Lower Eyre Peninsula Reinforcement

RIT-T: Project Specification Consultation Report

February 2012

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Contents

1. Introduction

1.1 Background

Electricity demand on the Lower Eyre Peninsula[1] is forecast to increase significantly in the medium term, due to underlying demand growth and potential iron ore mining developments, together with the establishment of support infrastructure and services.

Based on the information provided by proponents of new developments in the area, the potential increase in electricity demand is well beyond the capability of the existing electricity transmission network. Therefore, action is required by the time of the first significant demand increase to ensure a continued reliable and secure supply of electricity to the Lower Eyre Peninsula. The required timing will be driven by the timing of the spot load developments, but is currently forecast to be by 2015.

An important characteristic of the forecast new demand is that it comprises numerous spot loads which are geographically dispersed over a wide area, reflecting various resource tenements under multiple ownerships. This characteristic drives the development of a shared network augmentation to meet the forecast demand.

The total solution for proposed mining loads and associated infrastructure will also require various lengths of unregulated transmission lines and substations, which fall outside of the scope of the regulated shared network development discussed in this report. These unregulated works (including negotiated and non-regulated transmission services) will be negotiated directly between ElectraNet and the proponents, with the cost of these works fully paid for by the proponents.

In addition, the underlying increase in demand in the area means that the relevant Electricity Transmission Code (ETC)[2] standards at the Port Lincoln connection point will fail to be met from 2013/14. This will require action by ElectraNet to ensure that the ETC standard is not violated, ahead of a longer-term solution being put in place to meet the overall increase in demand on the Lower Eyre Peninsula.

This Project Specification Consultation Report (PSCR) has been prepared by ElectraNet as part of the prescribed National Electricity Rules (NER)[3] process for the approval of proposed shared network augmentations. It represents the first stage of the consultation process in relation to the application of the Regulatory Investment Test – Transmission (RIT-T) for the reinforcement of the Lower Eyre Peninsula.

This report:

- Describes the identified need which ElectraNet is seeking to address, together with the assumptions used in identifying this need;
- Sets out the technical characteristics that a non-network option would be required to deliver in order to address this identified need;
- Describes the credible options that ElectraNet currently considers may address the identified need; and

[1] The Lower Eyre Peninsula is defined as the area south of Whyalla, currently serviced by a single radial 132 kV transmission network.
[2] Electricity Transmission Code, ET/06 2011, available at www.escosa.sa.gov.au
[3] National Electricity Rules, clause 5.6.6.

- Discusses specific categories of market benefit which in the case of this specific RIT-T assessment are unlikely to be material, in line with the requirement of NER 5.6.6(c)(6)(iii).

1.2 Submissions

ElectraNet welcomes written submissions on this PSCR. Submissions are particularly sought on the credible options presented and from potential proponents of non-network options to meet the forecast demand and support the ETC reliability standards at Port Lincoln.

Submissions are due on or before 18 May 2012.

Submissions should be emailed to consultation@electranet.com.au. Submissions will be published on the ElectraNet website. If you do not wish for your submission to be made publicly available please clearly stipulate this at the time of lodging your submission.

Further details in relation to this project can be obtained from:

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2. Lower Eyre Peninsula region

2.1 Background

The Eyre Peninsula is a region of South Australia bounded by Whyalla, Port Lincoln and Ceduna. Covering an area of over 230,000 km^2, the Eyre Peninsula supports a population of approximately 59,000 people or 3.6% of South Australia's total population[4].

The Upper Eyre Peninsula has a major population, industry and service centre at Whyalla (population 23,214)[5], with a large number of educational, retail and commercial facilities and services.

The Lower Eyre Peninsula has an economy based on aquaculture and primary production and processing, contributing about 33% of the state's grain harvest and 90% of seafood production. The Lower Eyre Peninsula has a major secondary service centre in Port Lincoln (population 14,726)[6] and it experiences a significant influx of visitors in coastal locations, which places extra demand on public infrastructure and services during peak visitor times.

The Lower Eyre Peninsula is experiencing a significant increase in forecast demand associated with mining development and associated infrastructure such as new ports and processing facilities. The Lower Eyre Peninsula also possesses high quality wind, wave and solar energy resources providing substantial renewable generation development potential.

2.2 Existing electricity supply arrangements

The Lower Eyre Peninsula region has a main radial transmission supply of 132 kV extending from Whyalla to Yadnarie substation (approximately 8.5 km west of Cleve). A radial 132 kV line also extends west to Wudinna and another south to the Port Lincoln substation. The original supply from Whyalla to Port Lincoln was established in 1967. Supply to Port Lincoln is supported by a network support agreement that allows ElectraNet to call upon the services of three distillate fired gas turbines generators located at Port Lincoln when needed.

ETSA Utilities provides the region's distribution network, which services most of the communities and farms throughout the region.

The Lower Eyre Peninsula transmission system is supplied via 275/132 kV substations located at Davenport and Cultana. ElectraNet is currently reinforcing Cultana substation and Whyalla Terminal 132/33 kV substation is currently being rebuilt.

The region's electricity is derived from both wind and coal resources. This includes two wind farms at Cathedral Rocks south of Port Lincoln (supplying 66 MW), and Mt Millar near

[4] 2011, Regional Development Australia, Regional Profile – Whyalla and Eyre Peninsula pp. 13-15. Available at http://www.eyreregion.com.au/inform/plans-and-strategies.

[5] Australian Bureau of Statistics, Estimated Resident Population, at June 2010 quoted in 2011 Regional Profile – Whyalla and Eyre Peninsula.

[6] Ibid.

Cowell (supplying 70 MW), which supplement the brown coal fired generating stations located at Port Augusta (Northern and Playford B).

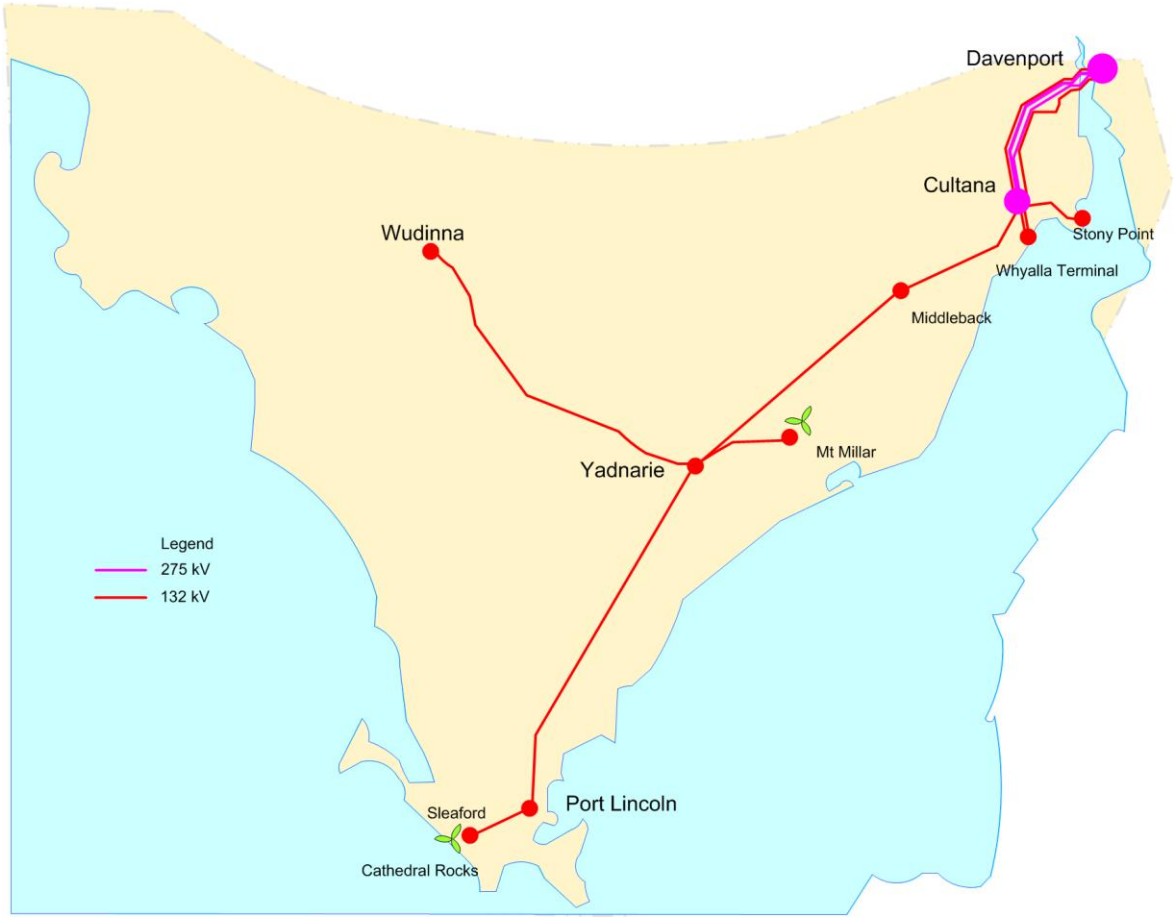

Figure 1: Lower Eyre Peninsula Transmission Network

2.3 Development

Electricity demand on the Lower Eyre Peninsula 132 kV transmission system has grown steadily over the years as a result of agricultural, residential, commercial, mining and industrial development.

