confirmed’ and possibly decrease the number of mounds not detected (false negatives) by the LiDAR.

Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)	Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
C001	659975.633	6299827.400	Y	5	30	C042	682645.868	6318082.946	Y	20	40
C002	660228.671	6299919.637	Y	22	30	C043	682662.963	6317985.012	Y	58	30
C003	660547.790	6299994.841	Y	80	25	C044	683052.233	6318123.875	Y	40	22
C004	660548.000	6300442.949	Y	41	30	C045	683093.672	6318290.032	Y	68	30
C005	667351.788	6305897.792	Y	25	30	C046	683252.955	6318719.118	Y	35	10
C006	667841.333	6306445.494	Y		35	C047	683577.561	6321380.893			
C007	667971.185	6306314.599	Y	80	45	C048	683618.377	6321344.196			
C008	668744.953	6306746.870	Y	35	37	C049	683693.986	6321636.841			
C009	668928.654	6306866.762	Y	50	25	C050	683872.424	6321901.325			
C010	668980.626	6307262.578	Y	65	30	C051	684426.101	6319521.788	Y	90	20
C011	670373.505	6310905.514				C052	685621.851	6322930.396			
C012	672130.529	6309435.465				C053	686091.062	6320539.980	Y	15	29
C013	672328.452	6312737.143				C054	686124.571	6323869.939	Y	22	12
C014	672613.192	6312519.329				C055	686226.554	6320872.192	Y	38	18
C015	674101.473	6314112.707				C056	686450.115	6320733.117	Y	5	20
C016	674479.808	6311541.158				C057	686955.589	6324153.005	Y	80	26
C017	675598.523	6315381.544	Y	17	16	C058	687056.079	6324181.159	Y	35	25
C018	675875.703	6315527.551	Y	10	18	C059	687097.772	6321716.992	Y	45	35
C019	675944.283	6315340.136	Y		10	C060	687577.515	6324500.903	Y	33	47
C020	676113.234	6315813.358	Y	25	18	C061	689163.149	6326201.243	Y	54	30
C021	676311.676	6315780.073	Y	29	15	C062	689754.915	6323628.166	Y	30	5
C022	676537.052	6315743.031	Y	24	15	C063	690335.412	6326997.619	Y	28	20
C023	676633.574	6315905.773	Y	6	21	C064	690701.710	6324521.656	Y	37	7
C024	677170.668	6316280.683	Y	13	25	C065	690875.899	6324588.790	Y	58	12
C025	677226.526	6316695.647	Y	8	22	C066	690978.059	6327298.420	Y	32	27
C026	677307.496	6316293.676	Y	15	18	C067	691819.175	6328124.635	Y	40	28
C027	678040.093	6317068.903	N			C068	692081.276	6328378.277	Y	45	30
C028	678635.355	6317323.626	Y	25	33	C069	692558.388	6326050.132	Y	12	22
C029	678747.896	6317898.716	Y	32	30	C070	692798.206	6326005.031	Y	20	32
C030	678831.111	6318071.397	Y	35	2	C071	692832.095	6326288.127	Y	30	15
C031	679019.752	6318145.398	Y	30	17	C072	692872.380	6326301.009	N		
C032	679270.423	6318028.566	Y			C073	692988.770	6326052.632	Y	66	15
C033	679451.223	6318500.112	N			C074	693029.122	6328889.554	Y	17	23
C034	679612.512	6318144.539	Y			C075	693632.026	6326770.823	Y	15	20
C035	679731.966	6318340.684	Y			C076	694398.012	6327449.056	Y		
C036	679879.841	6318640.846	Y	40	40	C077	694732.562	6327791.718	Y		
C037	680548.879	6319199.669	Y	30	12	C078	695011.948	6327668.613	Y	34	25
C038	680846.239	6319125.122	Y	23	20	C079	695317.386	6327962.825	Y	45	42
C039	682096.118	6320604.151				C080	695601.345	6328202.223	Y	40	32
C040	682187.520	6317835.435				C081	695737.826	6328129.194	Y	50	17

