AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Independent planning review – ElectraNet capital expenditure proposal for 2023-28

December 2021

A report for AEMO's South Australian advisory functions

Important notice

PURPOSE

The purpose of this report is to provide a review of the capital expenditure components of ElectraNet's revenue proposal for the regulatory control period from 1 July 2023 to 30 June 2028. AEMO provides this review in accordance with its additional advisory functions under section 50B of the National Electricity Law.

This review has been prepared by AEMO using information available at 17 November 2021. Information made available after this date may have been included where practical.

DISCLAIMER

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VERSION CONTROL

Version	Release date	Changes
1.0	21/12/2021	Initial release.

Executive summary

This planning review provides an independent technical assessment of emerging transmission network investment requirements in South Australia over ElectraNet's upcoming regulatory period from 1 July 2023 to 30 June 2028.

In July 2021, ElectraNet published a preliminary revenue proposal for public consultation.[1] AEMO is conducting an independent review of ElectraNet's revenue proposal under its South Australian advisory functions, at the request of the South Australian Government.

AEMO's review is being completed in two stages:

- Stage 1. Independent assessment of ElectraNet's capital expenditure (capex) proposal for 2023-28, provided in this report, based on the public preliminary revenue proposal and subsequent information provided by ElectraNet.
- Stage 2. Independent assessment of ElectraNet's capex proposal for 2023-28, to be provided after the Australian Energy Regulator (AER) publishes an issues paper and before ElectraNet submits its revised revenue proposal to the AER in December 2022.

Key Insights

System security will remain a focus in South Australia as the energy mix transformation continues, and distributed PV and battery storage is forecast to keep growing. ElectraNet's capex proposal for 2023-28 reflects an appropriate focus on addressing the transmission network implications of these trends.

ElectraNet's largest capex proposals are included as contingent projects, and several refer to drivers to be considered as part of AEMO's Integrated System Plan. In this review, AEMO has paid particular attention to the wording for the triggers of the indicative contingent projects. AEMO anticipates that close joint planning between ElectraNet and AEMO will be important in the coming years as the needs for these projects are further examined.

ElectraNet notes in its preliminary revenue proposal that South Australia has one of the oldest transmission networks in the National Electricity Market. As such, a large proportion of the capex proposals are for refurbishment and replacement of existing assets.

AEMO's assessment

AEMO's Stage 1 review of ElectraNet's capex revenue proposal drew on existing AEMO analysis underway for delivery of the Draft 2022 Integrated System Plan, 2021 System Strength Report, 2021 Inertia Report and 2021 Network Support and Control Ancillary Services Report. AEMO's Stage 1 review considered:

- The need for each proposed project to meet the requirements set out in the South Australian Electricity Transmission Code (ETC) [2].
- Economic justification for individual projects, where the proposed expenditure is driven by increasing market benefit.
- Whether the South Australian transmission network is expected to meet the requirements set out in the ETC for the 2023-2028 regulatory period.

[1] ElectraNet *2024-2028 Preliminary Revenue Proposal*, at https://www.electranet.com.au/wp-content/uploads/2021/07/ElectraNet-Preliminary-Revenue-Proposal-2021-screen-version.pdf.

[2] ESCOSA, *Electricity Transmission Code*, at https://www.escosa.sa.gov.au/industry/electricity/codes-guidelines/codes.

AEMO's stage 1 review has determined:

- There is an ongoing need for the equipment considered in all eight of the refurbishment and replacement projects.[3]
- There is a need for four of the six future network projects – ElectraNet has advised AEMO that they will withdraw one project, and AEMO requires more information to advise on the remaining project.
- Three of the six contingent projects may become justified within the upcoming regulatory control period – ElectraNet has advised AEMO that they will withdraw the other three projects.

Table 1 summarises AEMO's assessments of ElectraNet's capex revenue proposal for 2023-2028, and full detail is provided in the body of this report.

