29 March 2017

Mr Peter Adams
General Manager Wholesale Markets Branch
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

Dear Peter

Information Request – Kangaroo Island RIT-D FPAR

I refer to your letter dated 15 March 2017 to Sean Kelly seeking further information relating to the Kangaroo Island submarine cable RIT-D Final Project Assessment Report (**FPAR**). A summary of the three matters requested in the letter are:

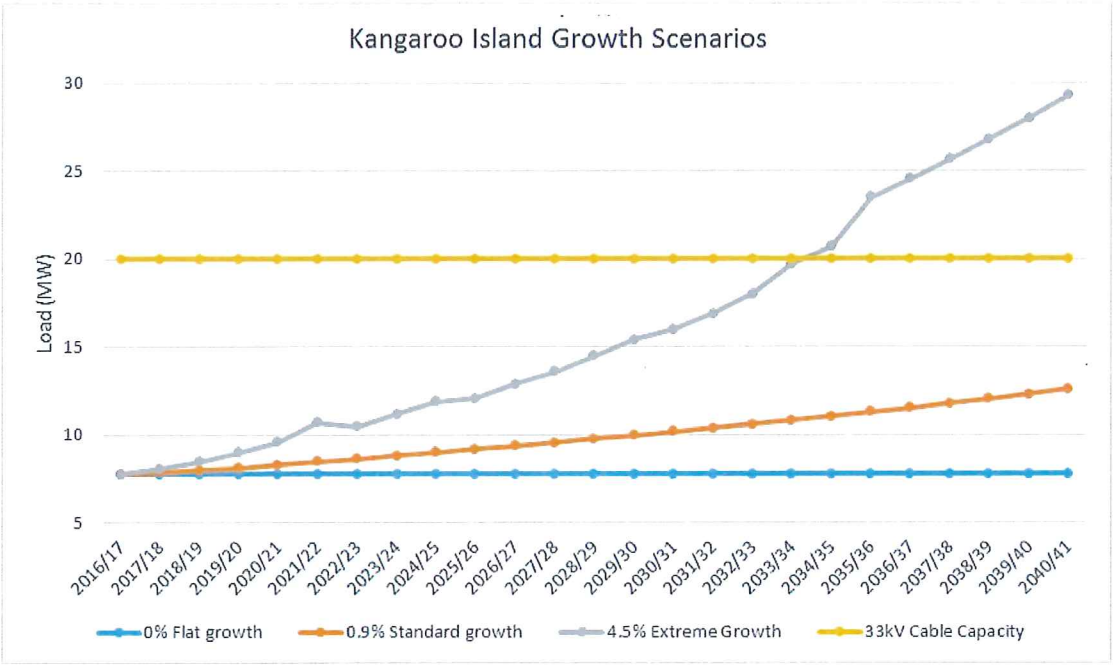
1. An assessment of the net market benefits of Options 1 and 8 using the 'default' settings for the various RIT-D parameters under a growth scenario (in the order of 5%) which would, unless addressed, exceed the capacity of the 33kV submarine cable (ie Option 1);
2. An indication of the extent of additional growth above the standard growth scenario (ie 0.9%) assessed in the disputed RIT-D assessment that may result from the Kangaroo Island (**KI**) Golf Course, American River Resort and other potential developments listed in the KI Economic Outlook; and
3. Information on demand growth due to SA Water deploying additional mobile desalination plants in the event of a drought on KI.

The following responses are provided to these three matters.

1. High Growth Rate Scenario

SA Power Networks used its RIT-D analysis model to compare the relative market benefits of Option 1 (install new 33kV submarine cable in 2018) and Option 8 (install new 66kV cable in 2018) assuming an extreme growth scenario (ie 4.5% demand growth per annum uniform across Kangaroo Island). In this analysis, SA Power Networks has used the 'default' settings for the various RIT-D parameters (e.g. standard unit costing methodology excluding corporate business overheads and contingencies to estimate the capital costs of both options based on a 25-year evaluation period). Figure 1 below represents the different growth scenarios (flat 0%, standard 0.9% and extreme 4.5%).