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Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)	Mound	Easting	Northing	Confirmed	Depth (cm)	Height (cm)
P001	659451.692	6298991.592	N			P048	683438.702	6321595.102			
P002	659466.353	6298977.497	N			P049	683716.105	6321421.663			
P003	659673.349	6299693.253	N			P050	683721.525	6318521.114	N		
P004	659874.158	6299354.658	N			P051	683749.672	6318574.386	N		
P005	660476.012	6299835.202	N			P052	683786.055	6318597.318	N		
P006	660736.414	6300103.745	N			P053	683802.054	6318585.348	N		
P007	660743.979	6300112.150	N			P054	684152.405	6321967.943			
P008	660758.043	6300098.895	N			P055	684483.630	6319149.269	N		
P009	660796.581	6300610.877	N			P056	684630.287	6319265.084	N		
P010	664675.006	6303594.606				P057	684689.616	6319293.570	N		
P011	665954.090	6304895.652				P058	684805.916	6319407.791	N		
P012	665969.355	6304765.196				P059	685087.051	6319632.179	N		
P013	665970.668	6304892.148				P060	685123.490	6319612.201	N		
P014	666130.093	6304511.098				P061	685127.943	6319616.723	N		
P015	666879.200	6305257.309	N			P062	685297.923	6319796.892	N		
P016	668144.602	6306161.985	N			P063	685430.719	6319908.618	N		
P017	668550.321	6306482.790	N			P064	685479.233	6323259.800	N		
P018	668624.824	6306543.808	N			P065	685506.300	6319940.534	N		
P019	668651.675	6306565.790	N			P066	685516.468	6323116.630	N		
P020	668834.035	6306709.009	N			P067	685519.746	6319948.644	N		
P021	668966.420	6307169.228	Y	50		P068	685523.521	6323162.384	N		
P022	671957.621	6309194.628				P069	685854.700	6323589.330	Y	5	45
P023	672557.090	6309580.513				P070	686180.642	6320500.828	N		
P024	672903.799	6312966.116				P071	686510.136	6320732.874	N		
P025	675385.363	6311914.863	N			P072	686676.374	6321145.401	N		
P026	675964.107	6312380.529	N			P073	686822.754	6321018.531	N		
P027	676566.491	6312787.656				P074	687280.427	6321889.277			
P028	676580.303	6312786.378				P075	687424.719	6324389.042	Y	60	29
P029	678119.496	6317113.559	N			P076	688543.719	6322807.986			
P030	678259.830	6314536.791				P077	688584.302	6322416.442	N		
P031	678505.377	6314375.212	N			P078	688960.271	6323239.433			
P032	679912.273	6315523.278	N			P079	689213.941	6323429.410			
P033	680470.264	6315957.622	N			P080	690354.967	6326897.682	Y	10	20
P034	680475.444	6315937.501	N			P081	691381.703	6328148.468	N		
P035	680815.028	6316243.092	N			P082	691618.455	6324796.056	N		
P036	680845.375	6316235.100	N			P083	691681.608	6324869.347	N		
P037	682209.413	6317319.056	N			P084	693122.087	6329180.321	N		
P038	682491.593	6317586.530	N			P085	693168.043	6326308.982	N		
P039	682526.003	6317593.379	N			P086	693868.655	6326850.112	Y	48	25
P040	682701.056	6317729.647	N			P087	696804.698	6329396.058	N		
P041	682704.746	6321182.557				P088	696926.541	6329405.308	N		
P042	682743.711	6317743.042	N			P089	697528.210	6329604.653	N		
P043	682758.847	6317776.618	N			P090	698440.568	6330159.263	N		
P044	682846.597	6317847.490	N			P091	700108.507	6331313.898	N		
P045	683048.883	6321085.216				P092	700119.406	6331393.236	N		
P046	683348.262	6318249.111	N			MF14b	688556.000	6325955.000	Y	30	17
P047	683428.016	6318710.894	Y	30	32	C37A	680748.000	6319150.000	Y	30	27

Table 1. Location and dimensions of confirmed Malleefowl mounds (bold and Y) and other objects



Figure 3. A pair of Malleefowl displaying on an active 'convex' mound at Secret Rocks.

False positives

The vast majority of the 67 false positives objects considered by AAM to be either 'confirmed' or 'possible' mounds that were visited were attributed to piles left by earthmoving equipment during construction or maintenance of the powerline or fire-containment activities. Several others were the elevated lignotubers and associated soil mounding around old-growth mallees (Fig. 4).