Table 1 Summary of the projects addressed in the report

Category	Projects assessed	AEMO's assessment
Refurbishment and replacement projects	8	AEMO considers there is a need for these projects. These projects will maintain the South Australian transmission assets to an operational standard, and AEMO considers that market and network conditions will necessitate the continued use of these assets. This report does not provide advice on the condition of ElectraNet's assets or their refurbishment or replacement decisions. These projects were assessed on the premise that the relevant poor asset conditions need to be addressed in the next regulatory period as advised by ElectraNet.
Future network projects	6	AEMO considers there is a need for 4 of these projects. One of these projects was withdrawn during the period that this review was undertaken, and AEMO supports this withdrawal. One of these projects was added within the review period, and AEMO considers that more assessment time and information is required to provide a position.
Contingent projects	6	AEMO considers that 3 of the proposed projects should be considered as contingent projects. ElectraNet withdrew three projects from their initial list of 5 projects and an added an additional project during the AEMO review period. AEMO considers that these remaining projects may become justified within the next regulatory control period.

[3] This assessment did not include one of the nine projects, as it was outside of AEMO's review scope. This assessment considered the ongoing need for the assets, but did not consider the condition of existing assets or the driver for the replacement.

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1. Background

At the request of ElectraNet and the South Australian Government, AEMO is conducting this review of ElectraNet's preliminary revenue proposal[4] for the period 1 July 2023 to 30 June 2028. This section provides the context for this review before noting the review scope and exclusions.

1.1 Context for this review

AEMO's review is being completed in two stages:

- Stage 1. Independent assessment of ElectraNet's capital expenditure (capex) proposal for 2023-28, provided in this report, based on the public preliminary revenue proposal and subsequent information provided by ElectraNet.
- Stage 2. Independent assessment of ElectraNet's capex proposal for 2023-28, to be provided after the Australian Energy Regulator (AER) publishes an issues paper and before ElectraNet submits its revised revenue proposal to the AER in December 2022.

1.2 Scope

In July 2021, ElectraNet published a preliminary revenue proposal for public consultation. AEMO is conducting an independent review of ElectraNet's revenue proposal under its South Australian advisory functions, at the request of the South Australian Government. In this Stage 1 review, AEMO assessed ElectraNet's proposal by considering:

- The need for each proposed project to meet the requirements set out in the South Australian Electricity Transmission Code (ETC) [5].
- Economic justification for individual projects, where the proposed expenditure is driven by increasing market benefit.
- Whether the South Australian transmission network is expected to meet the requirements set out in the ETC for the 2023-2028 regulatory period.

AEMO has also based its review on additional information provided by ElectraNet. AEMO also drew on its existing analysis underway for delivery of the Draft 2022 Integrated System Plan, 2021 System Strength Report, 2021 Inertia Report and 2021 Network Support and Control Ancillary Services Report. AEMO has not assessed ElectraNet's asset condition or ElectraNet's decision that the poor asset conditions need to be addressed in the next regulatory period.

The review of capex projects in ElectraNet's preliminary proposal including the following network investment categories:

- Replacement program
- Future network projects
- Contingent projects

[4] ElectraNet *2024-2028 Preliminary Revenue Proposal*, at https://www.electranet.com.au/wp-content/uploads/2021/07/ElectraNet-Preliminary-Revenue-Proposal-2021-screen-version.pdf

[5] ESCOSA, *Electricity Transmission Code*, at https://www.escosa.sa.gov.au/industry/electricity/codes-guidelines/codes

1.3 Exclusions

AEMO's independent review was limited to the network capex categories listed above, and did not assess:

- Operational expenditure and step change projects[6].
- Cost estimates for proposed network investment.
- The condition of existing assets or the driver for replacement.
- Secondary plant such as communications, instrumentation and protection.
- Any other aspects of the revenue proposal not associated with network projects.
- Network Capability Incentive Parameter Action Plan (NCIPAP) proposals, which will be considered by AEMO separately in accordance with the service target performance incentive scheme.