Figure 1 - Kangaroo Island peak demand growth - different growth rate scenarios



Based on the 4.5% growth rate, the submarine cable is forecast to exceed its 33kV 20MVA limit in 2034/35 (year 19 of the evaluation period). Therefore, work will be required in 2034 to avoid overloading the cable.

Both Option 1 and Option 8 have the same augmentations and capital expenditure, prior to 2034/35 (noting in addition that there is a higher cost for supplying and installing a 66kV submarine cable compared to a 33kV submarine cable). The augmentations include substation upgrades to support load growth, new 33kV voltage regulators at Penneshaw and American River and overhead powerlines thermal capacity upgrades of most 33kV lines between Cape Jervis and Kingscote. These augmentations have been estimated to cost $12.8 million and would occur between 2017 to 2031 as detailed in the Table 1 below.

Table 1 - Network augmentations prior to 2034/35 for both Options 1 and 8 excluding cable project cost.

Year	Description	Approximate Cost ($'000's)
2017	American River to MacGillivray 33kV line uprate	400
2022	New 20MVA 33kV Regulator station at Penneshaw MacGillivray Substation Upgrade	2,300
2024	New 3MVAr cap bank at Kingscote Tee Cuttlefish Bay to Penneshaw 33kV line uprate	1,300
2026	Cape Jervis to Fishery Beach 33kV line uprate New 20MVA 33kV voltage regulator at American River	2,100

Year	Description		Approximate Cost ($'000's)
2027	Kingscote Substation Upgrade		3,600
2030	New 4MVAr cap bank at Kingscote Substation		850
2031	Penneshaw to American River 33kV line uprate		2,200
		Total	12,750

Under Option 1, demand management will be used to limit the peak demand of KI to the capacity of the submarine cable. This has been modelled by operating the existing Kingscote Generators at peak demand times to ensure that the peak demand does not exceed the cable's capacity from 2034/35 onwards. It is estimated that the Kingscote Generators would be required to operate up to 2 MW for 5 hours in 2035 (ie one of the four generating machines) and up to 6 MW for 37 hours in 2041 (three of the four generating machines) under this extreme growth rate. Generation operating costs have been estimated at a total of $62,000 for the evaluation period based on a system support rate of $600 per MWh.

Under Option 8, the KI submarine cable would be energised at 66kV in 2034 (prior to this it would be operated at 33kV) in conjunction with a new 66kV powerline backbone from Cape Jervis to American River. To energise the cable at 66kV also requires an upgrade of the 66kV infrastructure at Cape Jervis Substation, new 66kV overhead powerlines from Cape Jervis to Fishery Beach and Cuttlefish Bay to American River, upgrade of the submarine cable's two termination stations to 66kV and modifications to the American River substation including installation of a new 66/33kV transformer and other associated substation works in 2034. Further upgrades are required in 2037, consisting of a new greater capacity 33kV overhead powerline from American River to Kingscote. These augmentations have been estimated to cost a total of $27.7 million.

The table below represents the augmentation required for Option 1 and 8 respectively.

Table 2 - Augmentation/demand management for Option 1 beyond 2034

Year	Augmentation/ Demand Management for Option 1		Approximate Cost ($'000's)
2035 - 2040	Demand Management solution by operating Kingscote generators (peak lopping solution)		62
2035	Penneshaw Substation Upgrade		600
2041	New 6MVAr capacitor bank at Penneshaw		850
		Total	1,512

Table 3 - Network augmentation for Option 8 beyond 2034

Year	Network Augmentation for Option 8	Approximate Cost ($'000's)
2034	New 66kV Cape Jervis to American River line (excluding cable) Cape Jervis 66kV Substation Upgrade American River Substation upgrade for 66/33kV connection American River to Kingscote tee 33kV line upgrade Fishery Beach and Cuttlefish Bay Termination Station Modification	21,700
2035	Penneshaw Substation Upgrade	600
2036	New American River to Kingscote 33kV line Kingscote 33kV Switchyard Upgrade	5,400
	Total	27,700

The table below compares the results of the Net Present Value (**NPV**) analysis of both options:

Table 4 - Net Present Value (NPV) of option 1 and option 8

Result ($'000's)	Total Cost	Relative Cost compared to Option 8	Relative Market Benefit compared to Option 8	Net Market Benefit	Rank
Option 1 (33kV Cable)	$31,738	-$6,461	-$1,785	$4,677	1
Option 8 (66kV Cable)	$38,199	$0	$0	$0	2