Figure 4. P89 is an example of a potential mound that was in fact the elevated lignotubers around a mallee stump.

False negatives

Four mounds identified by chopper or ground searches along the LiDAR transects were not identified by the LiDAR survey. One of these, MA108, was identified by the LiDAR operators but discarded because, like the other three false negatives, its height above ground level was lower than the arbitrary 25cm cut-off. Three of these undetected mounds had previously been located in the three 1 km² grids methodically surveyed by chopper and on the ground. Assuming that half of each 1 km² grid was surveyed by the 500m LiDAR swathe, these data suggests a false negative rate of approximately 1 mound per square kilometre. Together with the correctly detected mounds described above, these undetected false negative mounds suggest that the regional density of recent and historic Malleefowl mounds is approximately 3.6 km².

Comparison of powerline and control transect

38 mounds were confirmed on 24.1km of powerline transect ground truthed (density of 3.2 km²), compared with 37 on 16.6 km (density of 4.4 km²) of the control transect (Fig .5). These data suggest that Malleefowl mound density along the powerline was 73% of that in areas remote from the powerline.

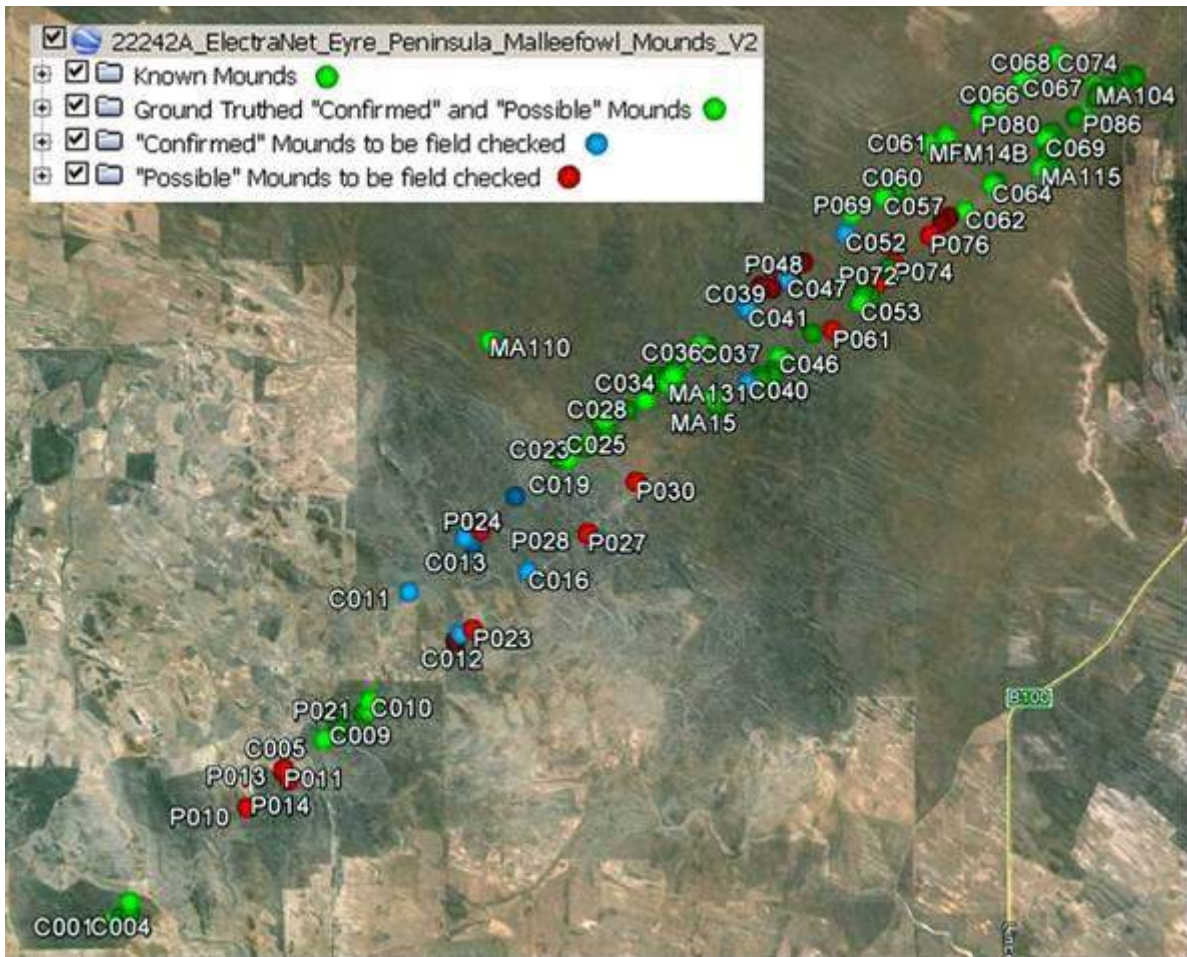