[6] Step change projects refer to new costs that are above ElectraNet's operating expenses. For more information see: ElectraNet *2024-2028 Preliminary Revenue Proposal*, at https://www.electranet.com.au/wp-content/uploads/2021/07/ElectraNet-Preliminary-Revenue-Proposal-2021-screen-version.pdf

2. Findings of AEMO's review

AEMO has applied the review scope and exclusions noted in Section 1 to assess ElectraNet's capital expenditure (capex) revenue proposal. This section provides AEMO's assessment, covering:

- Refurbishment and replacement projects, which ElectraNet has proposed to focus on "replacement of deteriorating high risk assets on South Australia's transmission network" (Section 2.1).
- Future network projects, proposed by ElectraNet to "maintain performance requirements and extend the capabilities of the network" in the context of ongoing system transformation pushing the network to its limits (Section 2.2).
- Contingent projects for significant network augmentation projects which may arise between 2023 and 2028 but which are not considered advanced or highly likely to be progressed within the period. (Section 2.3).

2.1 Refurbishment and replacement projects

ElectraNet notes that a large portion of the revenue proposal is made up of refurbishment and replacement projects to extend asset life and defer major investment. ElectraNet states that the South Australian transmission network is one of the oldest transmission networks in the National Electricity Market (NEM) and notes that "over 40 per cent of transmission towers, 30 per cent of conductors and 20 per cent of transformers are beyond their standard asset life"[7].

It is important to note that

- AEMO did not assess asset condition. Based on ElectraNet's advice, AEMO assumed that the poor condition assets noted in the project proposals need to be retired or replaced in the next regulatory period.
- AEMO assessed whether there would be an ETC breach if the poor condition assets were retired, that is where retiring the poor condition assets without reinvestment would result in an ETC breach.
- AEMO did not assess the potential option to defer the reinvestment beyond the next regulatory period based on asset condition.

Table 2 provides AEMO's assessment of 8 of the 9 refurbishment and replacement projects by considering whether there is an ongoing need for the assets due to projected electricity demand over the period 1 July 2023 to 30 June 2028. The Brinkworth-Waterloo Bearer Replacement Project was excluded because it relates to communications assets which are outside of AEMO's review scope.

[7] ElectraNet *2024-2028 Preliminary Revenue Proposal*, at https://www.electranet.com.au/wp-content/uploads/2021/07/ElectraNet-Preliminary-Revenue-Proposal-2021-screen-version.pdf.

Table 2 AEMO assessment of refurbishment and replacement projects

Proposed project	Details[8]	AEMO assessment
Line Insulation System Refurbishment	The transmission lines which need insulator replacement to extend transmission line life: • New Osborne - Lefevre No 1 275 kV line • Lefevre - New Osborne No 2 275 kV line • Mt Barker-Murray Bridge Hahndorf PS3 132 kV line • Snuggery – Blanche 132 kV line • Blanche - Mount Gambier 132 kV line • Cultana - Stony Point 132 kV line • Mobilong-Murray Bridge Hahndorf PS1 132 kV line • Ardrossan West-Dalrymple 132 kV line • Murray Bridge Hahndorf PS3-Murray Bridge Hahndorf PS2 132 kV line • Murray Bridge Hahndorf PS2-Mobilong 132 kV line • Para - Angas Creek 132 kV line • Cultana - Whyalla Central No 2 132 kV line • Cherry Gardens-Morphett Vale East 275 kV line • Happy Valley - Morphett Vale East 275 kV line.	There is an ongoing need for these transmission lines. AEMO agrees these transmission assets need to be maintained in an operational condition, to meet projected demand on the network and meet ETC and NER requirements.
Line Conductor Systems Refurbishment	The transmission lines which need conductor replacement: • Hummocks - Ardrossan West 132 kV line • Waterloo – Waterloo East 132 kV line • Waterloo East - Morgan Whyalla PS4 132 kV line • Morgan Whyalla PS4 – Robertstown 132 kV line • Robertstown – Morgan Whyalla PS3 132 kV line • Morgan Whyalla PS3 – Morgan Whyalla PS2 132 kV line • Morgan Whyalla PS2 – Morgan Whyalla PS1 132 kV line • Morgan Whyalla PS1 – North West Bend 132 kV line.	There is an ongoing need for these transmission lines. AEMO agrees these transmission network assets need to be maintained in an operational condition to meet projected demand on the network and meet ETC and NER requirements.
Isolator Unit Asset Replacement	The substations where isolators require replacement: • Para • Happy Valley • TIPS-A • Magill • South East • LeFevre • Snuggery • Penola West • Port Lincoln Terminal • Yadnarie • Dry Creek • Hummocks.	There is an ongoing need for these substations. AEMO agrees these transmission network assets need to be maintained in an operational condition to meet projected demand on the network and meet ETC and NER requirements.
Circuit Breakers Unit Asset Replacement	The substations where circuit breakers require replacement: • Para • Robertstown • Magill • Davenport • Parafield Gardens West • Mintaro • Port Lincoln Terminal • Mobilong • Yadnarie • Stony Point • Hummocks • North West Bend • Pimba.	There is an ongoing need for these substations. AEMO agrees these transmission network assets need to be maintained in an operational condition to meet projected demand on the network and meet ETC and NER requirements.