Population is projected to increase by 33% over the next 30 years[7]. Forecast peak load growth on the lower part of the Peninsula varies between 3.3% and 4.9% per annum[8] as a result of increased economic growth and increased mining, commercial and agricultural activity.

However ElectraNet notes that these forecasts pre-date the most recent developments in relation to significant potential spot loads on the Lower Eyre Peninsula. These developments are discussed in detail in section 3.3.

[7] Department of Planning and Local Government (DP&LG), Eyre and Western Region Plan, 2011, available at http://www.sa.gov.au/upload/franchise/Housing,%20property%20and%20land/PLG/Eyre_and_Western_Region_Plan.pdf

[8] 2011 ElectraNet Annual Planning Report (APR), Table B.3 ETSA Utilities high growth country connection point forecast

The Lower Eyre Peninsula Region has significant mineral and renewable energy resources. Over the next few decades mining investment and outputs are expected to grow substantially. The region is located in the mineral regions known as the Gawler Craton and the Eucla Basin. This region is widely recognised as an important new frontier for mineral development in Australia.

There are 120 exploration tenements south of a line from Streaky Bay to Whyalla and companies continue to explore with very positive results[9]. The location and total size of the prospective loads associated with these mining developments are identified in Figure 2 and are discussed in more detail in the following section. Prospective load estimates are based on inferred iron ore deposits and associated primary crushing and treatment processes identified in the proponent's pre-feasibility studies.

A number of major mining developments have now reached their pre-feasibility stage and have made formal connection enquiries for connection to the transmission network. These developments form the basis for estimating step changes in load growth in the region (as discussed in more detail in section 3.3.3).

Additionally, the Eyre Peninsula and the Great Australian Bight have been identified as one of the world's top 10 locations for renewable energy—for both wind and wave technology. This region has the potential to produce 1000s of MW of renewable energy supply.[10] Currently, constraints on the capacity of the existing transmission network on the Peninsula limits the incentive for new wind generation to connect to the network.

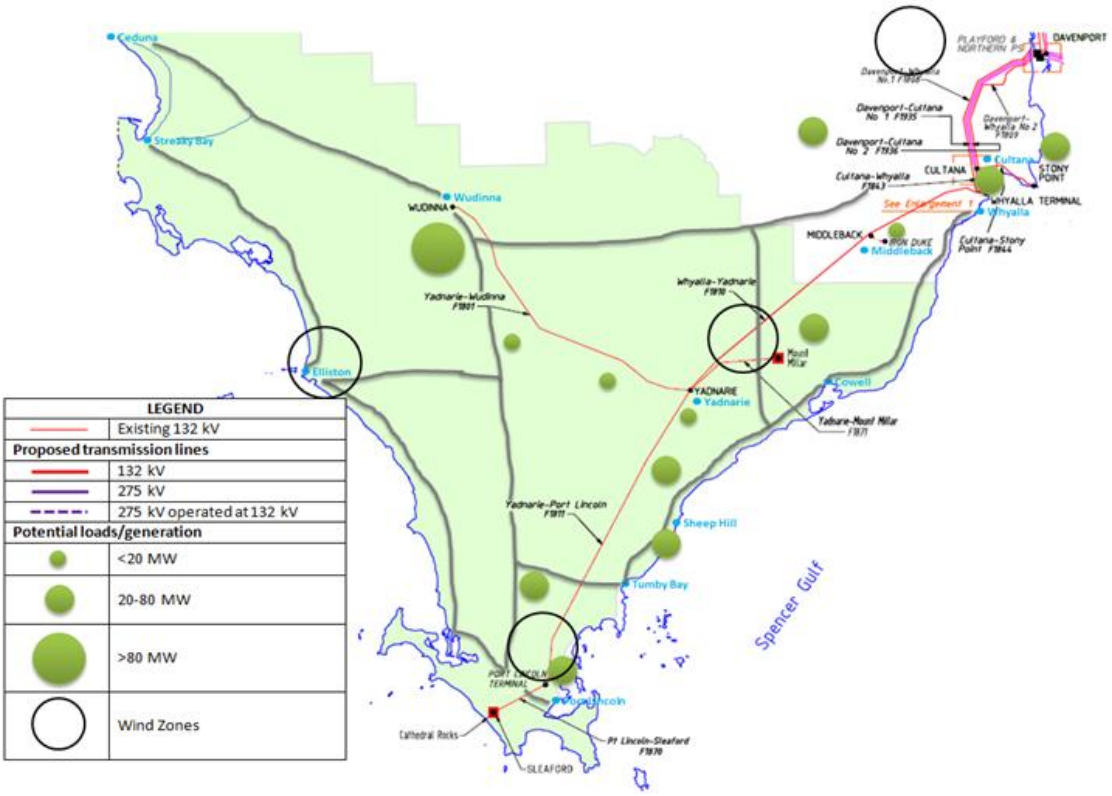

Figure 2: Prospective new load and wind generation developments – Eyre Peninsula

9 DP&LG, Eyre and Western Region Plan, 2011
10 DP&LG, Eyre and Western Region Plan, 2011, p.71

3. Identified Need

3.1 Description of the Identified Need

ElectraNet has identified the following limitations in relation to the existing Lower Eyre Peninsula transmission network:

1. Driven by load at Port Lincoln – insufficient electricity network infrastructure and network support to meet the South Australian Electricity Transmission Code (ETC) reliability standards at Port Lincoln from 2013/14;

2. Driven by total load on the Lower Eyre Peninsula – insufficient electricity infrastructure to meet forecast load (both with and without potential spot load developments) throughout the Lower Eyre Peninsula.

Each of these limitations is discussed further below, together with the assumptions made in identifying the identified need (particularly in relation to future load growth).[11]

In considering options to address these emerging network limitations, the condition of the existing Cultana – Middleback – Yadnarie – Port Lincoln 132 kV transmission lines must also be taken into account. Based on condition assessments undertaken, these lines are expected to require replacement prior to 2020.

ElectraNet also intends to consider the impact that investment to relieve the above network limitations may have on the amount and total output of wind generation in the Lower Eyre Peninsula.

3.2 Electricity Transmission Code requirements

The reliability requirements for the Lower Eyre Peninsula connection points are covered by Section 2 of the ETC and are set out in Table 1 below.

Table 1: ETC Categories for Lower Eyre Peninsula connection points

Connection Point	ETC Category
Middleback	1
Port Lincoln Terminal	3
Wudinna	2
Yadnarie	2

For Category 1 connection points, ElectraNet is required to provide equivalent transmission line and transformer capacity for at least 100% of contracted agreed maximum demand (AMD).

For Category 2 connection points, ElectraNet is required to provide equivalent transmission line and N-1 transformer capacity for at least 100% of contracted AMD.

[11] Further information on the Eyre Peninsula region can be sourced in Chapter 12 of ElectraNet's Annual Planning Report.

For Category 3 connection points, ElectraNet is required to provide equivalent transmission line and transformer capacity such that at least 100% of contracted AMD can be met following the failure of any transmission line, transformer or network support arrangement.

With the exception of Port Lincoln, ElectraNet currently meets the ETC requirements for all of the connection points on the Lower Eyre Peninsula through transmission assets alone. For Port Lincoln, the transmission service includes a network support agreement for the use of three contracted distillate fired open cycle gas generators, to provide both N and N-1 equivalent transmission line and transformer capacity in accordance with the ETC requirements.

3.3 Future load growth

The present Lower Eyre Peninsula 132 kV transmission system is operating at close to capacity during times of average demand. At peak demand times the transmission system is operating above capacity and relies on generation support at Port Lincoln to meet demand (as described above).

The following sections describe the nature of the existing load in the Lower Eyre Peninsula, and the assumptions made in relation to the underlying trend in future load growth and potential spot load increases in the area. Section 3.3.4 summarises the specific load scenarios adopted by ElectraNet in identifying the identified need.

3.3.1 Nature of the existing load

The existing Lower Eyre Peninsula region electrical load is characterised primarily by rural loads, including grain handling at ports located around the coast, urban, commercial and residential loads in the major population centres.

Figure 3 below shows the daily load profile for Port Lincoln for a peak January day in 2009. Figure 4 and Figure 5 show the load duration curve for 2008/09 (the peak load year) for Port Lincoln and the whole Lower Eyre Peninsula, respectively.