Figure 5. Green dots: confirmed (ground truthed) Malleefowl mounds; blue dots: not ground-truthed but 95% likely based on confirmed percentage of 'confirmed' objects; and red dots: not ground-truthed but 8.5% likely (based on confirmed percentage of 'possible' objects).

Within the powerline transect, there was no obvious pattern in higher density of mounds or ratio of historic to active mounds with increasing distance from the existing powerline (Fig. 6). However, 17% (5 of 29) of the mounds on the powerline transect were historic compared with 12% (4 of 34) of historic mounds on the remote control transect.

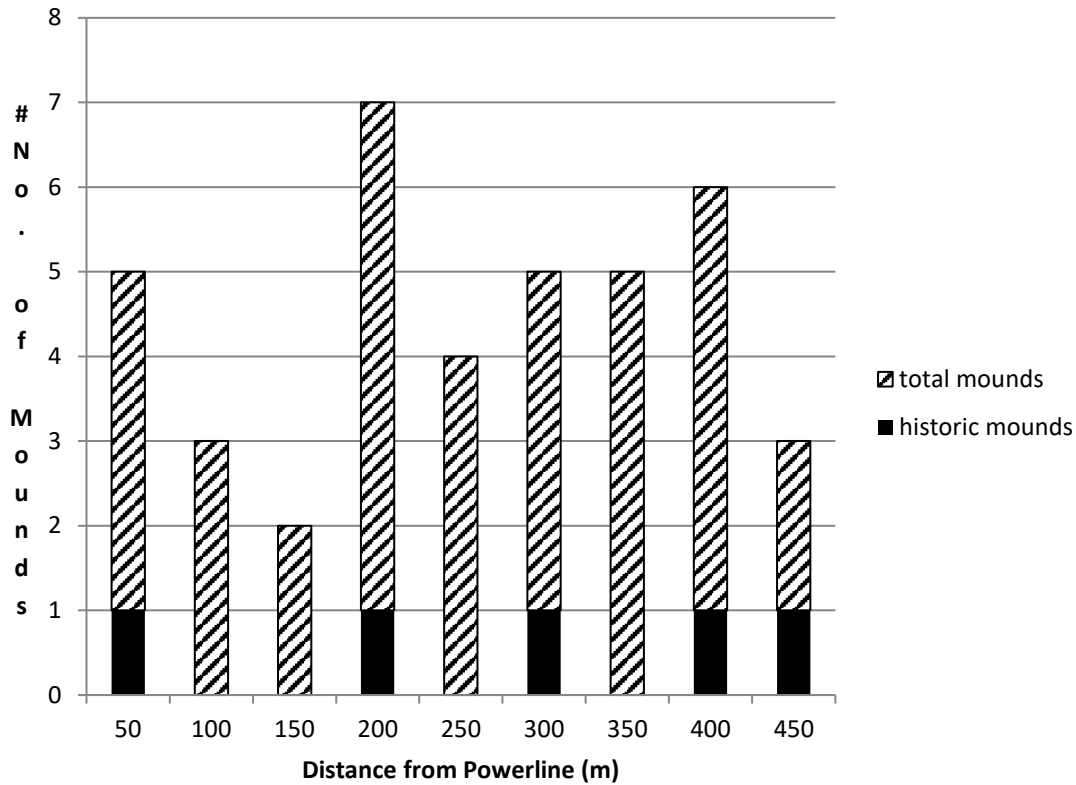


Figure 6. Distance of historic and more recent mounds from the powerline on the powerline transect

Low percentages of active nests (2 from 70, 2.9%) along both powerline and control transects recorded in this survey was consistent with low nesting success recorded by the Middleback Alliance monitoring program in 2013, when only 2 of 127 monitored mounds (1.6%) were recorded as active in the same region. This low nesting effort is believed to be related to environmental conditions and contrasts markedly with activity levels of 12.9%, 22.3% and 24.7% in the years 2011, 2012 and 2013 respectively. One dead Malleefowl was recorded at nest C008 near the southern extremity of the powerline transect. Fresh fox scats were evident on this mound that was only 70m from the powerline.