[8] ElectraNet provided AEMO with the specific transmission lines and substations linked to each proposed project in September 2021.

Proposed project	Details[8]	AEMO assessment
Substation Strung-Bus Insulation Replacement	The substations where porcelain insulators require replacing with glass systems: • Tailem Bend • Morphett Vale East • Para • Happy Valley • Brinkworth • Torrens Island B • Torrens Island A • Magill • South East • Snuggery • Keith • Mobilong • Mount Barker • Yadnarie • Kanmantoo • Murray Bridge / Hahndorf No.1 • Murray Bridge / Hahndorf No.2 • Murray Bridge / Hahndorf No.3 • Kincraig • Baroota • Mount Gambier • Blanche • Stony Point • Hummocks • Angas Creek • Leigh Creek South • Mount Gunson • Dry Creek	There is an ongoing need for these substations. AEMO agrees these transmission assets need to be maintained in an operational condition to meet projected demand on the network and meet ETC and NER requirements.
Instrument Transformer Unit Asset Replacement	The substations which require replacement of deteriorating units: • Tailem Bend • Para • Happy Valley • Robertstown • Kilburn • Davenport • South East • Cultana • Port Lincoln Terminal • Yadnarie • Mount Gambier • Hummocks • North West Bend • Angas Creek	There is an ongoing need for these substations. AEMO agrees these transmission assets need to be maintained in an operational condition to meet projected demand on the network and meet ETC and NER requirements.
AC Board Unit Asset Replacement	The substations which require replacement of superseded switchboards: • Mount Gambier • Leigh Creek South • Mobilong • Kingcraig • Blanche • East Terrace • Lefevre • Penola West • Monash • Kilburn • Robertstown	There is an ongoing need for these substations. AEMO agrees with the proposal to maintain the substation auxiliary supply system at these substations in an operational condition to meet projected demand on the network and meet ETC and NER requirements.

Proposed project	Details[8]	AEMO assessment
	• Hummocks • Pelican Point • Parafield Gardens West • Dalrymple • Middleback • Dorrien • New Osborne	
Protection Systems Unit Asset Replacement	The substations which require replacement of protection systems: • South East • Whyalla Terminal • Snuggery • Port Lincoln Terminal • New Osborne • Morphett Vale • Happy Valley • Kilburn • Parafield Gardens West • Tailem Bend • Mount Barker • Angas Creek • North West Bend • Berri • Hummocks • Brinkworth • Pimba • Davenport	There is an ongoing need for these substations. AEMO agrees with ElectraNet to maintain the protection system at these substations in an operational condition to meet projected demand on the network and meet ETC and NER requirements.

2.2 Future network projects

ElectraNet states that its future network projects relate to investments to "maintain performance requirements and extend network capabilities" while considering new and emerging technology. These are proposed in the context of the changing power system pushing the transmission network to its limits.

In this section, AEMO provides assessment of the four future network projects which ElectraNet has proposed to include in its revenue proposal for submission to the AER. Some commentary is also provided on a fifth project which ElectraNet has advised will be withdrawn from the proposal, and on a newly-added sixth project although further information is required before a full assessment can be provided.