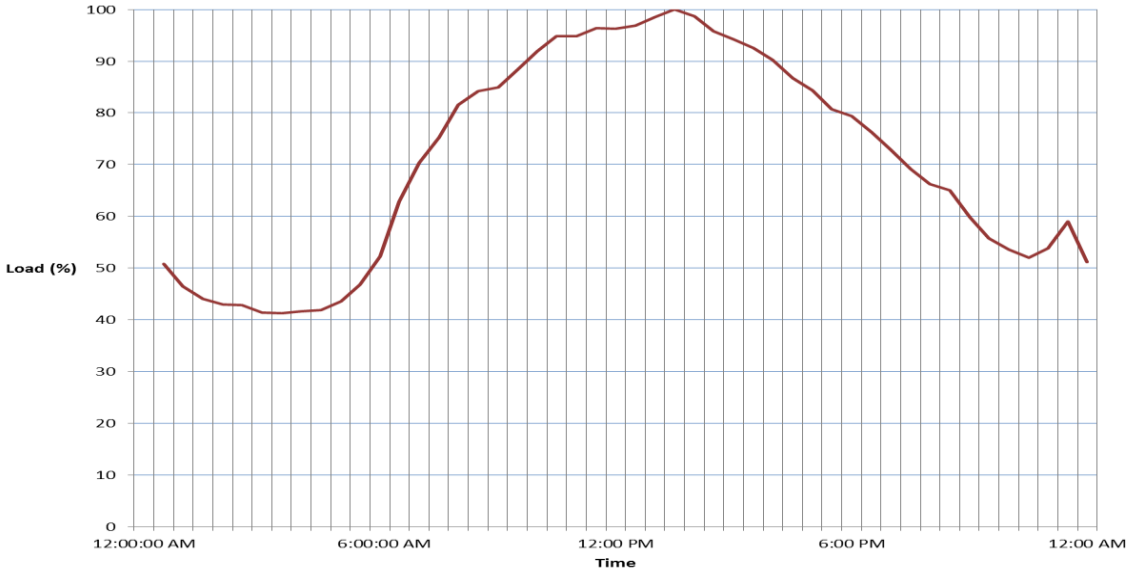

Figure 3: Port Lincoln 33 kV daily load profile – Peak load day: 29 January 2009

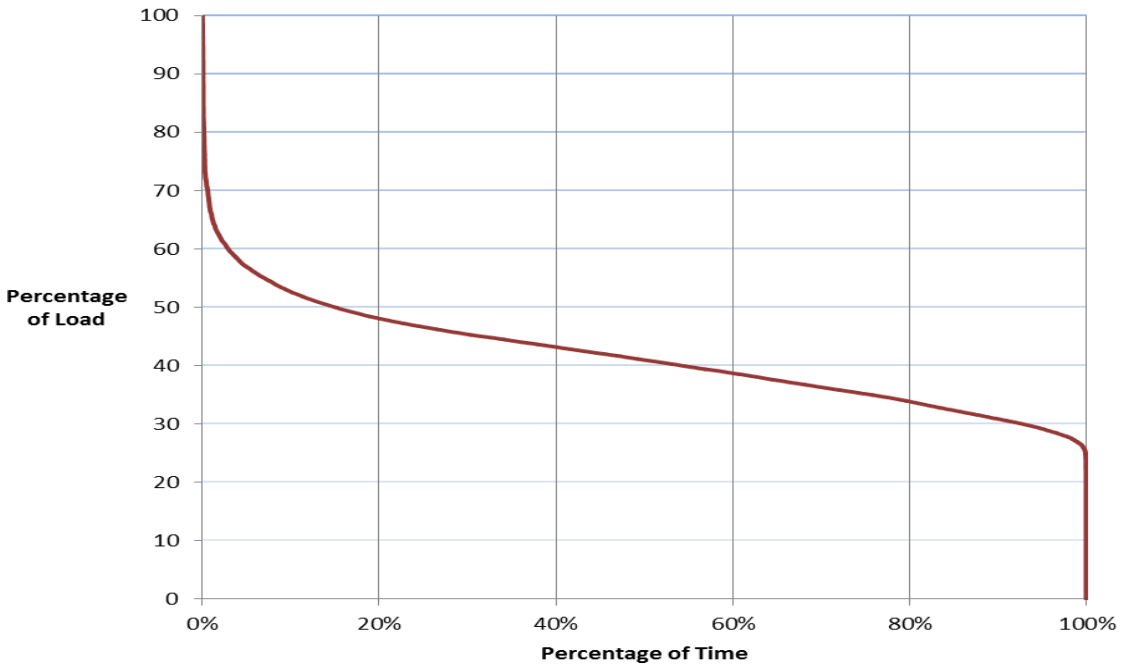

Figure 4: Port Lincoln 33 kV load duration curve: 2008/09

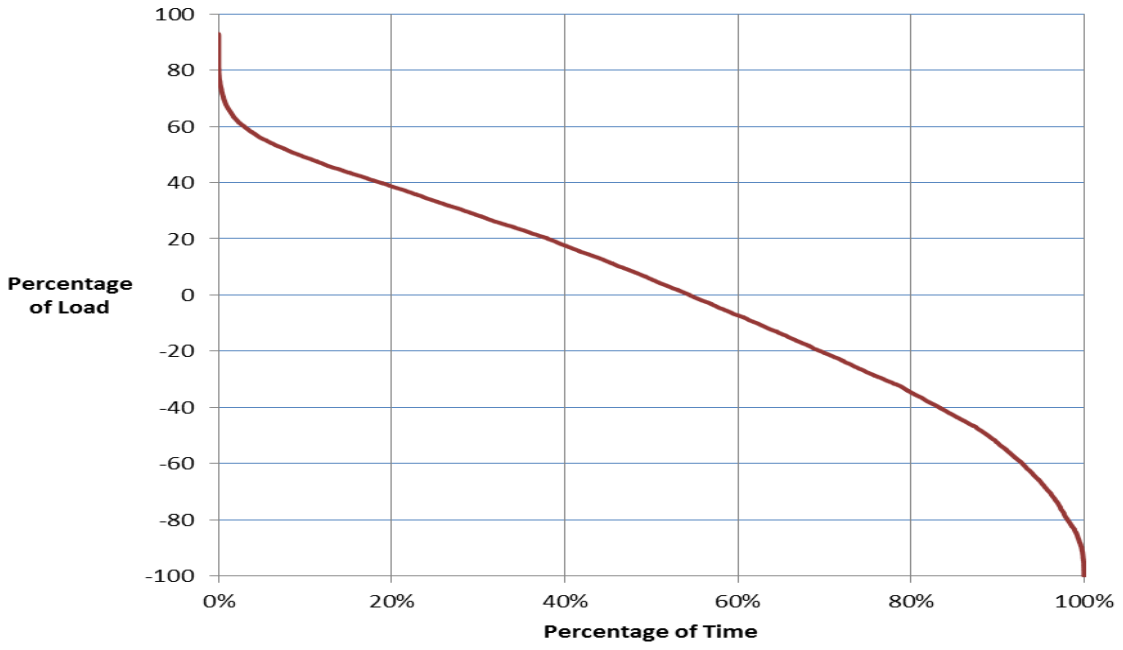

Figure 5: Lower Eyre Peninsula load duration curve: 2008/2009

3.3.2 Underlying load growth

Figure 6 shows the combined ETSA Utilities medium demand and direct connect customer forecasts for underlying load growth in the Lower Eyre Peninsula. This demand projection excludes any spot load increases associated with new customer developments.

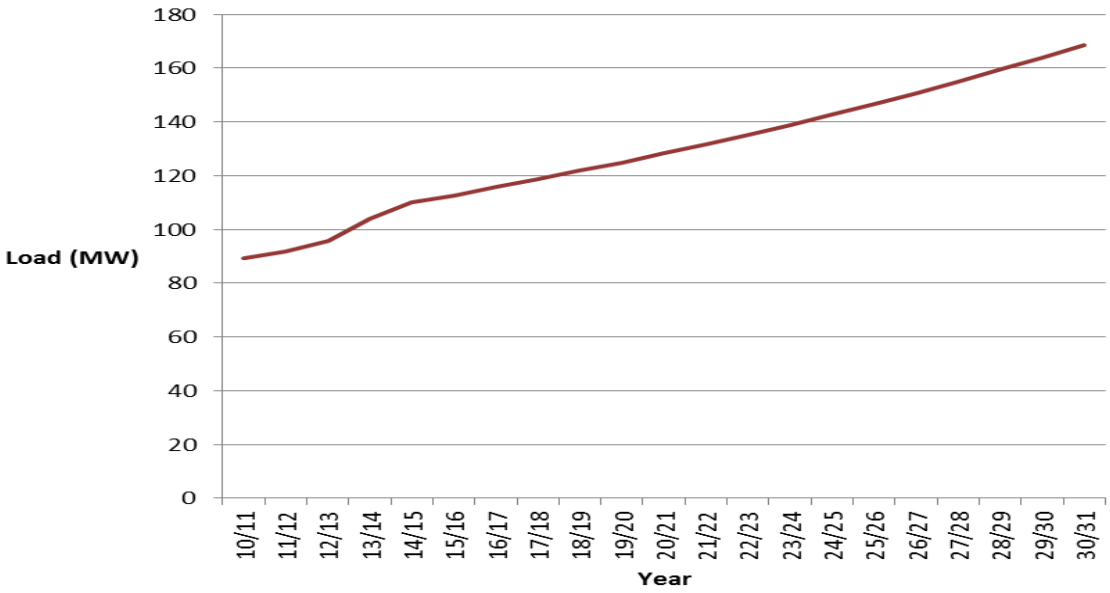

Figure 6: Lower Eyre Peninsula underlying load growth – Medium Demand Forecast

According to the ETSA Utilities and direct connect customer medium demand forecast, the average load growth rate for the Lower Eyre Peninsula (excluding Whyalla) over the next 20 years is 3.3% per year.