Discussion

This survey confirmed that the intact mallee vegetation traversed by the existing and proposed high voltage powerline through the Middleback region of NE Eyre Peninsula is inhabited by Malleefowl, with mound densities of 3.2-4.4 mounds per km². This density is approximately half the median mound density for Malleefowl sites in South Australia but relatively high for an arid region (J. Benshemesh pers. comm.). Less arid areas with high density mounds are typically restricted to small isolated remnants suggesting that the Middleback region, whilst supporting lower density is supporting a significant Malleefowl population due to the large area of intact habitat. The mound density determined by this study should form the basis of any offsets associated with impacts to the local Malleefowl habitat.

One of the key outcomes of this study was the comparison of recently active Malleefowl mound density adjacent to and remote from the powerline to determine whether proximity to the powerline might affect long-term nest site selection. Confirmed mound densities along the powerline were 28% lower than densities on the remote transect. There was also a 5% higher percentage of historic mounds on the powerline transect compared to the control transect. This lower density of recently active mounds and relatively low percentage of historic mounds would be expected if proximity to the powerline increased the likelihood of mounds being abandoned or led to higher predation rate of nesting birds. Together these data suggest that proximity to the powerline may negatively influence nest site selection, and possibly nesting success, in Malleefowl. The most plausible conclusion from this study is that recently active Malleefowl mound density and hence possibly nesting success, is reduced by approximately one third in the vicinity of the existing ElectraNet powerline.

Relative densities of recently active Malleefowl mounds adjacent to the powerline compared with remote areas could be confounded by variation in fire history and habitat between the two transects. Therefore, the negative correlation found in this study should ideally be compared with analogous datasets from other regions. Within the powerline transect, there was no indication that the distribution of recent or historic mounds showed any relationship with distance to the powerline, as could have been expected if higher predation rates (foxes and raptors using the powerline easement) affected nest location choice in the Malleefowl. It is possible that any effect of the powerline could extend for the entire 500m width of the powerline easement and hence not exhibit a pattern at a finer scale. Furthermore, if Malleefowl select their mound locations on the basis of habitat quality, rather than variability in predation risk, mound location would not be expected to be influenced by proximity to the powerline. Unfortunately, due to the low nesting success of Malleefowl in the Middleback region in 2013-14, we were unable to investigate any impacts of proximity to the powerline on Malleefowl nesting success, which is a more important measure of powerline impacts than the distribution of nesting effort that we measured.

The LiDAR survey was the most widespread and representative Malleefowl mound survey technique used in this survey. On the basis of the false negative records verified by ground searches, those mounds identified by LiDAR are assumed to constitute 69-72% of the mounds along the transmission line easement at the time the LiDAR was flown. A high percentage of the mounds not identified are likely to be historic low mounds that did not protrude more than 25cm above the surrounding ground surface. Identified mounds presented in Table 1, and provided in a spreadsheet appendix, will therefore provide guidance for positioning of pylons and other ground-disturbing activities. However, more detailed ground searches will be required prior to initiation of any ground-disturbing activity to ensure that new mounds have not been constructed or old mounds overlooked in the vicinity of the new powerline.

This study provided valuable information on the precision of LiDAR surveys for Malleefowl mounds and a comparison of the cost effectiveness of the different survey techniques compared here will form the basis of a scientific paper presented to the 2014 Malleefowl forum. Measurements of false-negative and false positive mounds, along with confirmed Malleefowl mounds identified by LiDAR, will enable the algorithm and process for refining likely mounds to be improved in future LiDAR surveys. Therefore, in addition to providing valuable information on the location of most Malleefowl mounds along the powerline easement and likely chronic effects of the powerline on Malleefowl nesting success, this study has advanced the science of Malleefowl monitoring and management.



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