Transmission network voltage control (Previously Maintain dynamic reactive capacity)

Project name	**EC.11645 – Transmission network voltage control**
Project description **[As provided by ElectraNet, in their public proposal and in subsequent information.]**	ElectraNet has proposed additional reactors to address voltage control and power quality issues arising from falling minimum demand and solar PV growth. ElectraNet updated the scope of works during the review period. The proposal is for 4x60 MVAr and 1x50MVAr shunt reactors to maintain dynamic reactive reserves in the existing dynamic reactive plant. These would comprise: • Happy Valley 60 MVAr • Munno Para 60 MVAr • Cherry Gardens 2x60 MVAr • South East 50 MVAr The project will also include upgrade of reactive plant control schemes and the automation of OLTCs at 32 connection points.
AEMO assessment	With a falling minimum South Australian demand forecast, AEMO expects voltage control in South Australia to become more challenging and for existing dynamic reactive plant to reach the limits of their ability to control voltage fluctuations and support power system stability. On 17 December 2021, AEMO published the 2021 NSCAS review of system security and reliability for each region in the NEM[9]. This review shows that post-contingent voltages in South Australia are forecast to exceed allowable limits towards the end of the five-year planning horizon. At this stage, AEMO supports ElectraNet's proposal and agrees that additional reactors will be required in South Australia to maintain adequate capability on dynamic reactive plant to manage voltage control and power system stability, whilst avoiding high voltage violations during periods of low demand. ElectraNet advised their studies indicate the need to maintain headroom on dynamic voltage control devices to ensure adequate reactive power reserves. AEMO's stage 2 review will ensure prudent steady state and dynamic voltage control is available within South Australia and to ensure sufficient reactive margins for credible and non-credible events as guided by the NER.

[9] AEMO. *2021 System Security Reports: System Strength, Inertia and NSCAS*. December 2021. Available via https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/planning-for-operability.

Power quality monitoring installation (Previously Harmonic filter banks)

	EC.15297 – Power quality monitoring installation
Project description **[As provided by ElectraNet, in their public proposal and in subsequent information.]**	ElectraNet is proposing to install additional power quality meters and power quality sensors to obtain improved power quality measurements. Power quality software and servers are required to support the development of power quality models. This will allow for improved assessment on the location and nature of observed harmonic distortions. During the review period ElectraNet provided an update to scope of works. ElectraNet has noted that: • Power quality performance is an aggregated outcome (collective of multiple customers) and in some cases cannot be attributed to a single source. • The changing nature of the power system (i.e. load and generation mix, system performance characteristics and attributes such as reduced fault levels and high speed switching power electronics) has impacted overall power quality performance. • ElectraNet is required under the NER to assess harmonics distortion using power quality monitors that meet the accuracy requirements in IEC61000-4-30 and IEC61000-4-7. • Analysis and review of data derived from improved measurements will confirm the severity and location of harmonic distortions. This project proposes to: • Retrofit capacitive voltage transformers used for power quality measurement with harmonic compensation in the form of power quality sensors and where required new power quality meters to ensure accurate harmonic distortion measurement of the complete harmonic spectrum. • Upgrades to measurement power quality software and servers to support the above noted additional power quality sensors and new power quality meters.
AEMO assessment	In its preliminary revenue proposal, ElectraNet proposed the Harmonic filter banks project as part of its Future Projects section. After further assessment, ElectraNet has split this into two separate projects. The first being the power quality monitoring installation project and the second being the contingent project called network power quality remediation. ElectraNet is responsible for investigating and managing power quality within the limits specified in the NER at its substations. AEMO notes ElectraNet's current work on investigating this and its revised project proposals to address harmonic distortions. If the current work confirms the root cause of harmonic distortions is due to issues relating to ElectraNet's transmission network service provider (TNSP) role, the proposed projects will likely address these issues. In this circumstance, AEMO would be supportive of projects allowing ElectraNet to address power quality issues and fulfil its NER responsibilities. AEMO has also reviewed the Network power quality remediation project as a contingent project and AEMO's assessment is in the relevant section below.

Local high voltage management project

On 6 September 2021, ElectraNet advised AEMO that the Local high voltage management project included in the public preliminary revenue proposal will not be pursued. This is because:

- After joint planning analysis with SA Power Networks, ElectraNet has noted that although the distribution network may experience some local voltage management issues later in the decade, these would fall outside of the next regulatory period.
- AEMO's 2021 Network Support and Control Ancillary Service (NSCAS) analysis indicates that no additional reactive power support will be needed outside of the need for transmission network voltage control, which is already covered in the project in Section 2.2 above.