For Option 1, an estimated capital cost of $39.6 million would be spent over the 25-year evaluation period which equates to $31.7 million in NPV terms. In comparison, Option 8 would require estimated expenditure of $67.7 million which equates to $38.2 million in NPV terms. This represents a cost saving of $6.5 million in NPV terms based on summation of direct costs for Option 1. Note that at the end of the 25-year evaluation period, the assets will have a residual value as they have remaining lives. The small difference in NPV terms compared to total cost results from adding back the NPV of the residual value of the assets at the end of the evaluation period. The NPV of the remaining assets is $16.5 million for Option 1 and $39.5 million for Option 8.

The "Relative Market Benefit" loss of $1.785 million (Option 1) is due to increased network losses that result from operating the network at 33kV (Option 1) instead of 66kV (Option 8).

The "Net Market Benefit" is calculated in NPV terms by deducting the "Relative Cost" from the "Relative Market Benefit". The analysis has demonstrated that even under the extreme growth rate scenario, the preferred option is still to install a new 33kV submarine cable from Fishery Beach to

Cuttlefish Bay in 2018 (ie Option 1), as it results in a higher net market benefit of $4.677 million when compared to Option 8 (ie install a 66kV submarine cable).

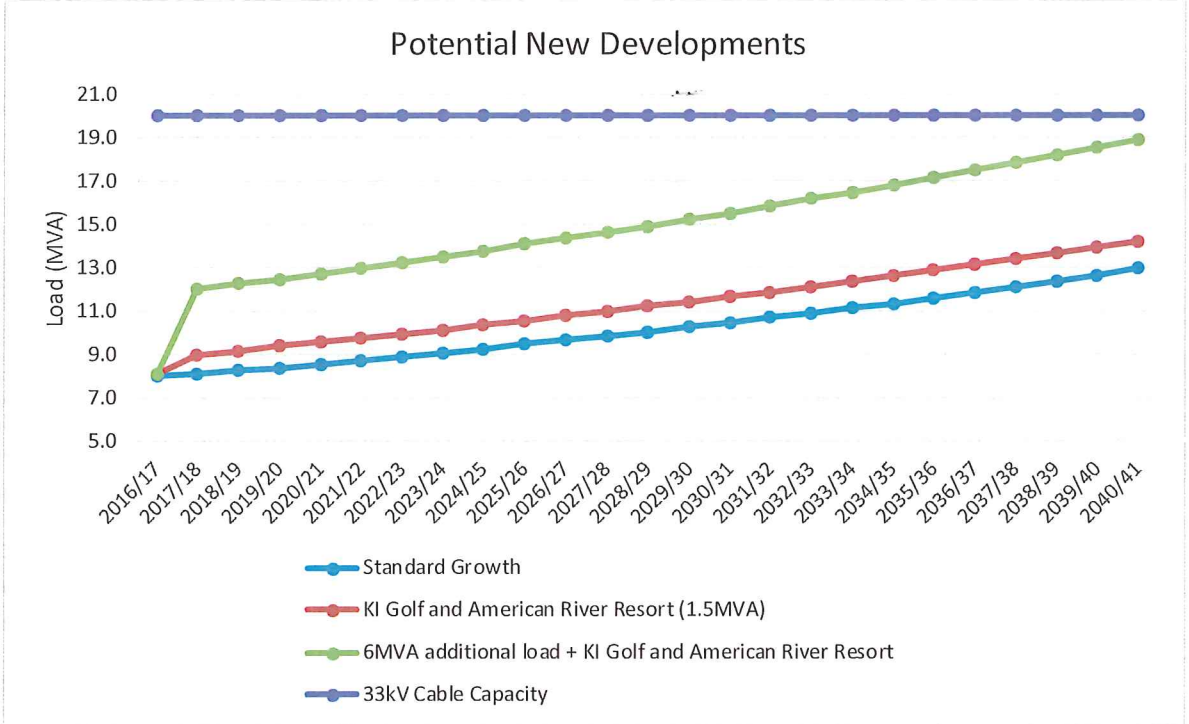
2. Indication of New Developments

The standard growth scenario (0.9% pa) provides 7 MVA of head room (ie spare capacity) in the 20 MVA capacity of the proposed 33kV submarine cable at the end of the 25-year evaluation period. This compares to the current maximum demand on the Island of 8 MVA and the average demand of 3.5 MVA. SA Power Networks' demand growth forecast only incorporates committed spot loads, as per our standard practice (refer to Distribution Annual Planning Report (DAPR)). The standard growth rate of approximately 0.9% per year is expected to accommodate the overall development requirements for KI.