Under this underlying demand forecast, the existing generation at Port Lincoln will fail to meet the required Category 3 ETC reliability standard from 2013/14 for the outage of the existing transmission line. Specifically, the loss of the Yadnarie – Port Lincoln 132 kV transmission line disconnects the entire Port Lincoln load from the network. Under the medium demand forecast, by 2013/14 the load at Port Lincoln will be above the 49 MW contracted generator capacity threshold. This means that the Port Lincoln load may not be supported under N-1 line outage conditions from this date without some load remaining unrestored. This would violate the ETC requirements for the Port Lincoln connection point. The extent of this violation would increase where additional spot loads locate in the vicinity of Port Lincoln and connect to the ETSA Utilities distribution system.

In addition, under the ETC ElectraNet is required to have at least the ability to supply 100% of the contracted AMD with the loss of any transmission line or transformer. By 2018/19 the medium growth connection point forecast shows that the transformer capacity at Port Lincoln becomes insufficient to meet the anticipated load.[12]

3.3.3 Potential new spot loads

In addition to the network limitations discussed above in relation to the underlying medium demand forecast, the Lower Eyre Peninsula system has limited or no capacity to accommodate significant additional demand without augmentation. This is particularly the case at the extremities of the existing 132 kV transmission system, such as at Port Lincoln, which at present, would not be able to accommodate even moderate increases of load without some form of major augmentation. Specifically, step load increases above 5 MW

[12] By 2018/19 the generator connected to the 33 kV bus at Port Lincoln cannot be contracted to provide 'equivalent transformer capacity' as a single generating unit does not deliver sufficient reliability to meet the ETC standard.

due to new mining developments or other activities could not be accommodated by the existing network (including current network support).

ElectraNet has received a number of formal connection enquiries for new load in the Lower Eyre Peninsula, generally related to the development of major mineral resource deposits. These enquiries represent about 480 MW of additional load. These loads are seeking network connection from 2014 onwards.

ElectraNet is presently progressing these connection enquiries. These loads would connect in the vicinity of Wudinna, Yadnarie and between Yadnarie and Port Lincoln substations. These loads cannot be accommodated by the current network without new transmission infrastructure being developed on the Lower Eyre Peninsula south of Cultana, or substantial dispersed non-network alternatives. The mining developments under-pinning these new spot loads generally relate to resources that are expected to be subject to extraction over the medium to long-term.

At this stage, these developments are anticipated to become committed in the next twelve months; i.e. during the course of this RIT-T assessment. It is possible that not all of the current enquiries will lead to a committed project, and/or that the current expected timeframes will change. However it is also likely that new developments will emerge. ElectraNet notes that the enquiries received to date represent only some of the step change loads listed in the 2011 Resources and Energy Infrastructure Demand Study prepared for RESIC[13] and outlined in the State Government's Eyre and Western Region plan.[14] It therefore appears likely that there will be substantial new spot load development in the Lower Eyre Peninsula area going forward.

It is important to note that the spot loads would be 'flatter' in nature and would not follow the load profile of the existing load. Therefore higher average and peak loads would become the norm in this region, given the increased energy requirements.

Consideration of the potential for spot load developments allows for the order of magnitude of potential regional load to be better understood and must be considered when planning for the future electricity supply needs of the Lower Eyre Peninsula. However it is also important to recognise the uncertainty in relation to both the magnitude and timing of future spot load development, and to ensure that proposed solutions provide sufficient flexibility to adequately address this uncertainty.

ElectraNet has received five formal connection enquires to date, covering six separate spot load developments.[15] These formal enquiries have been made subsequent to the earlier Eyre Peninsula Reinforcement Study reported in the 2011 APR. The proposed locations, timing and magnitude of these loads are set out in the following table, in order of their indicative timing.

[13] Appendix G p.1.
[14] pp. 29-30, 37-38, 49 and 64
[15] One of the connection enquiries received relates to two separate spot load developments.

Table 2: Connection enquires received for major new spot loads in the Lower Eyre Peninsula

Location	Requested timing	Indicative load (MW)
Port Spencer (approx. 20 km north of Tumby Bay	2014[16] 2014/15	5 25
Koppio (approx. 45 km north of Port Lincoln)	2014/15	70
Central Eyre Iron Project (approx. 35 km southeast of Wudinna)	2015	235
Central Eyre Iron Project (loads in Yadnarie area)	2015	25
Bungalow (approx. 15 km north east of Mt Millar)	2016/17	70
Carrow (approx. 45 km south of Yadnarie)	2016/17	50

If any (or all) of these connection enquiries were to proceed to committed status, these loads would be beyond the capability of the existing 132 kV transmission system on the Lower Eyre Peninsula. In addition to these formal enquiries, ElectraNet has continued to receive informal connection enquiries for the Lower Eyre Peninsula.

Based on studies carried out by the South Australian Government on potential economic expansion in the Eyre Peninsula, it appears possible that the current load in the region could eventually grow by over 900 MW, with 600 MW of this load requiring supply south of Cultana. Increases of this magnitude would be beyond the capability of the 275 kV transmission lines between Davenport and Cultana, requiring further investment at that time. Given the potential for future load growth of this magnitude, it is important that the solution adopted for the current identified need in the Lower Eyre Peninsula is compatible with potential further expansion of capacity in the future.

3.3.4 Future load scenarios

The 2011 APR published results from a preliminary Lower Eyre Peninsula Reinforcement Study carried out by ElectraNet to investigate the network development options that would cater for additional spot load connections to the transmission network. The load scenarios considered in that study were based on informal enquiries received by ElectraNet at that time.

Since publishing the APR, ElectraNet has received five formal connection enquiries from new mining-related loads. The load scenarios considered by ElectraNet in identifying the identified need for this investment are set out in Table 3 below, and reflect variations around the spot load demands, timings and locations from these connection enquiries.

[16] The existing transmission network has sufficient capacity to serve the initial construction demand of up to 5 MW.

Table 3: Load scenarios considered in identifying the identified need

Load Scenario	Description
1	ETSA Utilities medium demand forecast, as published in ElectraNet's 2011 APR
2	ETSA Utilities medium demand forecast for all connection points except Port Lincoln, where ETSA Utilities high demand forecast is used. Plus: 100 MW of spot loads (Port Spencer – 5 MW (2014), 25 MW (2014/15) and Koppio - 70 MW (2014/15)). These spot loads reflect two of the five formal connection enquiries received to date.
3	Scenario 2 plus additional spot loads at: Wudinna – 235 MW (2015), Yadnarie – 25 MW (2015), Bungalow – 70 MW (2016/17) and Carrow – 50 MW (2016/17)). This scenario reflects all five of the formal connection enquiries received by ElectraNet to date (i.e. a total of 480 MW additional spot loads)
4	Scenario 3 plus 50% of potential additional spot loads (based on additional informal enquiries). Overall the spot loads included in scenario 4 total 530 MW.

Table 4 sets out the total MW load forecast for each year (as a result of both underlying demand growth and new spot loads), under each of the four load scenarios described in the above table. A breakdown of this total MW load into the load at Port Lincoln, Yadnarie and Wudinna areas is set out in Appendix C, for each of the four load scenarios.

Table 4: Total demand under each load scenario (MW)

Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2010/ 11	89	90	90	90
2011/ 12	92	93	93	93
2012/ 13	96	97	97	97
2013/ 14	104	106	106	106
2014/ 15	110	118	118	118
2015/ 16	113	216	476	476
2016/ 17	116	219	599	629
2017/ 18	119	223	603	649
2018/ 19	122	227	607	653
2019/ 20	125	231	611	662
2020/ 21	128	235	615	666
2021/ 22	132	239	619	670
2022/ 23	135	244	624	675
2023/ 24	139	248	628	679
2024/ 25	143	253	633	684

Year	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2025/ 26	147	258	638	689
2026/ 27	151	264	644	695
2027 / 28	155	269	649	700
2028 / 29	159	275	655	706
2029 / 30	164	281	661	712
2030 / 31	169	288	668	719

It is likely that these load scenarios, or some variant of them, will also form the basis of the 'reasonable scenarios' used in the RIT-T assessment. However ElectraNet may revise the load scenarios for the RIT-T analysis to reflect any additional information which becomes available in the period prior to publication of the Project Assessment Draft Report (PADR).

ElectraNet currently considers that scenario 3 is likely to form the 'central load scenario' for the RIT-T analysis, as it reflects the formal connection enquires which are currently being progressed and which can therefore be considered as 'anticipated projects'. However ElectraNet also intends to include in the RIT-T assessment a scenario with higher spot load growth (such as scenario 4 described above) and a scenario in which spot load growth is lower and/or delayed (such as scenario 2). ElectraNet currently anticipates that one or more of the spot loads will become committed during the timeframe of this RIT-T. If this turns out to be the case, then scenario 1 (which does not have any spot loads) will no longer be a relevant scenario for inclusion in the RIT-T analysis.

The RIT-T requires ElectraNet to calculate the market benefit of alternative credible options across different reasonable scenarios. The outcome of the NPV assessment across all of the reasonable scenarios considered is weighted by the estimated probability of that scenario occurring (in line with paragraph (4)(a) of the RIT-T), in order to calculate the overall market benefit of each credible option. ElectraNet will then also consider the cost of each option in order to identify the credible option which has the highest net market benefit, and therefore satisfies the RIT-T.