AEMO agrees with ElectraNet that this project is unlikely to be required over the 2023-2028 planning period. This is contingent on the "Transmission network voltage control" project noted above being included.

Wide area monitoring scheme project detail

Project name	Wide area monitoring scheme
Project description **[As provided by ElectraNet, in their public proposal and in subsequent information.]**	ElectraNet is proposing to implement a wide area monitoring scheme (WAMS) to improve "operational situational awareness and provide data to improve dynamic system modelling through increased monitoring capability on the power system". This includes installation of phasor measurement units likely to be required by AEMO at candidate sites. ElectraNet and AEMO have jointly identified a number of substations in the South Australian transmission network and AEMO has issued a draft notice to request the installation and upgrade remote monitoring devices to fulfil AEMO's system security and market obligations. The candidate sites are noted below. • Upgrade, modify or replace monitoring equipment at: South East; Para; Tailem Bend; Robertstown; Davenport. • Install remote monitoring equipment at: Cultana; Blyth West; Monash; Port Lincoln; Hummocks; Brinkworth; Wattle Point; Torrens Island A; Torrens Island B; Pelican Point; New Osborne; Kilburn; Parafield Gardens West; Magill; City West; Northfields; Munno Para; Morphett Vale East; Happy Valley; Lefevre; Mount Lock; Torrens Island North.
AEMO assessment	AEMO currently has limited real-time visibility of emerging power system stability phenomena, primarily related to low system strength, low system inertia and higher penetrations of inverter-based generation, which is making it increasingly challenging for AEMO to discharge its market and power system security functions. Existing SCADA systems are unable to detect and respond to these power system phenomena. Without any visibility the control room cannot determine power system security in real-time and would need to pre-emptively constrain inverter-based generation or direct on synchronous generation. Both actions can have serious market implications. As noted in AEMO's NEM Engineering Framework[10], AEMO and TNSPs are collaborating on accessing high speed time-synchronised monitoring devices throughout the NEM. AEMO has recently upgraded its WAMS in its control rooms. This upgrade provides enhanced visibility, analytics and alarming for quicker and more effective response to power system issues. AEMO has identified critical locations in the South Australian network at which high-speed streaming of power system data is required and on 15 October 2021 issued a draft notice to ElectraNet under clause 4.11.1(d) of the NER, proposing to require ElectraNet to install or reconfigure high speed monitoring devices as part of a WAMS to allow AEMO to discharge its market and power system security functions. AEMO is due to issue a formal request to ElectraNet to install the relevant devices. These critical locations have been included in ElectraNet's project proposal. AEMO supports ElectraNet's proposed approach for this project.

Energy management system functional enhancements

Project name	Energy management system functional enhancements
Project description **[As provided by ElectraNet in their public proposal.]**	ElectraNet is proposing this project as part of an "ongoing program of upgrading and enhancing its control room systems". ElectraNet notes that this is to: • enable efficiencies through improved switching arrangements, • integrate fault investigations and event reporting into network operation systems, and • better integrate data into asset management systems 'to enhance asset performance reporting and asset lifecycle decision-making'.
AEMO assessment	ElectraNet has the responsibility to maintain adequate functionality of its Energy Management System and AEMO supports this project proposal to allow ElectraNet to fulfil its responsibilities.

[10] AEMO, NEM Engineering Framework, March 2021 available at https://aemo.com.au/-/media/files/initiatives/engineering-framework/2021/nem-engineering-framework-march-2021-report.pdf?la=en&hash=3B1283D31B542115CC56E0ECCDFB3D69

Project name	Energy management system functional enhancements
	Operational and planning analysis are key functions for AEMO and TNSPs. AEMO's NEM Engineering Framework[11] notes the increase in data exchange, storage, and processing. Enhancements to tools such as EMS result in access to more effective data for AEMO and TNSPs to support their operational, planning and control room functions.