The AER requested that SA Power Networks provide an assessment of the impact on the standard growth rate, if the Kangaroo Island Golf course and the American River Resort were to proceed. SA Power Networks considers, based on similar type developments, that the maximum demand at the developments would not exceed 1.5 MVA. Based on our knowledge of these types of developments and incorporating diversity between these and other loads at a substation level, sub-transmission losses and adjustments due to the presence of any embedded generation (including Photovoltaics – PV), the additional spot load is expected to increase the peak demand on the submarine cable by 0.75 MVA (ie 50% of the load at the developments). On the assumption that this additional load is connected immediately (ie by the end of 2017), and that all loads including these developments grow at a rate of 0.9% pa then the peak demand in 2040/41 would be approximately 14.2 MVA compared with 13 MVA based on standard growth rate of 0.9%. This still provides around 6 MVA of spare capacity in the cable for additional developments/spot loads on KI.

Assuming that an additional 6 MVA of load is connected by the end of 2017/18 (worst case scenario), the total diversified peak demand on the submarine cable would be expected to reach 18.9 MVA in 2040/41 (including the standard growth rate), still within the 20 MVA capacity of the 33kV cable. Please note that SA Power Networks expects the total requested load of potential development projects as described in the Kangaroo Island Economic Development Outlook to be significantly less than 6 MVA.

Figure 2 - Kangaroo Island Potential New Developments and peak demand growth



In conclusion, the proposed 20 MVA 33kV submarine cable provides sufficient capacity to cater for all committed load increases highlighted in the submissions from the KI Council and the KI Commissioner. The 7 MVA headroom in the capacity of the submarine cable under the 0.9% standard growth rate (which is higher than the state peak demand forecast, which is flat (ie 0%)), allows for substantial uncommitted and unforeseen customer spot load increases that may occur in the future.

3. SA Water Demand

Based on discussions with SA Water, they have advised that there are currently no plans for a new desalination plant(s) on Kangaroo Island.

According to the KI Water Demand and Supply Statement[1] published in November 2015, there are no issues with water supply from the current system until at least 2050, which is well beyond the 25 year RIT-D evaluation period. The current 100 ML per annum desalination plant at Penneshaw has a maximum demand of 80kVA.

If we ignore that the KI Water Demand and Supply Statement is forecasting no shortage in existing potable water supply until 2050 and assume an extreme scenario where there will be a doubling of the existing demand for potable water of 700 ML, then this would require the installation of

[1] The KI Water Demand and Supply Statement was developed by the Department of Environment, Water and Natural Resources (DEWNR) with the assistance of the Water Resources Task Force, an advisory committee to the Kangaroo Island Natural Resources Management (NRM) Board. Chaired by the KI NRM Board Presiding Member the Task Force includes representatives from the KI NRM Board, KI Council, AgKI, Eco-Action KI, SA Water and SA Environment Protection Authority http://www.naturalresources.sa.gov.au/kangarooisland/land-and-water/water-management/ki-demand-and-supply-statement

desalination plants with a total potable water capacity output of around 500 ML annually[2]. SA Power Networks estimates that to produce 500ML of potable water would require additional desalination plants with a peak demand of less than 500kVA. This additional peak demand after diversity would equate to a 250kVA increase in demand on the submarine cable. This increase in demand could still be accommodated with the 20 MVA 33kV cable, even with the inclusion of the additional 6 MVA of spot load discussed under section 2 above.

If you have any further queries, please contact Mr Grant Cox telephone (08) 8404 5012 or email Grant.Cox@sapowernetworks.com.au.

Yours sincerely

Mr Doug Schmidt
General Manager Network Management

[2] Currently potable water sources exceed demand by 200 ML annually.