3.4 Condition of 132 kV transmission lines

The NER does not require the RIT-T to be applied to expenditure on replacing or maintaining assets, where that expenditure is not intended to augment the transmission network.[17] However the need to replace the Whyalla – Yadnarie – Port Lincoln transmission lines in the near future, as a result of their condition, is a factor which must be taken into account in developing solutions to address the network limitations identified in the Lower Eyre Peninsula.

The Whyalla – Yadnarie – Port Lincoln transmission lines are now over 45 years old and are in poor condition. They were originally constructed with a thermal rating based on 49°C (120°F) and were partially uprated in 1998, to rectify specific under-clearance spans. In 2008 the entire line lengths were uprated to 65°C (Whyalla – Middleback) and to 60°C (Middleback – Yadnarie – Port Lincoln), to continue to meet the increasing demand in the area.

[17] NER 5.6.5C(3).

These line up-ratings have now exhausted the possible options for further thermal capacity increases on these lines, as a means of meeting additional demand. Additionally, condition assessment studies have been undertaken and have reported that conductor corrosion, strand breakage and other damage from vibration have been commonplace since early in the life of the line. Condition assessment commissioned by ElectraNet has recommended that the conductor, earth wire and towers (especially south of Middleback) be replaced prior to 2020, with many sections needing to be replaced prior to 2015. The extent and detailed timing of this requirement is subject to further investigation. ElectraNet notes that replacing the asset would require entirely new parallel line sections to be constructed and then cut over, due to the radial nature of this network and the need to maintain supply to loads under the ETC.

ElectraNet will be conducting on-going assessment and analysis in order to manage these assets prior to replacement.

3.5 The technical characteristics that a non-network option would be required to deliver

This section describes the technical characteristics that a non-network option would need to deliver in order to address the identified need.

As outlined in section 3.1, the identified need in relation to the Lower Eyre Peninsula comprises:

- Insufficient electricity network infrastructure and generation network support to meet ETC reliability standards at Port Lincoln from 2013/14 onwards; and
- Insufficient electricity infrastructure to meet future forecast load (both with and without potential spot load developments) throughout the Lower Eyre Peninsula.

3.5.1 Near-term requirements

Non-network providers could participate in the overall solution by reducing the loading on the existing Cultana – Middleback – Yadnarie – Port Lincoln 132 kV transmission lines to within their thermal ratings, under system normal and contingency conditions. This would assist in meeting the ETC reliability standards at Port Lincoln, particularly prior to the time by which a longer-term solution could be put in place to meet the overall increase in demand in the Lower Eyre Peninsula.

Table 5 shows the number of MW required to be supplied by new generation or to be supported by Demand Management (DM) at Port Lincoln, in the absence of any new step loads, in order to meet the identified network limitations discussed in section 3.1. Under scenario 1, the quantity rises from 1.4 MW in 2013/14 to 5.6 MW by 2015/16 (the earliest commissioning date for the network options discussed in section 4.1).

Table 5: Non-network requirements: Scenario 1 (MW)

Year	PORT LINCOLN AREA
2013/ 14	1.4
2014/ 15	3.5
2015/ 16	5.6

Year	PORT LINCOLN AREA
2016/ 17	7.9
2017/ 18	10
2018/ 19	13
2019/ 20	15
2020/ 21	18
2021/ 22	21
2022/ 23	24
2023/ 24	27
2024/ 25	30
2025/ 26	33
2026/ 27	36
2027/ 28	40
2028/ 29	43
2029/ 30	47
2030/ 31	51

The information in Table 5 can be used as an indication for generation developers and DM proponents to propose specific generation/DM development options in relation to addressing the ETC reliability standards at Port Lincoln. ElectraNet has also engaged a consultant to investigate the availability of DM options which may help in meeting the near-term identified need. ElectraNet intends to use information provided by non-network proponents in response to this PSCR as well as the findings of this consultancy, in the assessment of options for the PADR.

Proposed services must be capable of reliably meeting electricity demand under a range of conditions and, if a generator, must meet all the relevant NER and ETC requirements related to grid connection. Non-network proponents should become familiar with the specific requirements of each connection point and other reliability requirements as set out in the ETC[18].

ElectraNet has obligations under the ETC and NER to ensure supply reliability is maintained for customers. Failure to meet these obligations may give rise to liability. A proponent of a proposed network support service must also be willing to accept any liability that may arise from its contribution to a reliability supply failure.

3.5.2 Medium to long-term requirements

In the medium to longer term, new generation/DM located in the vicinity of Port Lincoln, Yadnarie and Wudinna, and potentially between Port Lincoln and Yadnarie, would assist in enabling the network to continue to meet future load growth.

The estimated magnitude of support required, and approximate locations, is set out in Table 5 to Table 8, and can be characterised by:

[18] The Electricity Transmission Code is available at http://www.escosa.sa.gov.au/library/110628-ElectricityTransmissionCode_ETC06.pdf

- In a scenario where there are no spot loads (scenario 1, Table 5), the required reduction or support is 18 MW by 2020/21 and 51 MW by 2030/31; or
- In scenarios where there are step loads, the required reduction or support amounts may be in the region of 364 MW in 2015/16 rising to 489 MW in 2016/17 (under load scenario 3, Table 7).

The information in Table 5 to Table 8 can be used as an indication for generation developers and DM proponents to propose specific generation/DM development options in relation to the Lower Eyre Peninsula.

ElectraNet notes that where sufficient non-network capability was available to address the identified need in relation to meeting future demand growth, that there would continue to be a need to replace the current network infrastructure in order to address asset condition concerns (as discussed in section 3.4).

Table 6: Non-network requirements: Scenario 2 (MW)

Year	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA
2013/ 14	3	0	0
2014/ 15	6	0	0
2015/ 16	79	25	0
2016/ 17	82	26	0
2017/ 18	85	26	0
2018/ 19	88	26	0
2019/ 20	91	27	0
2020/ 21	94	27	0
2021/ 22	98	27	0
2022/ 23	102	28	0
2023/ 24	106	28	0
2024/ 25	110	29	0
2025/ 26	115	29	0
2026/ 27	119	30	0
2027/ 28	124	30	0
2028/ 29	129	30	0
2029/ 30	134	31	0
2030/ 31	140	31	0

Table 7: Non-network requirements: Scenario 3 (MW)

Year	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA
2013/ 14	3	0	0
2014/ 15	6	0	0

Year	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA
2015/ 16	79	50	235
2016/ 17	82	171	236
2017/ 18	85	171	236
2018/ 19	88	171	236
2019/ 20	91	172	236
2020/ 21	94	172	237
2021/ 22	98	172	237
2022/ 23	102	173	237
2023/ 24	102	173	237
2024/ 25	110	174	238
2025/ 26	115	174	238
2026/ 27	119	175	238
2027/ 28	124	175	239
2028/ 29	129	175	239
2029/ 30	134	176	239
2030/ 31	140	176	240

Table 8: Non-network requirements: Scenario 4 (MW)

Year	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA
2013/ 14	3	0	0
2014/ 15	6	0	0
2015/ 16	79	50	235
2016/ 17	87	196	236
2017/ 18	95	202	241
2018/ 19	98	202	241
2019/ 20	106	203	241
2020/ 21	109	203	242
2021/ 22	113	203	242
2022/ 23	117	204	242
2023/ 24	121	204	242
2024/ 25	125	205	243
2025/ 26	130	205	243
2026/ 27	134	206	243
2027/ 28	139	206	244
2028/ 29	144	206	244
2029/ 30	149	207	244

Year	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA
2030/ 31	155	207	245

3.6 Requirement to apply the RIT-T

ElectraNet is required to apply the RIT-T to this investment, as none of the exemptions listed in NER 5.6.5C(a) apply.

ElectraNet has classified this project as a reliability corrective action because:

- The existing network plus the current generation support at Port Lincoln will not be able to provide the required level of reliability under the ETC for Port Lincoln from 2013/14; and
- The existing 132 kV transmission network is not expected to be able to meet demand from the existing load from 2018/19 (under the medium demand forecast), or to meet any of the additional, anticipated step-loads in the Lower Eyre Peninsula.

Failure to address the limitations described above will cause violations in ElectraNet's ETC reliability responsibilities at Port Lincoln, Yadnarie, Wudinna and Middleback connection points.

ElectraNet notes that any investment to relieve the above network limitations is also expected to have an impact on the amount and total of wind generation in the Lower Eyre Peninsula. ElectraNet has previously identified network limitations which currently constrain the output of the existing wind farms at Cathedral Rocks and Mt Millar,[19] and which limit incentives for additional wind generation to locate in the Lower Eyre Peninsula.[20]

The market benefits associated with any additional development of wind generation in the region will be incorporated into the RIT-T assessment, in accordance with the NER. The classification of this RIT-T assessment as one which is driven by reliability corrective action does not therefore mean that market benefits associated with addition wind generation will not be taken into account in applying the RIT-T.

This project has not been foreshadowed in the National Transmission Network Development Plan as it does not play a part in the main transmission flow paths between the NEM regions.

[19] 2011 ElectraNet APR, p. 121.
[20] 2011 ElectraNet APR, p. 123.

4. Potential credible options to address the Identified Need

This section sets out the known credible options considered to be capable of addressing the identified need.