Robertstown to Metro corridor

Project name	EC.15424 - Robertstown to Metro corridor
Project description **[As provided by ElectraNet in their subsequent information]**	This project will acquire the land, easements and approvals around Para substation to enable construction of a new double circuit 275 KV line between Robertstown and Para. The early works are required to preserve the option to deliver the preferred path through the Para substation and allow timely delivery of the future network option between Mid North of South Australia and Adelaide load centres. This project has been identified in AEMO's 2020 Integrated System Plan as required in the early 2030s. This project is not identified in the Draft 2022 ISP in December 2021 and may be reviewed following consultation with ElectraNet for the final 2022 ISP in June 2022.
AEMO assessment	AEMO considers that more information is required before AEMO can comment on the proposed early works for the Robertstown to Metro corridor.

[11] AEMO, NEM Engineering Framework, March 2021 available at https://aemo.com.au/-/media/files/initiatives/engineering-framework/2021/nem-engineering-framework-march-2021-report.pdf?la=en&hash=3B1283D31B542115CC56E0ECCDFB3D69

2.3 Contingent projects

ElectraNet proposed five indicative contingent projects for significant augmentation projects in their revenue proposal. On 17 November, ElectraNet advised that three of these projects were no longer being included as contingent projects. These removed projects are:

- Upper south east network augmentation project
- Main grid system strength project
- Robertstown to Mid North transfer capacity increase

ElectraNet also advised that an additional contingent project has been added. With this information, AEMO has assessed the remaining three projects and supports them being included as contingent project proposals. The table below summarises the contingent projects and associated trigger events proposed by ElectraNet as well as AEMO's assessment outcomes.

Eyre Peninsula upgrade

Project name	Eyre Peninsula upgrade
Project description **[As provided by ElectraNet, in their public proposal.]**	ElectraNet notes this is to "upgrade the northern section of the Eyre Peninsula line from 132 kV to 275 kV to serve higher loads, which is accommodated in the design", and/or augment power transfer capacity between Davenport and Cultana.
Trigger events defined by ElectraNet **[As provided by ElectraNet, in their public proposal and in subsequent information.]**	ElectraNet's proposed triggers include "a load increase of 50 MW, most likely from mining operations, would require an upgrade in the capacity of the line". Also, the ISP may "identify a need for the upgrade if there is substantial renewable or hydrogen development in the region". Additionally, ElectraNet has provided more information on the triggers in their 2021 Transmission Annual Planning Report (TAPR), which AEMO has reviewed. All of these triggers must be met for the project to proceed. This additional information is provided below. 1. Customer commitment for additional load to connect to the transmission network causing the Cultana 275/132 kV transformers to exceed their thermal limit of 200 MW and/or causing a need for augmentation of power transfer capacity between Davenport and Cultana. 2. Successful completion of a RIT-T that includes an assessment of the credible options showing the upgrade of the 132 kV Eyre Peninsula Link to 275 kV and/or augmentation of power transfer capacity between Davenport and Cultana is the preferred option a) demonstrating positive net market benefits; and/or b) addressing a reliability corrective action. 3. ElectraNet board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Rules.
AEMO assessment	AEMO notes that ElectraNet is currently delivering a committed project (Eyre Peninsula Link) to replace the existing 132 kV lines between Cultana and Port Lincoln with new double circuit lines between Cultana and Yadnarie and between Yadnarie and Port Lincoln, with the northern part of those upgrades to include the option to be energised at 275 kV if required in the future. Following the completion of the Eyre Peninsula link, power transfer from 275 kV to 132 kV at Cultana substation will be limited by the 275/132 kV transformers. AEMO agrees the potential overload of Cultana 275/132 kV transformers needs to be addressed to accommodate future load growth in Eyre Peninsula area. An upgrade of the Northern section of Eyre Peninsula line is one option to meet this need. Other options include non-network options. AEMO's Draft 2022 ISP did not identify this upgrade as an actionable project. In its 2021 Transmission Cost Report[12], AEMO noted this upgrade as an option to accommodate an additional new 300 MW of renewable generation in the Eyre Peninsula REZ. Also, it stated that access to this additional generation is subject to network limitations between Davenport and Adelaide.