Clause 5.6.6(c)(5) of the NER requires the PSCR to include "a description of all credible options of which the Transmission Network Service Provider is aware that address the identified need, which may include, without limitation, alternative transmission options, interconnectors, generation, demand side management, market network services or other network options".

Other options which ElectraNet considered but has decided not to pursue are also described along with the reasons for not pursuing them.

The term credible option is described in 5.6.5D(a) of the Rules as an option (or groups of options) that:

1. Addresses the identified need;
2. Is (or are) commercially and technically feasible; and
3. Can be implemented in sufficient time to meet the identified need.

In identifying credible options for the limitations described in Section 3 of this report, ElectraNet is required to consider, in addition to the NER, its obligations under the ETC. In particular the ETC requires ElectraNet to plan, develop and operate the transmission network such that there will be no requirements to shed load under normal and reasonably foreseeable operating conditions[21].

The credible options presented here all represent an overall investment strategy, which can be varied and expanded in response to new spot loads, or to changes in the timing of spot loads. As a result, the options exhibit the flexibility required to deal with the uncertainty in relation to the timing and extent of new spot load development on the Lower Eyre Peninsula.

4.1 Transmission options

The two credible network options discussed below can be broadly characterised as:

- A 275 kV double-circuit transmission line solution; and
- A 275 kV double-circuit transmission line solution initially operated at 132 kV.

ElectraNet notes that the lead-time for investment required under both of these options means that they are unlikely to be sufficient to address the risk of violation of the ETC standard in the Port Lincoln area in the early part of the period. ElectraNet therefore expects that these options would also incorporate an additional generation/DM component in order to address compliance with the ETC requirement at Port Lincoln. The requirements that a non-network option would need to meet in order to address this identified need were discussed earlier in section 3.5.1.

[21] Electricity Transmission Code, ET/06 2011, p2.

The following sections set out only the high level components of each option. It is expected that additional components (such as reactive support) will be required. The more detailed aspects of each of these network options will be further developed during the next phase of the assessment, and prior to release of the PADR.

4.1.1 Option 1: 275 kV double circuit transmission line from Cultana to Port Lincoln North

Under this option a double circuit (1,000 MVA, N-1) 275 kV transmission line is constructed between Cultana and Yadnarie with the establishing of a 275/132 kV substation at Yadnarie. Under scenario 1 a double circuit (600 MVA, N-1) 275 kV transmission line is constructed between Cultana and Yadnarie due to lower projected loads.

Further a double circuit (600 MVA, N-1) 275 kV transmission line is constructed between Yadnarie and Port Lincoln North, establishing a 275/132 kV substation at Port Lincoln North (in the proximity of Koppio) and connecting the existing Port Lincoln substation by way of a double circuit 132 kV line. This option replaces the existing Middleback – Yadnarie – Port Lincoln 132 kV single circuit transmission line on a new easement.

As the additional anticipated loads request connection, new substations and transmission lines would be constructed. Specifically:

- A new spot load located at Carrow or Port Spencer would require the addition of a new 275/132 kV substation at Carrow
- A new spot load located near Wudinna would require both (i) the construction of a new 275 kV transmission line from Yadnarie sub-station to a new Wudinna East substation, (ii) the construction of a new 275/132 kV substation to the east of Wudinna and (iii) connecting the Wudinna East and Wudinna substations by way of a 132 kV transmission line.

This option is depicted in Figure 7 below. The timings and cost of each of the elements of the Option 1 investment strategy under the four load scenarios is summarised in Table 9.

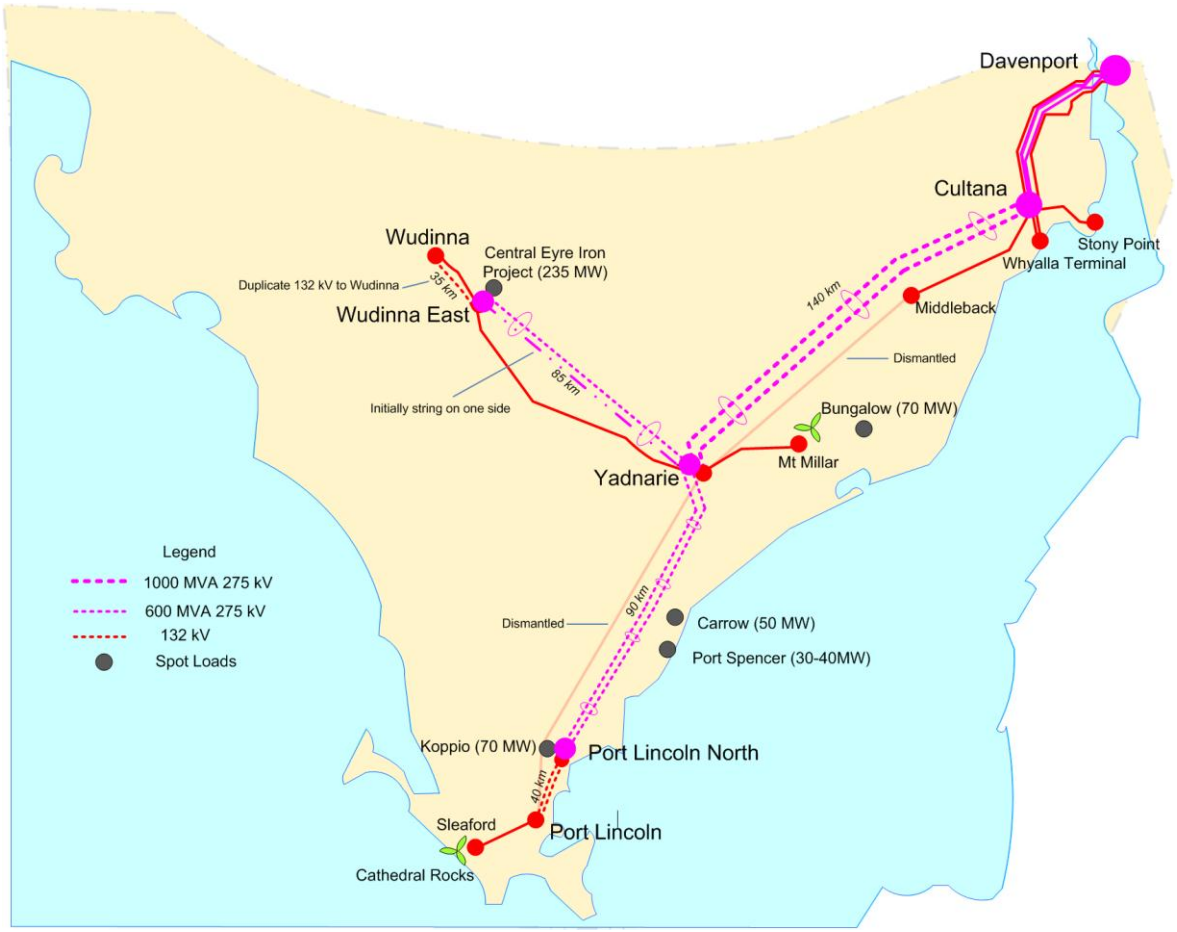

Figure 7: Option 1: 275 kV transmission solution

In all of these variants, the construction of the new double circuit 275 kV transmission line from Cultana to Yadnarie to Port Lincoln North also addresses the condition concerns in relation to the existing line, and replaces this line without a disruption to supply. Also, the rebuilding of the 132 kV transmission line from Cultana – Middleback (approximately 50 km) in 2022/23 would be required under all variants in order to address condition concerns; alternatively a new 275/132 kV substation could be created around Middleback.

Table 9: Timing and costs of Option 1 under each load scenario

Technical Characteristics of Option 1	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)
Approximate construction time in years	3		2		3		3	
Non-network solution to maintain Port Lincoln ETC reliability	2014	TBD	2014	TBD	2014	TBD	2014	TBD
Construction of a new double circuit (600 MVA N-1) 275 kV transmission line from the Cultana to Yadnarie Substations (approximately 140km) as well as a new 275/132 kV substation at Yadnarie	2018/19	335						
Construction of a new double circuit, high capacity (1,000 MVA N-1), twin conductor 275 kV transmission line from the Cultana to Yadnarie Substations (approximately 140km) as well as a new 275/132 kV substation at Yadnarie			2015/16	375	2015/16	375	2015/16	375
Construction of a new double circuit (600 MVA, N-1) 275 kV transmission line from the Yadnarie to Port Lincoln North Substations (approximately 90km), a new 275/132 kV substation at Port Lincoln North and a new double circuit (200 MVA, N-1) 132 kV transmission line from the Port Lincoln North to Port Lincoln Substations (approximately 40km)	2018/19	260	2015/16	260	2015/16	260	2015/16	260
Construction of new 275/132 kV substation at Carrow (between Yadnarie and Port Lincoln North), portion of works will be negotiated					2016/17	55	2016/17	55

Technical Characteristics of Option 1	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)	Estimated year of commissioning	Estimated cost ($m)
Rebuild Port Lincoln 132/33 kV substation with 2 x 120 MVA transformers	2018/19	40	2018/19	40	2018/19	40	2018/19	40
Construction of a new double circuit, strung on one side only (600 MVA) 275 kV transmission line from the Yadnarie to Wudinna East Substations (approximately 85km), a new 275/132 kV substation at Wudinna East and a new 132 kV transmission line from the Wudinna East to Wudinna Substations (approximately 35km)					2015/16	180	2015/16	180
TOTAL ($ 2011/12)		**635**		**675**		**910**		**910**

4.1.2 Option 2: 275 kV double circuit transmission line from Cultana to Port Lincoln North, operated initially at 132 kV

Under this option a double circuit 275 kV transmission line is constructed between Cultana and Port Lincoln North and initially energised to 132 kV. This option replaces the existing Cultana – Yadnarie – Port Lincoln 132 kV single circuit transmission line on a new easement. The rebuilding of the 132 kV transmission line from Cultana – Middleback (approximately 50 km) in 2022/23 would be required under this option in order to address condition concerns; alternatively a new 132 kV substation could be created around Middleback.

As the additional anticipated loads request connection, new substations and transmission lines would be constructed (as for Option 1) and the line would also be energised to 275 kV.

This option has the same layout as shown in Figure 7.

The timings and cost of each of these elements of the Option 2 investment strategy would differ under scenarios 1 and 2 from that proposed for Option 1. Specifically:

- Initially for scenario 1 no 275/132 kV substations would be established at Yadnarie and Port Lincoln North, resulting in a reduction of initial capital investment of about $100million.
- Initially for scenario 2 no 275/132 kV substation would be established at Port Lincoln North, resulting in a reduction of initial capital investment of about $55million.

For scenarios 3 and 4, the timings and cost of each element of Option 2 would be the same as Option 1, i.e. the increase in spot load under these scenarios would mean that the line between Cultana and Port Lincoln North would need to be energised as 275 kV as soon as it was commissioned.

4.2 Non-network options

Section 3.5 sets out the technical characteristics that a non-network option would be required to deliver. ElectraNet notes that non-network options could particularly assist in addressing the near-term requirement in meeting the ETC standard at Port Lincoln.

Non-network options to meet the near-term requirements (set out in section 3.5.1) could include demand side response or additional generation support at Port Lincoln.

Non-network options to meet the medium to long-term requirements (set out in section 3.5.2) could include on-site generation at multiple mine sites. Demand side response is unlikely to be commercially or technically feasible given the scale of the load requirements.

No specific non-network options have been identified by ElectraNet at this stage. ElectraNet is seeking responses from potential proponents of non-network options to this PSCR. ElectraNet has also engaged a consultant to investigate the availability of DM options which may help in meeting the near-term identified need.

4.3 Options considered but not progressed

The preliminary Lower Eyre Peninsula Reinforcement Study identified and studied eight transmission network options, which can be broadly categorised as follows:

- 132 kV radial solutions with generator support;
- 132 kV and 275 kV double circuit solutions; and
- Diverse 132 kV and 275 kV single circuit solutions.

The 132 kV radial and diverse 132 kV and 275 kV single circuit transmission options are discussed below, as options which ElectraNet has considered but decided not to pursue. ElectraNet considers that the 132 kV voltage level is no longer adequate to meet the medium to longer term needs of the Lower Eyre Peninsula, given the distances and expected increases in spot load involved and the connection enquires which have been received since the release of the earlier study. A 132 kV radial solution, or a double-circuit solution involving 132 kV lines are therefore no longer considered to represent options which are technically feasible.

ElectraNet also examined single circuit 275 kV options (which include rebuilding the existing transmission line to 275 kV) and has dismissed these as not technically feasible given the time constraints of the spot load increases.

Options that will not be taken through to the next stage of analysis are discussed below.

4.3.1 132 kV radial transmission line from Cultana to Port Lincoln

ElectraNet investigated options of replacing the existing 132 kV transmission line with a single circuit 132 kV transmission line. Under both options considered, increasing levels of generation support are needed to maintain the ETC reliability standards under the medium demand forecast (scenario 1).

The option of a 132 kV radial rebuild on the existing easement is not commercially viable as it requires the diesel generators to be providing full N-1 power supply during the construction of the new line, in the absence of the existing line.

Building a single 132 kV radial transmission line on a new easement and decommissioning the existing line would only be technically and commercially feasible under scenario 1, with additional generators at Port Lincoln to maintain the N-1 reliability of ETC Category 3. Under all other demand scenarios with additional anticipated spot loads (i.e. scenarios 2 to 4 described earlier), the 132 kV transmission line is inadequate to provide the level of energy required and additional 275 kV transmission lines are required to be built. This would cause sections of the new 132 kV transmission line to become redundant. ElectraNet believes that this option is therefore not technically or commercially feasible.

4.3.2 Multiple single circuit options

ElectraNet considered three options relating to building multiple single circuit transmission lines on separate easements, rather than building double circuit transmission lines.

ElectraNet considered an option which involved building a new 132 kV single circuit transmission line on a new easement and rebuilding the existing 132 kV transmission line. The current generator support arrangements would continue and increase with load growth

to provide the N-1 capability under outage conditions until the second 132 kV circuit has been commissioned.

This option had a lower initial capital cost than double circuit options but higher ongoing costs and would only be technically and commercially feasible under scenario 1. Under load scenarios which include additional anticipated spot loads (i.e. scenarios 2 to 4 described earlier), the 132 kV transmission lines are inadequate to provide the level of energy required and additional 275 kV transmission lines are required. This would cause the new 132 kV transmission line to become redundant. ElectraNet believes that this option is therefore not technically or commercially feasible.

ElectraNet also considered two options which involved building new 275 kV single circuits (which for one option was energised initially to 132 kV) and rebuilding the existing 132 kV transmission line as a 275 kV single circuit. These options do not provide N-1 capability after initial commissioning and require generation support during the construction of the second 275 kV single circuit.

These options had a marginally lower initial capital cost than double circuit options and would be technically and commercially feasible under scenario 1. However ElectraNet believes that the second circuits could not be constructed in the timeframes required under scenarios 2-4, to meet the initial spot loads. It would take longer to build two single lines on separate easements than it would to build one double-circuit line. Moreover the higher overall cost of these options compared with the double circuit options considered placed them low down in the rankings. ElectraNet therefore considers that these options are not technically and commercially feasible.

4.4 Material inter-regional impact

In accordance with NER 5.6.6(c)(6)(ii), ElectraNet has considered whether any of the credible options above are expected to have a material interregional impact. ElectraNet considers this to be the same as a material inter-network impact, which is defined in the NER as:

'A material impact on another Transmission Network Service Provider's network, which may include (without limitation): (a) the imposition of power transfer constraints within another Transmission Network Service Provider's network; or (b) an adverse impact on the quality of supply in another Transmission Network Service Provider's network.

AEMO currently defines the criteria for material inter-network impact. AEMO's suggested screening test for whether or not a transmission augmentation has a material inter-network impact is that it satisfies the following:[22]

- A decrease in power transfer capability between the transmission networks or in another TNSP's network of no more than the minimum of 3% of the maximum transfer capability and 50 MW;
- An increase in power transfer capability between transmission networks of no more than the minimum of 3% of the maximum transfer capability and 50 MW;
- An increase in fault level by less than 10 MVA at any substation in another TNSP's network; and

[22] The screening test is set out in Appendix 3 of the IRPC's Final Determination: Criteria for Assessing Material Inter-Network Impact of Transmission Augmentations, Version 1.3, October 2004.

- The investment does not involve either a series capacitor or modification in the vicinity of an existing series capacitor.

ElectraNet notes that none of the credible options set out in this Report involve either a series capacitor or modification in the vicinity of an existing series capacitor. None of the credible options discussed above are expected to result in change in power transfer capability between South Australia and neighbouring transmission networks. In addition fault levels are not expected to increase by more than 10 MVA at any substation in another TNSP's network.

As a consequence, by reference to AEMO's screening criteria, there are no material inter-network impacts associated with any of the credible options.

5. Materiality of market benefits for this RIT-T assessment

The NER requires that all categories of market benefit identified in relation to the RIT-T are included in the RIT-T assessment, unless the TNSP can demonstrate that a specific category (or categories) is unlikely to be material in relation to the RIT-T assessment for a specific option.

Under NER 5.6.6(c)(6)(iii), the PSCR should set out the classes of market benefit that the TNSP considers are not likely to be material for a particular RIT-T assessment. The classes of benefit that must be considered under the RIT-T are:[23]

- Changes in fuel consumption arising through different patterns of generation dispatch
- Changes in voluntary load curtailment
- Changes in involuntary load shedding
- Changes in costs for parties, other than for ElectraNet due to: (i) differences in the timing of new plant, (ii) differences in capital costs; and (iii) differences in the operational and maintenance costs
- Differences in the timing of transmission investment
- Changes in network losses
- Changes in ancillary services costs
- Competition benefits
- Any additional option value (where this value has not already been included in the other classes of market benefits) gained or foregone from implementing that credible option
- Negative of any penalty paid or payable for not meeting the renewable energy target
- Other classes of market benefits that are determined to be relevant by the Transmission Network Service Provider and agreed to by the AER (in writing).

At this stage of the consultation, ElectraNet considers that only changes in ancillary services are not a material class of market benefit for this RIT-T assessment. The reasons for this conclusion are set out in section 5.1.