[12] AEMO. 2021 Transmission Cost Report. https://www.aemo.com.au/-/media/files/major-publications/isp/2021/transmission-cost-report.pdf?la=en

Interconnector upgrade (Previously Project EnergyConnect upgrade)

Project Name	EC.15206 - Interconnector upgrade
Project description **[As provided by ElectraNet, in their public proposal.]**	This project would allow for increase in inter-regional transfer capacity through such measures as frequency response capability.
Trigger events defined by ElectraNet **[As provided by ElectraNet, in their public proposal and in subsequent information.]**	ElectraNet notes that "sufficient renewable generation development would trigger the need for the upgrade based on expected market benefits from lower dispatch costs". ElectraNet has provided more information on the triggers which AEMO has reviewed. This is captured below. 1. Successful completion of a RIT-T with an identified need to increase inter-regional transfer capability between South Australia and adjoining regions a) demonstrating positive net market benefits; and/or b) addressing a reliability corrective action 2. ElectraNet board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Rules.
AEMO assessment	ElectraNet has proposed this project to enhance transfer capability of Project EnergyConnect (PEC). The planned transfer capability of PEC is expected to be available from June 2025. ElectraNet considers that this project is likely to demonstrate net market benefits in a future ISP. AEMO is not currently considering a project of this nature for the 2022 ISP, however it is possible that future ISPs could include the need for additional interconnector capability in South Australia. AEMO considers power transfer between SA and NSW needs to be monitored and reviewed in order to inform the case for an upgrade to PEC. AEMO supports the proposed triggers and supports the inclusion of this contingent project if it is to be progressed through a RIT-T by ElectraNet. If the project becomes an actionable ISP project, AEMO also considers that contingent project classification may not be required for an actionable ISP project – those projects may be covered separately under the new NER 5.16A.5.

Network power quality remediation

	EC.15572 - Network power quality remediation
Project description **[As provided by ElectraNet, in their public proposal.]**	This project proposes to install location specific solutions for the management of power quality non compliances with NER obligations on the transmission system as follows: 1. Harmonic filters to reduce voltage harmonic distortion a) 10 MVAr C-type (damped) filter in the Upper North region. Likely sites are Mt Gunson 132 kV or Pimba 132 kV substation b) 10 MVAr C-type (damped) filter at Monash 132 kV substation c) 60 MVAr C-type (damped) filter at South East 275 kV substation Each filter will require a reactor to offset reactive power contribution. 2. 20 MVAr STATCOM at Whyalla Terminal 33 kV to reduce the propagation of voltage flicker in the Eyre Peninsula region where currently six substations exceed both short- and long-term voltage flicker compliance limits with Whyalla having the greatest exceedance (6.1 and 4.7 times the planning limit for short term and long-term flicker respectively). The four locations noted above have power quality (harmonic distortion or flicker) emissions measurements that have potentially exceeded thresholds defined in the NER. The installation of improved measurement systems as part of Power quality monitoring installation project will confirm the initial measurements of these 4 locations where non-compliances were observed. Assessment from improved measurements from the new power quality meters and power quality sensors will confirm the severity of the breaches and the necessity to implement the recommendation above.
Trigger events defined by ElectraNet	1. Successful completion of a RIT-T including an assessment of credible options showing a transmission investment is justified to address voltage quality requirements on the South Australian transmission network

	EC.15572 - Network power quality remediation
[As provided by ElectraNet, in their public proposal and in subsequent information.]	2. ElectraNet board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Rules
AEMO assessment	In its preliminary revenue proposal, ElectraNet proposed the Harmonic filter banks project as part of its Future Projects section. After further assessment, ElectraNet has split this into two separate projects. The first being the Power quality monitoring installation project and the second being the contingent project called network power quality remediation. As noted above, ElectraNet is responsible for investigating and managing power quality within the limits specified in the NER at its substations. ElectraNet is currently investigating harmonic distortions and power quality issues. If the current work confirms the root cause of harmonic distortions is due to issues relating to ElectraNet's TNSP role, the proposed projects will likely address these. In this circumstance, AEMO would be supportive of projects allowing ElectraNet to address power quality issues and fulfil its NER responsibilities. AEMO has also reviewed the Network power quality monitoring project and AEMO's assessment is in the relevant section above.