ElectraNet notes that since this investment is a reliability corrective action, quantification of the market benefit associated with changes in voluntary load curtailment and changes in involuntary load shedding will only apply in so far as the market benefit delivered exceeds the minimum standard required for reliability corrective action.[24]

5.1 Changes in ancillary services costs

The cost of frequency control ancillary services (FCAS) may increase as a consequence of any increase in the installed capacity or output of wind generation resulting from the network investment options being considered for the Lower Eyre Peninsula. However

[23] AER, Regulatory Investment Test for Transmission, June 2010, clause (5).
[24] AER, Regulatory Investment Test for Transmission, June 2010, clause (9).

FCAS costs are relatively small compared to total market costs, and so are not likely to be material in the selection of the preferred option under the RIT-T.

Inclusion of all, or some, of the FCAS markets as part of the market modelling under the RIT-T would lead to a substantial increase in the complexity and cost of the RIT-T assessment. Such increased complexity is not warranted given that changes in FCAS costs will not have a role in determining the preferred option for this RIT-T assessment.

There is no expected change to the costs of Network Control Ancillary Services (NCAS) and System Restart Ancillary Services (SRAS) as a result of the options being considered. Therefore these costs are considered not material in the assessment of a preferred option in this RIT-T assessment.

6. Identifying the preferred option

Under NER 5.6.5B(b), the purpose of the RIT-T is to identify the credible option which maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the National Electricity Market, compared to all other credible options (i.e. the preferred option). Where the identified need is for reliability corrective action, a preferred option may have a negative net economic benefit.

Under the RIT-T, the identification of the preferred option is determined by:

- calculating the present value of the probability weighted market benefit for each credible option across each relevant reasonable scenario, *minus*
- the calculated present value of the probability weighted costs of each credible option, across relevant cost assumptions.

Guidance on the process for determining the preferred option is set out in the AER's Regulatory Investment Test for Transmission Application Guidelines (June 2010)[25]. Additional guidance is provided in Grid Australia's RIT-T Cost Benefit Analysis handbook[26].

[25] Section 3.7
[26] Chapter 8

Lower Eyre Peninsula Reinforcement

Appendices

February 2012

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Appendix A Definitions

Applicable regulatory instruments	All laws, regulations, orders, licences, codes, determinations and other regulatory instruments (other than the Rules) which apply to Registered Participants from time to time, including those applicable in each participating jurisdiction as listed below, to the extent that they regulate or contain terms and conditions relating to access to a network, connection to a network, the provision of network services, network service price or augmentation of a network. A comprehensive list of applicable regulatory instruments is provided in the NER, with this reproduced for the relevant states in section 2.1 above.
AEMO	Australian Energy Market Operator
Base case	A situation in which no option is implemented by, on behalf of the transmission network service provider.
Commercially feasible	An option is commercially feasible under clause 5.6.5D(a)(2) of the Electricity Rules if a reasonable and objective operator, acting rationally in accordance with the requirements of the RIT-T, would be prepared to develop or provide the option in isolation of any substitute options. This is taken to be synonymous with 'economically feasible'.
Costs	Costs are the present value of the direct costs of a credible option.
Credible option	A credible option is an option (or group of options) that: (1) address the identified need; (2) is (or are) commercially and technically feasible; and (3) can be implemented in sufficient time to meet the identified need.
Economically feasible	An option is likely to be economically feasible where its estimated costs are comparable to other credible options which address the identified need. One important exception to this general guidance applies where it is expected that a credible option or options are likely to deliver materially higher market benefits. In these circumstances the option may be "economically feasible" despite the higher expected cost. This is taken to be synonymous with 'commercially feasible'.
Identified need	The reason why the Transmission Network Service Provider proposes that a particular investment be undertaken in respect of its transmission network.
Market benefit	Market benefit must be: (a) the present value of the benefits of a credible option calculated by: (ii) comparing, for each relevant reasonable scenario: (A) the state of the world with the credible option in place to (B) the state of the world in the base case, And (ii) weighting the benefits derived in sub-paragraph (i) by the probability of each relevant reasonable scenario occurring. (b) a benefit to those who consume, produce and transport electricity in the market, that is, the change in producer plus consumer surplus.

Net economic benefit	Net economic benefit equals the market benefit less costs.
Preferred option	The preferred option is the credible option that maximises the net economic benefit to all those who produce, consume and transport electricity in the market compared to all other credible options. Where the identified need is for reliability corrective action, a preferred option may have a negative net economic benefit (that is, a net economic cost).
Reasonable scenario	Reasonable scenario means a set of variables or parameters that are not expected to change across each of the credible options or the base case.
Reliability corrective action	Investment by a Transmission Network Service Provider in respect of its transmission network for the purpose of meeting the service standards linked to the technical requirements of schedule 5.1 or in applicable regulatory instruments and which may consist of network or non-network options.

Appendix B Checklist of compliance clauses

This section sets out a compliance checklist which demonstrates the compliance of the RIT-T with the requirements of clauses 5.6.6(c) [and 5.6.6(y)] of the NER version 46.

NER Clause	Rule	Section
5.6.6(c)	A Transmission Network Service Provider must prepare a report (the project specification consultation report), which must include:	
	1. a description of the identified need;	3.1
	2. the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the Transmission Network Service Provider considers reliability corrective action is necessary);	3.2, 3.3
	3. the technical characteristics of the identified need that a non-network option would be required to deliver, such as:	
	(i) the size of load reduction or additional supply;	
	(ii) location; and	
	(iii) operating profile;	3.5
	4. if applicable, reference to any discussion on the description of the identified need or the credible options in respect of that identified need in the most recent National Transmission Network Development Plan;	N/A
	5. a description of all credible options of which the Transmission Network Service Provider is aware that address the identified need, which may include, without limitation, alternative transmission options, interconnectors, generation, demand side management, market network services or other network options;	4.1 4.2
	6. for each credible option identified in accordance with subparagraph (5), information about:	
	(i) the technical characteristics of the credible option;	4.1 4.2
	(ii) whether the credible option is reasonably likely to have a material inter-regional impact;	4.4
	(iii) the classes of market benefits that the Transmission Network Service Provider considers are likely not to be material in accordance with clause 5.6.5B(c)(6), together with reasons of why the Transmission Network Service Provider considers that these classes of market benefits are not likely to be material;	5
	(iv) the estimated construction timetable and commissioning date; and	4.1
	(v) to the extent practicable, the total indicative capital and operating and maintenance costs.	4.1

Appendix C Load scenarios

Table C1: Load Scenario 1: Breakdown of MW projections by location

	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA	TOTAL
10/11	45	29	16	89
11/12	47	29	16	92
12/13	48	31	16	96
13/14	50	37	16	104
14/15	53	41	17	110
15/16	55	41	17	113
16/17	57	42	17	116
17/18	59	42	17	119
18/19	62	42	18	122
19/20	64	43	18	125
20/21	67	43	18	128
21/22	70	44	19	132
22/23	73	44	19	135
23/24	76	44	19	139
24/25	79	45	19	143
25/26	82	45	20	147
26/27	85	46	20	151
27/28	89	46	20	155
28/29	92	47	21	159
29/30	96	47	21	164
30/31	100	48	21	169

Table C2: Load Scenario 2: Breakdown of MW projections by location

	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA	TOTAL
10/11	45	29	16	90
11/12	48	29	16	93
12/13	50	31	16	97
13/14	52.4	37	16	106
14/15	55.0	46	17	118
15/16	127.7	71	17	216
16/17	130.6	72	17	219
17/18	134	72	17	223
18/19	137	72	18	227
19/20	140	73	18	231
20/21	143	73	18	235
21/22	147	74	19	239
22/23	151	74	19	244
23/24	155	74	19	248
24/25	159	75	19	253
25/26	164	75	20	258
26/27	168	76	20	264
27/28	173	76	20	269
28/29	178	77	21	275
29/30	183	77	21	281
30/31	189	78	21	288

Table C3: Load Scenario 3: Breakdown of MW projections by location

	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA	TOTAL
10/11	45	29	16	90
11/12	48	29	16	93
12/13	50	31	16	97
13/14	52.4	37	16	106
14/15	55.0	46	17	118
15/16	127.7	96	252	476
16/17	130.6	217	252	599
17/18	134	217	252	603
18/19	137	217	253	607
19/20	140	218	253	611
20/21	143	218	253	615
21/22	147	219	254	619
22/23	151	219	254	624
23/24	155	219	254	628
24/25	159	220	254	633
25/26	164	220	255	638
26/27	168	221	255	644
27/28	173	221	255	649
28/29	178	222	256	655
29/30	183	222	256	661
30/31	189	223	256	668

Table C4: Load Scenario 4: Breakdown of MW projections by location

	PORT LINCOLN AREA	YADNARIE AREA	WUDINNA AREA	TOTAL
10/11	45	29	16	90
11/12	48	29	16	93
12/13	50	31	16	97
13/14	52.4	37	16	106
14/15	55.0	46	17	118
15/16	127.7	96	252	476
16/17	135.6	242	252	629
17/18	144	248	257	649
18/19	147	248	258	653
19/20	155	249	258	662
20/21	158	249	258	666
21/22	162	250	259	670
22/23	166	250	259	675
23/24	170	250	259	679
24/25	174	251	259	684
25/26	179	251	260	689
26/27	183	252	260	695
27/28	188	252	260	700
28/29	193	253	261	706
29/30	198	253	261	712
30/31	204	254	261	719